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(71) Applicant: **AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE**

(72) Inventor:
KUFER, PETER C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
RAUM, TOBIAS C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
KISCHEL, ROMAN C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
LUTTERBÜSE, RALF C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
HOFFMANN, PATRICK C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
RAU, DORIS C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
MANGOLD, SUSANNE C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
KLINGER, MATTHIAS C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
SCHALLER, EVELYNE C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE
HAUSMANN, SUSANNE C/O AMGEN RESEARCH (MUNICH) GMBH STAFFELSEESTR. 2 81477 MUNICH GERMANY DE

(54) **Title:**
CROSS-SPECIES-SPECIFIC PSMAXCD3 BISPECIFIC SINGLE CHAIN ANTIBODY

(57) **Abstract:**
CROSS-SPECIES-SPECIFIC PSMAXCD3 BISPECIFIC SINGLE CHAIN ANTIBODY ABSTRACT The present invention relates to a bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3 epsilon chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ill NOs. 2, 4, 6, and 8, and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA). The invention also provides nucleic acids encoding said bispecific single chain antibody molecule as well as vectors and host cells and a process for its production. The invention further relates to pharmaceutical compositions

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comprising said bispecific single chain antibody molecule and medical uses of said bispecific single chain antibody molecule.
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CROSS-SPECIES-SPECIFIC PSMAXCD3 BISPECIFIC SINGLE CHAIN ANTIBODY

ABSTRACT

The present invention relates to a bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3 epsilon chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ill NOs. 2, 4, 6, and 8, and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA). The invention also provides nucleic acids encoding said bispecific single chain antibody molecule as well as vectors and host cells and a process for its production. The invention further relates to pharmaceutical compositions comprising said bispecific single chain antibody molecule and medical uses of said bispecific single chain antibody molecule.

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Cross-species-specific PSMAxCD3 bispecific single chain antibody

The present invention relates to a bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3 epsilon chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, and 8, and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA). The invention also provides nucleic acids encoding said bispecific single chain antibody molecule as well as vectors and host cells and a process for its production. The invention further relates to pharmaceutical compositions comprising said bispecific single chain antibody molecule and medical uses of said bispecific single chain antibody molecule.

T cell recognition is mediated by clonotypically distributed alpha beta and gamma delta T cell receptors (TcR) that interact with the peptide-loaded molecules of the peptide MHC (pMHC) (Davis & Bjorkman, Nature 334 (1988), 395-402). The antigen-specific chains of the TcR do not possess signalling domains but instead are coupled to the conserved multisubunit signaling apparatus CD3 (Call, Cell 111 (2002), 967-979, Alarcon, Immunol. Rev. 191 (2003), 38-46, Malissen Immunol. Rev. 191 (2003), 7-27). The mechanism by which TcR ligation is directly communicated to the signalling apparatus remains a fundamental question in T cell biology (Alarcon, loc. cit.; Davis, Cell 110 (2002), 285-287). It seems clear that sustained T cell responses involve coreceptor engagement, TcR oligomerization, and a higher order arrangement of TcR–pMHC complexes in the immunological synapse (Davis & van der Merwe, Curr. Biol. 11 (2001), R289-R291, Davis, Nat. Immunol. 4 (2003), 217-224). However very early TcR signalling occurs in the absence of these events and may involve a ligand-induced conformational change in CD3 epsilon (Alarcon, loc. cit., Davis (2002), loc. cit., Gil, J. Biol. Chem. 276 (2001), 11174-11179, Gil, Cell 109 (2002), 901-912). The epsilon, gamma, delta and zeta subunits of the signaling complex associate with each other to form a CD3 epsilon-gamma heterodimer, a CD3 epsilon-delta heterodimer, and a CD3 zeta-zeta homodimer (Call, loc. cit.).

Various studies have revealed that the CD3 molecules are important for the proper cell surface expression of the alpha beta TcR and normal T cell development (Berkhout, J. Biol. Chem. 263 (1988), 8528-8536, Wang, J. Exp. Med. 188 (1998), 1375-1380, Kappes, Curr. Opin. Immunol. 7 (1995), 441-447). The solution structure of the ectodomain fragments of the mouse CD3 epsilon gamma heterodimer showed that the epsilon gamma subunits are both C2-set Ig domains that interact with each other to form an unusual side-to-side dimer configuration (Sun, Cell 105 (2001), 913-923). Although the cysteine-rich stalk appears to play an important role in driving CD3 dimerization (Su, loc. cit., Borroto, J. Biol. Chem. 273 (1998), 12807-12816), interaction by means of the extracellular domains of CD3 epsilon and CD3 gamma is sufficient for assembly of these proteins with TcR beta (Manolios, Eur. J. Immunol. 24 (1994), 84-92, Manolios & Li, Immunol. Cell Biol. 73 (1995), 532-536). Although still controversial, the dominant stoichiometry of the TcR most likely comprises one alpha beta TcR, one CD3 epsilon gamma heterodimer, one CD3 epsilon delta heterodimer and one CD3 zeta zeta homodimer (Call, loc. cit.). Given the central role of the human CD3 epsilon gamma heterodimer in the immune response, the crystal structure of this complex bound to the therapeutic antibody OKT3 has recently been elucidated (Kjer-Nielsen, PNAS 101, (2004), 7675-7680).

A number of therapeutic strategies modulate T cell immunity by targeting TcR signaling, particularly the anti-human CD3 monoclonal antibodies (mAbs) that are widely used clinically in immunosuppressive regimes. The CD3-specific mouse mAb OKT3 was the first mAb licensed for use in humans (Sgro, Toxicology 105 (1995), 23-29) and is widely used clinically as an immunosuppressive agent in transplantation (Chatenoud, Clin. Transplant 7 (1993), 422-430, Chatenoud, Nat. Rev. Immunol. 3 (2003), 123-132, Kumar, Transplant. Proc. 30 (1998), 1351-1352), type 1 diabetes (Chatenoud (2003), loc. cit.), and psoriasis (Utset, J. Rheumatol. 29 (2002), 1907-1913). Moreover, anti-CD3 mAbs can induce partial T cell signalling and clonal anergy (Smith, J. Exp. Med. 185 (1997), 1413-1422). OKT3 has been described in the literature as a potent T cell mitogen (Van Wauve, J. Immunol. 124 (1980), 2708-18) as well as a potent T cell killer (Wong, Transplantation 50 (1990), 683-9). OKT3 exhibits both of these activities in a time-dependent fashion; following early activation of T cells leading to cytokine release, upon further administration OKT3 later blocks all known T cell functions. It is due to this later blocking of T cell

function that OKT3 has found such wide application as an immunosuppressant in therapy regimens for reduction or even abolition of allograft tissue rejection.

OKT3 reverses allograft tissue rejection most probably by blocking the function of all T cells, which play a major role in acute rejection. OKT3 reacts with and blocks the function of the CD3 complex in the membrane of human T cells, which is associated with the antigen recognition structure of T cells (TCR) and is essential for signal transduction. Which subunit of the TCR/CD3 is bound by OKT3 has been the subject of multiple studies. Though some evidence has pointed to a specificity of OKT3 for the epsilon-subunit of the TCR/CD3 complex (Tunnacliffe, Int. Immunol. 1 (1989), 546-50; Kjer-Nielsen, PNAS 101, (2004), 7675-7680). Further evidence has shown that OKT3 binding of the TCR/CD3 complex requires other subunits of this complex to be present (Salmeron, J. Immunol. 147 (1991), 3047-52).

Other well known antibodies specific for the CD3 molecule are listed in Tunnacliffe, Int. Immunol. 1 (1989), 546-50. As indicated above, such CD3 specific antibodies are able to induce various T cell responses such as lymphokine production (Von Wussow, J. Immunol. 127 (1981), 1197; Palacious, J. Immunol. 128 (1982), 337), proliferation (Van Wauve, J. Immunol. 124 (1980), 2708-18) and suppressor-T cell induction (Kunicka, in "Lymphocyte Typing II" 1 (1986), 223). That is, depending on the experimental conditions, CD3 specific monoclonal antibody can either inhibit or induce cytotoxicity (Leewenberg, J. Immunol. 134 (1985), 3770; Phillips, J. Immunol. 136 (1986) 1579; Platsoucas, Proc. Natl. Acad. Sci. USA 78 (1981), 4500; Itoh, Cell. Immunol. 108 (1987), 283-96; Mentzer, J. Immunol. 135 (1985), 34; Landegren, J. Exp. Med. 155 (1982), 1579; Choi (2001), Eur. J. Immunol. 31, 94-106; Xu (2000), Cell Immunol. 200, 16-26; Kimball (1995), Transpl. Immunol. 3, 212-221).

Although many of the CD3 antibodies described in the art have been reported to recognize the CD3 epsilon subunit of the CD3 complex, most of them bind in fact to conformational epitopes and, thus, only recognize CD3 epsilon in the native context of the TCR. Conformational epitopes are characterized by the presence of two or more discrete amino acid residues which are separated in the primary sequence, but come together on the surface of the molecule when the polypeptide folds into the native protein/antigen (Sela, (1969) Science 166, 1365 and Laver, (1990) Cell 61,

553-6). The conformational epitopes bound by CD3 epsilon antibodies described in the art may be separated in two groups. In the major group, said epitopes are being formed by two CD3 subunits, e.g. of the CD3 epsilon chain and the CD3 gamma or CD3 delta chain. For example, it has been found in several studies that the most widely used CD3 epsilon monoclonal antibodies OKT3, WT31, UCHT1, 7D6 and Leu-4 did not bind to cells singly transfected with the CD3-epsilon chain. However, these antibodies stained cells doubly transfected with a combination of CD3 epsilon plus either CD3 gamma or CD3 delta (Tunnacliffe, loc. cit.; Law, Int. Immunol. 14 (2002), 389-400; Salmeron, J. Immunol. 147 (1991), 3047-52; Coulie, Eur. J. Immunol. 21 (1991), 1703-9). In a second smaller group, the conformational epitope is being formed within the CD3 epsilon subunit itself. A member of this group is for instance mAb APA 1/1 which has been raised against denatured CD3 epsilon (Risueno, Blood 106 (2005), 601-8). Taken together, most of the CD3 epsilon antibodies described in the art recognize conformational epitopes located on two or more subunits of CD3. The discrete amino acid residues forming the three-dimensional structure of these epitopes may hereby be located either on the CD3 epsilon subunit itself or on the CD3 epsilon subunit and other CD3 subunits such as CD3 gamma or CD3 delta.

Another problem with respect to CD3 antibodies is that many CD3 antibodies have been found to be species-specific. Anti-CD3 monoclonal antibodies – as holds true generally for any other monoclonal antibodies - function by way of highly specific recognition of their target molecules. They recognize only a single site, or epitope, on their target CD3 molecule. For example, one of the most widely used and best characterized monoclonal antibodies specific for the CD3 complex is OKT-3. This antibody reacts with chimpanzee CD3 but not with the CD3 homolog of other primates, such as macaques, or with dog CD3 (Sandusky et al., J. Med. Primatol. 15 (1986), 441-451). Similarly, WO2005/118635 or WO2007/033230 describe human monoclonal CD3 epsilon antibodies which react with human CD3 epsilon but not with CD3 epsilon of mouse, rat, rabbit or non-chimpanzee primates such as rhesus monkey, cynomolgus monkey or baboon monkey. The anti-CD3 monoclonal antibody UCHT-1 is also reactive with CD3 from chimpanzee but not with CD3 from macaques (own data). On the other hand, there are also examples of monoclonal antibodies, which recognize macaque antigens, but not their human counterparts. One example

of this group is monoclonal antibody FN-18 directed to CD3 from macaques (Uda et al., J. Med. Primatol. 30 (2001), 141-147). Interestingly, it has been found that peripheral lymphocytes from about 12% of cynomolgus monkeys lacked reactivity with anti-rhesus monkey CD3 monoclonal antibody (FN-18) due to a polymorphism of the CD3 antigen in macaques. Uda et al. described a substitution of two amino acids in the CD3 sequence of cynomolgus monkeys, which are not reactive with FN-18 antibodies, as compared to CD3 derived from animals, which are reactive with FN-18 antibodies (Uda et al., J Med Primatol. 32 (2003), 105-10; Uda et al., J Med Primatol. 33 (2004), 34-7).

The discriminatory ability, i.e. the species specificity, inherent not only to CD3 monoclonal antibodies (and fragments thereof), but to monoclonal antibodies in general, is a significant impediment to their development as therapeutic agents for the treatment of human diseases. In order to obtain market approval any new candidate medication must pass through rigorous testing. This testing can be subdivided into preclinical and clinical phases: Whereas the latter – further subdivided into the generally known clinical phases I, II and III – is performed in human patients, the former is performed in animals. The aim of pre-clinical testing is to prove that the drug candidate has the desired activity and most importantly is safe. Only when the safety in animals and possible effectiveness of the drug candidate has been established in preclinical testing this drug candidate will be approved for clinical testing in humans by the respective regulatory authority. Drug candidates can be tested for safety in animals in the following three ways, (i) in a relevant species, i.e. a species where the drug candidates can recognize the ortholog antigens, (ii) in a transgenic animal containing the human antigens and (iii) by use of a surrogate for the drug candidate that can bind the ortholog antigens present in the animal. Limitations of transgenic animals are that this technology is typically limited to rodents. Between rodents and man there are significant differences in the physiology and the safety results cannot be easily extrapolated to humans. The limitations of a surrogate for the drug candidate are the different composition of matter compared to the actual drug candidate and often the animals used are rodents with the limitation as discussed above. Therefore, preclinical data generated in rodents are of limited predictive power with respect to the drug candidate. The approach of choice for safety testing is the use of a relevant species, preferably a lower primate. The

limitation now of monoclonal antibodies suitable for therapeutic intervention in man described in the art is that the relevant species are higher primates, in particular chimpanzees. Chimpanzees are considered as endangered species and due to their human-like nature, the use of such animals for drug safety testing has been banned in Europe and is highly restricted elsewhere. CD3 has also been successfully used as a target for bispecific single chain antibodies in order to redirect cytotoxic T cells to pathological cells, resulting in the depletion of the diseased cells from the respective organism (WO 99/54440; WO 04/106380). For example, Bargou et al. (Science 321 (2008):974-7) have recently reported on the clinical activity of a CD19xCD3 bispecific antibody construct called blinatumomab, which has the potential to engage all cytotoxic T cells in human patients for lysis of cancer cells. Doses as low as 0.005 milligrams per square meter per day in non-Hodgkin's lymphoma patients led to an elimination of target cells in blood. Partial and complete tumor regressions were first observed at a dose level of 0.015 milligrams, and all seven patients treated at a dose level of 0.06 milligrams experienced a tumor regression. Blinatumomab also led to clearance of tumor cells from bone marrow and liver. Though this study established clinical proof of concept for the therapeutic potency of the bispecific single chain antibody format in treating blood-cell derived cancer, there is still need for successful concepts for therapies of other cancer types.

In 2008, an estimated 186,320 men will be newly diagnosed with prostate cancer in the United States and about 28,660 men will die from the disease. The most recent report available on cancer mortality shows that, in 2004, the overall death rate from prostate cancer among American men was 25 per 100,000. In the late 1980s, the widespread adoption of the prostate-specific antigen (PSA) test represented a major improvement in the management of prostate cancer. This test measures the amount of PSA protein in the blood, which is often elevated in patients with prostate cancer. In 1986, the U.S. Food and Drug Administration approved the use of the PSA test to monitor patients with prostate cancer and, in 1994, additionally approved its use as a screening test for this disease. Due to the widespread implementation of PSA testing in the United States, approximately 90 percent of all prostate cancers are currently diagnosed at an early stage, and, consequently, men are surviving longer after diagnosis. However, the results of two ongoing clinical trials, the NCI-sponsored Prostate, Lung, Colorectal, and Ovarian (PLCO) screening trial and the European

Study of Screening for Prostate Cancer (ERSPC) will be needed to determine whether PSA screening actually saves lives. Ongoing clinical trials over the past 25 years have investigated the effectiveness of natural and synthetic compounds in the prevention of prostate cancer. For example, the Prostate Cancer Prevention Trial (PCPT), which enrolled nearly 19,000 healthy men, found that finasteride, a drug approved for the treatment of benign prostatic hyperplasia (BPH), which is a noncancerous enlargement of the prostate, reduced the risk of developing prostate cancer by 25 percent. Another trial, the Selenium and Vitamin E Cancer Prevention Trial (SELECT), is studying more than 35,000 men to determine whether daily supplements of selenium and vitamin E can reduce the incidence of prostate cancer in healthy men. Other prostate cancer prevention trials are currently evaluating the protective potential of multivitamins, vitamins C and D, soy, green tea, and lycopene, which is a natural compound found in tomatoes. One study, reported in 2005, showed that specific genes were fused in 60 to 80 percent of the prostate tumors analyzed. This study represents the first observation of non-random gene rearrangements in prostate cancer. This genetic alteration may eventually be used as a biomarker to aid in the diagnosis and, possibly, treatment of this disease. Other studies have shown that genetic variations in a specific region of chromosome 8 can increase a man's risk of developing prostate cancer. These genetic variations account for approximately 25 percent of the prostate cancers that occur in white men. They are the first validated genetic variants that increase the risk of developing prostate cancer and may help scientists better understand the genetic causes of this disease. There is also ongoing research that examines how proteins circulating in a patient's blood can be used to improve the diagnosis of prostate and other cancers. In 2005, scientists identified a group of specific proteins that are produced by a patient's immune system in response to prostate tumors. These proteins, a type of autoantibody, were able to detect the presence of prostate cancer cells in blood specimens with greater than 90 percent accuracy. When used in combination with PSA, these and other blood proteins may eventually be used to reduce the number of false-positive results obtained with PSA testing alone and, therefore, reduce the large number of unnecessary prostate biopsies that are performed each year due to false-positive PSA test results.

Apart from PSA, several other markers for prostate cancer have been identified, including e.g. the six-transmembrane epithelial antigen of the prostate (STEAP) (Hubert et al., PNAS 96 (1999), 14523-14528), the prostate stem cell antigen (PSCA) (Reiter et al., Proc. Nat. Acad. Sci. 95: 1735-1740, 1998) and the prostate-specific membrane antigen (PSMA; PSM) (Israeli et al., Cancer Res. 53 (1993). PSMA was originally defined by the monoclonal antibody (MAb) 7E11 derived from immunization with a partially purified membrane preparation from the lymph node prostatic adenocarcinoma (LNCaP) cell line (Horoszewicz et al., Anticancer Res. 7 (1987), 927-35). A 2.65-kb cDNA fragment encoding the PSMA protein was cloned and subsequently mapped to chromosome 11p11.2 (Israeli et al., loc. cit.; O'Keefe et al., Biochem. Biophys. Acta 1443 (1998), 113-127). Initial analysis of PSMA demonstrated widespread expression within the cells of the prostatic secretory epithelium. Immunohistochemical staining demonstrated that PSMA was absent to moderately expressed in hyperplastic and benign tissues, while malignant tissues stained with the greatest intensity (Horoszewicz et al., loc. cit.). Subsequent investigations have recapitulated these results and evinced PSMA expression as a universal feature in practically every prostatic tissue examined to date. These reports further demonstrate that expression of PSMA increases precipitously proportional to tumor aggressiveness (Burger et al., Int. J. Cancer 100 (2002), 228-237; Chang et al., Cancer Res. 59 (1999), 3192-98; Chang et al., Urology 57 (2001), 1179-83), Kawakami and Nakayama, Cancer Res. 57 (1997), 2321-24; Liu et al., Cancer Res. 57 (1997), 3629-34; Lopes et al., Cancer Res. 50 (1990), 6423-29; Silver et al., Clin. Cancer Res. 9 (2003), 6357-62; Sweat et al., Urology 52 (1998), 637-40; Troyer et al., Int. J. Cancer 62 (1995), 552-558; Wright et al., Urology 48 (1996), 326-334). Consistent with the correlation between PSMA expression and tumor stage, increased levels of PSMA are associated with androgen-independent prostate cancer (PCa). Analysis of tissue samples from patients with prostate cancer has demonstrated elevated PSMA levels after physical castration or androgen-deprivation therapy. Unlike expression of prostate specific antigen, which is downregulated after androgen ablation, PSMA expression is significantly increased in both primary and metastatic tumor specimens (Kawakami et al., Wright et al., loc. cit.). Consistent with the elevated expression in androgen-independent tumors, PSMA transcription is also known to be downregulated by steroids, and administration of testosterone mediates a dramatic reduction in PSMA protein and

mRNA levels (Israeli et al., Cancer Res. 54 (1994), 1807-11; Wright et al., loc. cit.). PSMA is also highly expressed in secondary prostatic tumors and occult metastatic disease. Immunohistochemical analysis has revealed relatively intense and homogeneous expression of PSMA within metastatic lesions localized to lymph nodes, bone, soft tissue, and lungs compared with benign prostatic tissues (Chang et al. (2001), loc. cit.; Murphy et al., Cancer 78 (1996), 809-818; Sweat et al., loc. cit.). Some reports have also indicated limited PSMA expression in extraprostatic tissues, including a subset of renal proximal tubules, some cells of the intestinal brush-border membrane, and rare cells in the colonic crypts (Chang et al. (1999), Horoszewicz et al., Israeli et al. (1994), Lopes et al., Troyer et al., loc. cit.). However, the levels of PSMA in these tissues are generally two to three orders of magnitude less than those observed in the prostate (Sokoloff et al., Prostate 43 (2000), 150-157). PSMA is also expressed in the tumor-associated neovasculature of most solid cancers examined yet is absent in the normal vascular endothelium (Chang et al. (1999), Liu et al., Silver et al., loc. cit.). Although the significance of PSMA expression within the vasculature is unknown, the specificity for tumor-associated endothelium makes PSMA a potential target for the treatment of many forms of malignancy.

Though there has been put much effort in identifying novel targets for therapeutic approaches for cancer, cancer is yet one of the most frequently diagnosed diseases. In light of this, there is still need for effective treatments for cancer.

The present invention provides for a bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε (epsilon) chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, and 8; and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA).

Though T cell-engaging bispecific single chain antibodies described in the art have great therapeutic potential for the treatment of malignant diseases, most of these bispecific molecules are limited in that they are species specific and recognize only human antigen, and - due to genetic similarity - likely the chimpanzee counterpart. The advantage of the present invention is the provision of a bispecific single chain

antibody comprising a binding domain exhibiting cross-species specificity to human and non-chimpanzee primate of the CD3 epsilon chain.

In the present invention, an N-terminal 1-27 amino acid residue polypeptide fragment of the extracellular domain of CD3 epsilon was surprisingly identified which – in contrast to all other known epitopes of CD3 epsilon described in the art – maintains its three-dimensional structural integrity when taken out of its native environment in the CD3 complex (and optionally fused to a heterologous amino acid sequence such as EpCAM or an immunoglobulin Fc part). The present invention, therefore, provides for a bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of an N-terminal 1-27 amino acid residue polypeptide fragment of the extracellular domain of CD3 epsilon (which CD3 epsilon is, for example, taken out of its native environment and/or comprised by (presented on the surface of) a T-cell) of human and at least one non-chimpanzee primate CD3 epsilon chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, and 8; and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA). Preferred non-chimpanzee primates are mentioned herein elsewhere. At least one (or a selection thereof or all) primate(s) selected from Callithrix jacchus; Saguinus oedipus, Saimiri sciureus, and Macaca fascicularis (either SEQ ID 1047 or 1048 or both), is (are) particularily preferred. Macaca mulatta, also known as Rhesus Monkey is also envisaged as another preferred primate. It is thus envisaged that antibodies of the invention bind to (are capable of binding to) the context independent epitope of an N-terminal 1-27 amino acid residue polypeptide fragment of the extracellular domain of CD3 epsilon of human and Callithrix jacchus, Saguinus oedipus, Saimiri sciureus, and Macaca fascicularis (either SEQ ID 1047 or 1048 or both), and optionally also to Macaca mulatta. A bispecific single chain antibody molecule comprising a first binding domain as defined herein can be obtained (is obtainable by) or can be manufactured in accordance with the protocol set out in the appended Examples (in particular Example 2). To this end, it is envisaged to (a) immunize mice with an N-terminal 1-27 amino acid residue polypeptide fragment of the extracellular domain of CD3 epsilon of human and/or Saimiri sciureus; (b) generation of an immune murine antibody scFv library; (c) identification of CD3 epsilon specific binders by testing the capability to bind to at least SEQ ID NOs. 2, 4, 6, and 8.

The context-independence of the CD3 epitope provided in this invention corresponds to the first 27 N-terminal amino acids of CD3 epsilon or functional fragments of this 27 amino acid stretch. The phrase "context-independent," as used herein in relation to the CD3 epitope means that binding of the herein described inventive binding molecules/antibody molecules does not lead to a change or modification of the conformation, sequence, or structure surrounding the antigenic determinant or epitope. In contrast, the CD3 epitope recognized by a conventional CD3 binding molecule (e.g. as disclosed in WO 99/54440 or WO 04/106380) is localized on the CD3 epsilon chain C-terminally to the N-terminal 1-27 amino acids of the context-independent epitope, where it only takes the correct conformation if it is embedded within the rest of the epsilon chain and held in the right sterical position by heterodimerization of the epsilon chain with either the CD3 gamma or delta chain.
Anti-CD3 binding domains as part of a PSMAxCD3 bispecific single chain molecule as provided herein and generated (and directed) against a context-independent CD3 epitope provide for a surprising clinical improvement with regard to T cell redistribution and, thus, a more favourable safety profile. Without being bound by theory, since the CD3 epitope is context-independent, forming an autonomous selfsufficient subdomain without much influence on the rest of the CD3 complex, the CD3 binding domain of the PSMAxCD3 bispecific single chain molecule provided herein induces less allosteric changes in CD3 conformation than the conventional CD3 binding molecules (like molecules provided in WO 99/54440 or WO 04/106380), which recognize context-dependent CD3 epitopes.

The context-independence of the CD3 epitope which is recognized by the CD3 binding domain of the PSMAxCD3 bispecific single chain antibody of the invention is associated with less or no T cell redistribution (T cell redistribution equates with an initial episode of drop and subsequent recovery of absolute T cell counts) during the starting phase of treatment with said PSMAxCD3 bispecific single chain antibody of the invention. This results in a better safety profile of the PSMAxCD3 bispecific single chain antibody of the invention compared to conventional CD3 binding molecules known in the art, which recognize context-dependent CD3 epitopes. Particularly, because T cell redistribution during the starting phase of treatment with CD3 binding molecules is a major risk factor for adverse events, like CNS adverse events, the PSMAxCD3 bispecific single chain antibody of the invention by recognizing a context-independent rather than a context-dependent CD3 epitope has a substantial

safety advantage over the CD3 binding molecules known in the art. Patients with such CNS adverse events related to T cell redistribution during the starting phase of treatment with conventional CD3 binding molecules usually suffer from confusion and disorientation, in some cases also from urinary incontinence. Confusion is a change in mental status in which the patient is not able to think with his or her usual level of clarity. The patient usually has difficulties to concentrate and thinking is not only blurred and unclear but often significantly slowed down. Patients with CNS adverse events related to T cell redistribution during the starting phase of treatment with conventional CD3 binding molecules may also suffer from loss of memory. Frequently, the confusion leads to the loss of ability to recognize people, places, time or the date. Feelings of disorientation are common in confusion, and the decision-making ability is impaired. CNS adverse events related to T cell redistribution during the starting phase of treatment with conventional CD3 binding molecules may further comprise blurred speech and/or word finding difficulties. This disorder may impair both, the expression and understanding of language as well as reading and writing. Besides urinary incontinence, vertigo and dizziness may also accompany CNS adverse events related to T cell redistribution during the starting phase of treatment with conventional CD3 binding molecules in some patients.

The maintenance of the three-dimensional structure within the mentioned 27 amino acid N-terminal polypeptide fragment of CD3 epsilon can be used for the generation of, preferably human, binding domains which are capable of binding to the N-terminal CD3 epsilon polypeptide fragment *in vitro* and to the native (CD3 epsilon subunit of the) CD3 complex on T cells *in vivo* with the same binding affinity. These data strongly indicate that the N-terminal fragment as described herein forms a tertiary conformation, which is similar to its structure normally existing *in vivo*. A very sensitive test for the importance of the structural integrity of the amino acids 1-27 of the N-terminal polypeptide fragment of CD3 epsilon was performed. Individual amino acids of amino acids 1-27 of the N-terminal polypeptide fragment of CD3 epsilon were changed to alanine (alanine scanning) to test the sensitivity of the amino acids 1-27 of the N-terminal polypeptide fragment of CD3 epsilon for minor disruptions. The CD3 specific binding domains as part of the PSMAxCD3 bispecific single chain antibody of the invention were used to test for binding to the alanine-mutants of amino acids 1-27 of the N-terminal polypeptide fragment of CD3 epsilon (see appended Example 5). Individual exchanges of the first five amino acid residues at

the very N-terminal end of the fragment and two of the amino acids at positions 23 and 25 of the amino acids 1-27 of the N-terminal polypeptide fragment of CD3 epsilon were critical for binding of the antibody molecules. The substitution of amino acid residues in the region of position 1-5 comprising the residues Q (Glutamine at position 1), D (Aspartic acid at position 2), G (Glycine at position 3), N (Asparagine at position 4), and E (Glutamic acid at position 5) to Alanine abolished binding of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention to said fragment. While, for at least some of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention, two amino acid residues at the C-terminus of the mentioned fragment T (Threonine at position 23) and I (Isoleucine at position 25) reduced the binding energy to the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention.

Unexpectedly, it has been found that the thus isolated, preferably human, PSMAxCD3 bispecific single chain antibody of the invention not only recognizes the human N-terminal fragment of CD3 epsilon, but also the corresponding homologous fragments of CD3 epsilon of various primates, including New-World Monkeys (Marmoset, Callithrix jacchus; Saguinus oedipus; Saimiri sciureus) and Old-World Monkeys (Macaca fascicularis, also known as Cynomolgus Monkey; or Macaca mulatta, also known as Rhesus Monkey). Thus, multi-primate specificity of the PSMAxCD3 bispecific single chain antibody of the invention was detected. The following sequence analyses confirmed that human and primates share a highly homologous sequence stretch at the N-terminus of the extracellular domain of CD3 epsilon.

The amino acid sequence of the aformentioned N-terminal fragments of CD3 epsilon are depicted in SEQ ID No. 2 (human), SEQ ID No. 4 (Callithrix jacchus); SEQ ID No. 6 (Saguinus oedipus); SEQ ID No. 8 (Saimiri sciureus); SEQ ID No. 1047 *QDGNEEMGSITQTPYQVSISGTTILTC* or SEQ ID No. 1048 *QDGNEEMGSITQTPYQVSISGTTVILT* (Macaca fascicularis, also known as Cynomolgus Monkey), and SEQ ID No. 1049 *QDGNEEMGSITQTPYHVSISGTTVILT* (Macaca mulatta, also known as Rhesus Monkey).

The second binding domain of the PSMAxCD3 bispecific single chain antibody of the invention binds to the prostate-specific membrane antigen (PSMA). Preferably, the

second binding domain of the PSMAxCD3 bispecific single chain antibody binds to the human PSMA or a non-chimpanzee primate PSMA; more preferred it binds to the human PSMA and a non-chimpanzee primate PSMA and therefore is cross-species specific; even more preferred to the human PSMA and the macaque PSMA (and therefore is cross-species specific as well). Particularly preferred, the macaque PSMA is the Cynomolgus monkey PSMA and/or the Rhesus monkey PSMA. However, it is not excluded from the scope of the present invention, that the second binding domain may also bind to PSMA homologs of other species, such as to the PSMA homolog in rodents.

Prostate cancer is the second most cancer in men. For 2008, it is estimated that 186,320 men will be newly diagnosed with prostate cancer in the United States and about 28,660 men will die from the disease. Prostate cancer risk is strongly related to age: very few cases are registered in men under 50 and three-quarters of cases occur in men over 65 years. The largest number of cases is diagnosed in those aged 70-74. Currently, the growth rate of the older population is significantly higher than that of the total population. By 2025-2030, projections indicate that the population over 60 will be growing 3.5 times as rapidly as the total population. The proportion of older persons is projected to more than double worldwide over the next half century, which means that a further increase in incidence of diagnosed prostate cancer has to be expected for the future. The highly restricted expression of PSMA and its upregulation in advanced stages and metastatic disease of prostate cancer as well as its role as neoantigen on tumor vasculature of many different types of other solid tumors qualifies PSMA as attractive target antigen for antibody-based cancer therapy. As shown in the following examples, the PSMAxCD3 bispecific single chain antibody of the invention provides an advantageous tool in order to kill PSMA-expressing human cancer cells, as exemplified by the human prostate cancer cell line LNCaP. In addition, the cytotoxic activity of the PSMAxCD3 bispecific single chain antibody of the invention is higher than the cytotoxic activity of antibodies described in the art. Since preferably both the CD3 and the PSMA binding domain of the PSMAxCD3 bispecific single chain antibody of the invention are cross-species specific, i.e. reactive with the human and non-chimpanzee primates antigens, it can be used for preclinical evaluation of safety, activity and/or pharmacokinetic profile of these binding domains in primates and – in the identical form - as drug in humans.

Advantageously, the present invention provides also PSMAxCD3 bispecific single chain antibodies comprising a second binding domain which binds both to the human PSMA and to the macaque PSMA homolog, i.e. the homolog of a non-chimpanzee primate. In a preferred embodiment, the bispecific single chain antibody thus comprises a second binding domain exhibiting cross-species specificity to the human and a non-chimpanzee primate PSMA. In this case, the identical bispecific single chain antibody molecule can be used both for preclinical evaluation of safety, activity and/or pharmacokinetic profile of these binding domains in primates and as drug in humans. Put in other words, the same molecule can be used in preclinical animal studies as well as in clinical studies in humans. This leads to highly comparable results and a much-increased predictive power of the animal studies compared to species-specific surrogate molecules. Since both the CD3 and the PSMA binding domain of the PSMAxCD3 bispecific single chain antibody of the invention are cross-species specific, i.e. reactive with the human and non-chimpanzee primates' antigens, it can be used both for preclinical evaluation of safety, activity and/or pharmacokinetic profile of these binding domains in primates and – in the identical form - as drug in humans. It will be understood that in a preferred embodiment, the cross-species specificity of the first and second binding domain of the antibodies of the invention is identical.

It has been found in the present invention that it is possible to generate a, preferably human, PSMAxCD3 bispecific single chain antibody wherein the identical molecule can be used in preclinical animal testing, as well as clinical studies and even in therapy in human. This is due to the unexpected identification of the, preferably human, PSMAxCD3 bispecific single chain antibody, which, in addition to binding to human CD3 epsilon and PSMA, respectively, (and due to genetic similarity likely to the chimpanzee counterpart), also binds to the homologs of said antigens of non-chimpanzee primates, including New-World Monkeys and Old-World Monkeys. As shown in the following Examples, said preferably human, PSMAxCD3 bispecific single chain antibody of the invention can be used as therapeutic agent against various diseases, including, but not limited, to cancer. The PSMAxCD3 bispecific single chain antibody is particularly advantageous for the therapy of cancer, preferably solid tumors, more preferably carcinomas and prostate cancer. In view of

the above, the need to construct a surrogate PSMAxCD3 bispecific single chain antibody for testing in a phylogenetic distant (from humans) species disappears. As a result, the identical molecule can be used in animal preclinical testing as is intended to be administered to humans in clinical testing as well as following market approval and therapeutic drug administration. The ability to use the same molecule for preclinical animal testing as in later administration to humans virtually eliminates, or at least greatly reduces, the danger that the data obtained in preclinical animal testing have limited applicability to the human case. In short, obtaining preclinical safety data in animals using the same molecule as will actually be administered to humans does much to ensure the applicability of the data to a human-relevant scenario. In contrast, in conventional approaches using surrogate molecules, said surrogate molecules have to be molecularly adapted to the animal test system used for preclinical safety assessment. Thus, the molecule to be used in human therapy in fact differs in sequence and also likely in structure from the surrogate molecule used in preclinical testing in pharmacokinetic parameters and/or biological activity, with the consequence that data obtained in preclinical animal testing have limited applicability / transferability to the human case. The use of surrogate molecules requires the construction, production, purification and characterization of a completely new construct. This leads to additional development costs and time necessary to obtain that molecule. In sum, surrogates have to be developed separately in addition to the actual drug to be used in human therapy, so that two lines of development for two molecules have to be carried out. Therefore, a major advantage of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention exhibiting cross-species specificity described herein is that the identical molecule can be used for therapeutic agents in humans and in preclinical animal testing.

It is preferred that at least one of said first or second binding domains of the bispecific single chain antibody of the invention is CDR-grafted, humanized or human, as set forth in more detail below. Preferably, both the first and second binding domains of the bispecific single chain antibody of the invention are CDR-grafted, humanized or human. For the preferably human, PSMAxCD3 bispecific single chain antibody of the invention, the generation of an immune reaction against said binding molecule is excluded to the maximum possible extent upon administration of the molecule to human patients.

Another major advantage of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention is its applicability for preclinical testing in various primates. The behavior of a drug candidate in animals should ideally be indicative of the expected behavior of this drug candidate upon administration to humans. As a result, the data obtained from such preclinical testing should therefore generally have a highly predictive power for the human case. However, as learned from the tragic outcome of the recent Phase I clinical trial on TGN1412 (a CD28 monoclonal antibody), a drug candidate may act differently in a primate species than in humans: Whereas in preclinical testing of said antibody no or only limited adverse effects have been observed in animal studies performed with cynomolgus monkeys, six human patients developed multiple organ failure upon administration of said antibody (Lancet 368 (2006), 2206-7). The results of these dramatic, non-desired negative events suggest that it may not be sufficient to limit preclinical testing to only one (non-chimpanzee primate) species. The fact that the PSMAxCD3 bispecific single chain antibody of the invention binds to a series of New-World and Old-World Monkeys may help to overcome the problems faced in the case mentioned above. Accordingly, the present invention provides means and methods for minimizing species differences in effects when drugs for human therapy are being developed and tested.

With the, preferably human, cross-species specific PSMAxCD3 bispecific single chain antibody of the invention it is also no longer necessary to adapt the test animal to the drug candidate intended for administration to humans, such as e.g. the creation of transgenic animals. The, preferably human, PSMAxCD3 bispecific single chain antibody of the invention exhibiting cross-species specificity according to the uses and the methods of invention can be directly used for preclinical testing in non-chimpanzee primates, without any genetic manipulation of the animals. As well known to those skilled in the art, approaches in which the test animal is adapted to the drug candidate always bear the risk that the results obtained in the preclinical safety testing are less representative and predictive for humans due to the modification of the animal. For example, in transgenic animals, the proteins encoded by the transgenes are often highly over-expressed. Thus, data obtained for the biological activity of an antibody against this protein antigen may be limited in their

predictive value for humans in which the protein is expressed at much lower, more physiological levels.

A further advantage of the uses of the preferably human PSMAxCD3 bispecific single chain antibody of the invention exhibiting cross-species specificity is the fact that chimpanzees as an endangered species are avoided for animal testing. Chimpanzees are the closest relatives to humans and were recently grouped into the family of hominids based on the genome sequencing data (Wildman et al., PNAS 100 (2003), 7181). Therefore, data obtained with chimpanzee is generally considered to be highly predictive for humans. However, due to their status as endangered species, the number of chimpanzees, which can be used for medical experiments, is highly restricted. As stated above, maintenance of chimpanzees for animal testing is therefore both costly and ethically problematic. The uses of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention avoid both ethical objections and financial burden during preclinical testing without prejudicing the quality, i.e. applicability, of the animal testing data obtained. In light of this, the uses of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention provide for a reasonable alternative for studies in chimpanzees.

A still further advantage of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention is the ability of extracting multiple blood samples when using it as part of animal preclinical testing, for example in the course of pharmacokinetic animal studies. Multiple blood extractions can be much more readily obtained with a non-chimpanzee primate than with lower animals, e.g. a mouse. The extraction of multiple blood samples allows continuous testing of blood parameters for the determination of the biological effects induced by the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention. Furthermore, the extraction of multiple blood samples enables the researcher to evaluate the pharmacokinetic profile of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein. In addition, potential side effects, which may be induced by said, preferably human, PSMAxCD3 bispecific single chain antibody of the invention reflected in blood parameters can be measured in different blood samples extracted during the course of the administration of said antibody.

This allows the determination of the potential toxicity profile of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein.

The advantages of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein exhibiting cross-species specificity may be briefly summarized as follows:

First, the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein used in preclinical testing is the same as the one used in human therapy. Thus, it is no longer necessary to develop two independent molecules, which may differ in their pharmacokinetic properties and biological activity. This is highly advantageous in that e.g. the pharmacokinetic results are more directly transferable and applicable to the human setting than e.g. in conventional surrogate approaches.
Second, the uses of the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein for the preparation of therapeutics in human is less cost- and labor-intensive than surrogate approaches.
Third, the, preferably human, PSMAxCD3 bispecific single chain antibody of the invention as defined herein can be used for preclinical testing not only in one primate species, but in a series of different primate species, thereby limiting the risk of potential species differences between primates and human.
Fourth, chimpanzee as an endangered species for animal testing can be avoided if desired.
Fifth, multiple blood samples can be extracted for extensive pharmacokinetic studies.
Sixth, due to the human origin of the, preferably human, binding molecules according to a preferred embodiment of the invention, the generation of an immune reaction against said binding molecules is minimalized when administered to human patients. Induction of an immune response with antibodies specific for a drug candidate derived from a non-human species as e.g. a mouse leading to the development of human-anti-mouse antibodies (HAMAs) against therapeutic molecules of murine origin is excluded.
Last but not least, the therapeutic use of the PSMAxCD3 bispecific single chain antibody of the invention provides a novel and inventive therapeutic approach for cancer, preferably solid tumors, more preferably carcinomas and prostate cancer. As

shown in the following examples, the PSMAxCD3 bispecific single chain antibody of the invention provides an advantageous tool in order to kill PSMA-expressing human prostate cancer cells. Moreover, the cytotoxic activity of the PSMAxCD3 bispecific single chain antibody of the invention is higher than the activity of antibodies described in the art.

As noted herein above, the present invention provides polypeptides, i.e. bispecific single chain antibodies, comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain and a second binding domain capable of binding to PSMA. The second binding domain preferably binds to human PSMA and a non-chimpanzee primate PSMA. The advantage of bispecific single chain antibody molecules as drug candidates fulfilling the requirements of the preferred bispecific single chain antibody of the invention is the use of such molecules in preclinical animal testing as well as in clinical studies and even for therapy in human. In a preferred embodiment of the cross-species specific bispecific single chain antibodies of the invention the second binding domain binding to PSMA is human. In a cross-species specific bispecific molecule according to the invention the binding domain binding to an epitope of human and non-chimpanzee primate CD3 epsilon chain is located in the order VH-VL or VL-VH at the N-terminus or the C-terminus of the bispecific molecule. Examples for cross-species specific bispecific molecules according to the invention in different arrangements of the VH- and the VL-chain in the first and the second binding domain are described in the appended examples.

As used herein, a "bispecific single chain antibody" denotes a single polypeptide chain comprising two binding domains. Each binding domain comprises one variable region from an antibody heavy chain ("VH region"), wherein the VH region of the first binding domain specifically binds to the CD3ε molecule, and the VH region of the second binding domain specifically binds to PSMA. The two binding domains are optionally linked to one another by a short polypeptide spacer. A non-limiting example for a polypeptide spacer is Gly-Gly-Gly-Gly-Ser (G-G-G-G-S) and repeats thereof. Each binding domain may additionally comprise one variable region from an antibody light chain ("VL region"), the VH region and VL region within each of the first and second binding domains being linked to one another via a polypeptide linker, for

example of the type disclosed and claimed in EP 623679 B1, but in any case long enough to allow the VH region and VL region of the first binding domain and the VH region and VL region of the second binding domain to pair with one another such that, together, they are able to specifically bind to the respective first and second binding domains.

The term "protein" is well known in the art and describes biological compounds. Proteins comprise one or more amino acid chains (polypeptides), whereby the amino acids are bound among one another via a peptide bond. The term "polypeptide" as used herein describes a group of molecules, which consists of more than 30 amino acids. In accordance with the invention, the group of polypeptides comprises "proteins" as long as the proteins consist of a single polypeptide chain. Also in line with the definition the term "polypeptide" describes fragments of proteins as long as these fragments consist of more than 30 amino acids. Polypeptides may further form multimers such as dimers, trimers and higher oligomers, i.e. consisting of more than one polypeptide molecule. Polypeptide molecules forming such dimers, trimers etc. may be identical or non-identical. The corresponding higher order structures of such multimers are, consequently, termed homo- or heterodimers, homo- or heterotrimers etc. An example for a hereteromultimer is an antibody molecule, which, in its naturally occurring form, consists of two identical light polypeptide chains and two identical heavy polypeptide chains. The terms "polypeptide" and "protein" also refer to naturally modified polypeptides/proteins wherein the modification is effected e.g. by post-translational modifications like glycosylation, acetylation, phosphorylation and the like. Such modifications are well known in the art.

The term "binding domain" characterizes in connection with the present invention a domain of a polypeptide which specifically binds to/interacts with a given target structure/antigen/epitope. Thus, the binding domain is an "antigen-interaction-site". The term "antigen-interaction-site" defines, in accordance with the present invention, a motif of a polypeptide, which is able to specifically interact with a specific antigen or a specific group of antigens, e.g. the identical antigen in different species. Said binding/interaction is also understood to define a "specific recognition". The term "specifically recognizing" means in accordance with this invention that the antibody molecule is capable of specifically interacting with and/or binding to at least two,

preferably at least three, more preferably at least four amino acids of an antigen, e.g. the human CD3 antigen as defined herein. Such binding may be exemplified by the specificity of a "lock-and-key-principle". Thus, specific motifs in the amino acid sequence of the binding domain and the antigen bind to each other as a result of their primary, secondary or tertiary structure as well as the result of secondary modifications of said structure. The specific interaction of the antigen-interaction-site with its specific antigen may result as well in a simple binding of said site to the antigen. Moreover, the specific interaction of the binding domain/antigen-interaction-site with its specific antigen may alternatively result in the initiation of a signal, e.g. due to the induction of a change of the conformation of the antigen, an oligomerization of the antigen, etc. A preferred example of a binding domain in line with the present invention is an antibody. The binding domain may be a monoclonal or polyclonal antibody or derived from a monoclonal or polyclonal antibody.

The term "antibody" comprises derivatives or functional fragments thereof which still retain the binding specificity. Techniques for the production of antibodies are well known in the art and described, e.g. in Harlow and Lane "Antibodies, A Laboratory Manual", Cold Spring Harbor Laboratory Press, 1988 and Harlow and Lane "Using Antibodies: A Laboratory Manual" Cold Spring Harbor Laboratory Press, 1999. The term "antibody" also comprises immunoglobulins (Ig's) of different classes (i.e. IgA, IgG, IgM, IgD and IgE) and subclasses (such as IgG1, IgG2 etc.).

The definition of the term "antibody" also includes embodiments such as chimeric, single chain and humanized antibodies, as well as antibody fragments, like, inter alia, Fab fragments. Antibody fragments or derivatives further comprise $F(ab')_2$, Fv, scFv fragments or single domain antibodies, single variable domain antibodies or immunoglobulin single variable domain comprising merely one variable domain, which might be VH or VL, that specifically bind to an antigen or epitope independently of other V regions or domains; see, for example, Harlow and Lane (1988) and (1999), loc. cit. Such immunoglobulin single variable domain encompasses not only an isolated antibody single variable domain polypeptide, but also larger polypeptides that comprise one or more monomers of an antibody single variable domain polypeptide sequence.

Various procedures are known in the art and may be used for the production of such antibodies and/or fragments. Thus, the (antibody) derivatives can also be produced

by peptidomimetics. Further, techniques described for the production of single chain antibodies (see, inter alia, US Patent 4,946,778) can be adapted to produce single chain antibodies specific for elected polypeptide(s). Also, transgenic animals may be used to express humanized or human antibodies specific for polypeptides and fusion proteins of this invention. For the preparation of monoclonal antibodies, any technique, providing antibodies produced by continuous cell line cultures can be used. Examples for such techniques include the hybridoma technique (Köhler and Milstein Nature 256 (1975), 495-497), the trioma technique, the human B-cell hybridoma technique (Kozbor, Immunology Today 4 (1983), 72) and the EBV-hybridoma technique to produce human monoclonal antibodies (Cole et al., Monoclonal Antibodies and Cancer Therapy, Alan R. Liss, Inc. (1985), 77-96). Surface plasmon resonance as employed in the BIAcore system can be used to increase the efficiency of phage antibodies which bind to an epitope of a target polypeptide, such as CD3 epsilon or PSMA (Schier, Human Antibodies Hybridomas 7 (1996), 97-105; Malmborg, J. Immunol. Methods 183 (1995), 7-13). It is also envisaged in the context of this invention that the term "antibody" comprises antibody constructs, which may be expressed in a host as described herein below, e.g. antibody constructs which may be transfected and/or transduced via, inter alia, viruses or plasmid vectors.

The term "specific interaction" as used in accordance with the present invention means that the binding domain does not or does not significantly cross-react with polypeptides which have similar structure as those bound by the binding domain, and which might be expressed by the same cells as the polypeptide of interest. Cross-reactivity of a panel of binding domains under investigation may be tested, for example, by assessing binding of said panel of binding domains under conventional conditions (see, e.g., Harlow and Lane, Antibodies: A Laboratory Manual, Cold Spring Harbor Laboratory Press, 1988 and Using Antibodies: A Laboratory Manual, Cold Spring Harbor Laboratory Press, 1999). Examples for the specific interaction of a binding domain with a specific antigen comprise the specificity of a ligand for its receptor. Said definition particularly comprises the interaction of ligands, which induce a signal upon binding to its specific receptor. Examples for said interaction, which is also particularly comprised by said definition, is the interaction of an antigenic determinant (epitope) with the binding domain (antigenic binding site) of an

antibody.

The term "cross-species specificity" or "interspecies specificity" as used herein means binding of a binding domain described herein to the same target molecule in humans and non-chimpanzee primates. Thus, "cross-species specificity" or "interspecies specificity" is to be understood as an interspecies reactivity to the same molecule "X" expressed in different species, but not to a molecule other than "X". Cross-species specificity of a monoclonal antibody recognizing e.g. human CD3 epsilon, to a non-chimpanzee primate CD3 epsilon, e.g. macaque CD3 epsilon, can be determined, for instance, by FACS analysis. The FACS analysis is carried out in a way that the respective monoclonal antibody is tested for binding to human and non-chimpanzee primate cells, e.g. macaque cells, expressing said human and non-chimpanzee primate CD3 epsilon antigens, respectively. An appropriate assay is shown in the following examples. The above-mentioned subject matter applies mutatis mutandis for the PSMA antigen: Cross-species specificity of a monoclonal antibody recognizing e.g. human PSMA, to a non-chimpanzee primate PSMA, e.g. macaque PSMA, can be determined, for instance, by FACS analysis. The FACS analysis is carried out in a way that the respective monoclonal antibody is tested for binding to human and non-chimpanzee primate cells, e.g. macaque cells, expressing said human and non-chimpanzee primate PSMA antigens, respectively.

As used herein, CD3 epsilon denotes a molecule expressed as part of the T cell receptor and has the meaning as typically ascribed to it in the prior art. In human, it encompasses in individual or independently combined form all known CD3 subunits, for example CD3 epsilon, CD3 delta, CD3 gamma, CD3 zeta, CD3 alpha and CD3 beta. The non-chimpanzee primate, non-human CD3 antigens as referred to herein are, for example, *Macaca fascicularis* CD3 and *Macaca mulatta* CD3. In *Macaca fascicularis*, it encompasses CD3 epsilon FN-18 negative and CD3 epsilon FN-18 positive, CD3 gamma and CD3 delta. In *Macaca mulatta*, it encompasses CD3 epsilon, CD3 gamma and CD3 delta. Preferably, said CD3 as used herein is CD3 epsilon.

The human CD3 epsilon is indicated in GenBank Accession No.NM_000733 and comprises SEQ ID NO. 1. The human CD3 gamma is indicated in GenBank Accession NO. NM_000073. The human CD3 delta is indicated in GenBank

Accession No. NM_000732.

The CD3 epsilon "FN-18 negative" of *Macaca fascicularis* (i.e. CD3 epsilon not recognized by monoclonal antibody FN-18 due to a polymorphism as set forth above) is indicated in GenBank Accession No. AB073994.

The CD3 epsilon "FN-18 positive" of *Macaca fascicularis* (i.e. CD3 epsilon recognized by monoclonal antibody FN-18) is indicated in GenBank Accession No. AB073993. The CD3 gamma of *Macaca fascicularis* is indicated in GenBank Accession No. AB073992. The CD3 delta of *Macaca fascicularis* is indicated in GenBank Accession No. AB073991.

The nucleic acid sequences and amino acid sequences of the respective CD3 epsilon, gamma and delta homologs of *Macaca mulatta* can be identified and isolated by recombinant techniques described in the art (Sambrook et al. Molecular Cloning: A Laboratory Manual; Cold Spring Harbor Laboratory Press, 3rd edition 2001). This applies mutatis mutandis to the CD3 epsilon, gamma and delta homologs of other non-chimpanzee primates as defined herein. The identification of the amino acid sequence of Callithrix jacchus, Saimiri sciureus und Saguinus oedipus is described in the appended examples. The amino acid sequence of the extracellular domain of the CD3 epsilon of *Callithrix jacchus* is depicted in SEQ ID NO: 3, the one of *Saguinus oedipus* is depicted in SEQ ID NO: 5 and the one of *Saimiri sciureus* is depicted in SEQ ID NO: 7.

The human PSMA is indicated in GenBank Accession No. 'AY101595'. The cloning of the PSMA homolog of macaque is demonstrated in the following examples, the corresponding cDNA and amino acid sequences are shown in SEQ ID NOs. 385 and 386, respectively.

In line with the above, the term "epitope" defines an antigenic determinant, which is specifically bound/identified by a binding domain as defined herein. The binding domain may specifically bind to/interact with conformational or continuous epitopes, which are unique for the target structure, e.g. the human and non-chimpanzee primate CD3 epsilon chain or the human and non-chimpanzee primate PSMA. A conformational or discontinuous epitope is characterized for polypeptide antigens by the presence of two or more discrete amino acid residues which are separated in the primary sequence, but come together on the surface of the molecule when the polypeptide folds into the native protein/antigen (Sela, (1969) Science 166, 1365 and

Laver, (1990) Cell 61, 553-6). The two or more discrete amino acid residues contributing to the epitope are present on separate sections of one or more polypeptide chain(s). These residues come together on the surface of the molecule when the polypeptide chain(s) fold(s) into a three-dimensional structure to constitute the epitope. In contrast, a continuous or linear epitope consists of two or more discrete amino acid residues, which are present in a single linear segment of a polypeptide chain. Within the present invention, a "context-dependent" CD3 epitope refers to the conformation of said epitope. Such a context-dependent epitope, localized on the epsilon chain of CD3, can only develop its correct conformation if it is embedded within the rest of the epsilon chain and held in the right position by heterodimerization of the epsilon chain with either CD3 gamma or delta chain. In contrast, a context-independent CD3 epitope as provided herein refers to an N-terminal 1-27 amino acid residue polypeptide or a functional fragment thereof of CD3 epsilon. This N-terminal 1-27 amino acid residue polypeptide or a functional fragment thereof maintains its three-dimensional structural integrity and correct conformation when taken out of its native environment in the CD3 complex. The context-independency of the N-terminal 1-27 amino acid residue polypeptide or a functional fragment thereof, which is part of the extracellular domain of CD3 epsilon, represents, thus, an epitope which is completely different to the epitopes of CD3 epsilon described in connection with a method for the preparation of human binding molecules in WO 2004/106380. Said method used solely expressed recombinant CD3 epsilon. The conformation of this solely expressed recombinant CD3 epsilon differed from that adopted in its natural form, that is, the form in which the CD3 epsilon subunit of the TCR/CD3 complex exists as part of a noncovalent complex with either the CD3 delta or the CD3-gamma subunit of the TCR/CD3 complex. When such solely expressed recombinant CD3 epsilon protein is used as an antigen for selection of antibodies from an antibody library, antibodies specific for this antigen are identified from the library although such a library does not contain antibodies with specificity for self-antigens/autoantigens. This is due to the fact that solely expressed recombinant CD3 epsilon protein does not exist in vivo; it is not an autoantigen. Consequently, subpopulations of B cells expressing antibodies specific for this protein have not been depleted in vivo; an antibody library constructed from such B cells would contain genetic material for antibodies specific for solely expressed recombinant CD3 epsilon protein.

However, since the context-independent N-terminal 1-27 amino acid residue polypeptide or a functional fragment thereof is an epitope, which folds in its native form, binding domains in line with the present invention cannot be identified by methods based on the approach described in WO 2004/106380. Therefore, it could be verified in tests that binding molecules as disclosed in WO 2004/106380 are not capable of binding to the N-terminal 1-27 amino acid residues of the CD3 epsilon chain. Hence, conventional anti-CD3 binding molecules or anti-CD3 antibody molecules (e.g. as disclosed in WO 99/54440) bind CD3 epsilon chain at a position which is more C-terminally located than the context-independent N-terminal 1-27 amino acid residue polypeptide or a functional fragment provided herein. Prior art antibody molecules OKT3 and UCHT-1 have also a specificity for the epsilon-subunit of the TCR/CD3 complex between amino acid residues 35 to 85 and, accordingly, the epitope of these antibodies is also more C-terminally located. In addition, UCHT-1 binds to the CD3 epsilon chain in a region between amino acid residues 43 to 77 (Tunnacliffe, Int. Immunol. 1 (1989), 546-50; Kjer-Nielsen, PNAS 101, (2004), 7675-7680; Salmeron, J. Immunol. 147 (1991), 3047-52). Therefore, prior art anti-CD3 molecules do not bind to and are not directed against the herein defined context-independent N-terminal 1-27 amino acid residue epitope (or a functional fragment thereof). In particular, the state of the art fails to provide anti-CD3 molecules which specifically binds to the context-independent N-terminal 1-27 amino acid residue epitope and which are cross-species specific, i.e. bind to human and non-chimpanzee primate CD3 epsilon.

For the generation of a, preferably human, binding domain comprised in a bispecific single chain antibody molecule of the invention, e.g. monoclonal antibodies binding to both the human and non-chimpanzee primate CD3 epsilon (e.g. macaque CD3 epsilon) or monoclonal antibodies binding to both the human and non-chimpanzee primate PSMA can be used.

As used herein, "human" and "man" refers to the species *Homo sapiens*. As far as the medical uses of the constructs described herein are concerned, human patients are to be treated with the same molecule.

It is preferred that at least one of said first or second binding domains of the

bispecific single chain antibody of the invention is CDR-grafted, humanized or human. Preferably, both the first and second binding domains of the bispecific single chain antibody of the invention are CDR-grafted, humanized or human.

The term "human" antibody as used herein is to be understood as meaning that the bispecific single chain antibody as defined herein, comprises (an) amino acid sequence(s) contained in the human germline antibody repertoire. For the purposes of definition herein, said bispecific single chain antibody may therefore be considered human if it consists of such (a) human germline amino acid sequence(s), i.e. if the amino acid sequence(s) of the bispecific single chain antibody in question is (are) identical to (an) expressed human germline amino acid sequence(s). A bispecific single chain antibody as defined herein may also be regarded as human if it consists of (a) sequence(s) that deviate(s) from its (their) closest human germline sequence(s) by no more than would be expected due to the imprint of somatic hypermutation. Additionally, the antibodies of many non-human mammals, for example rodents such as mice and rats, comprise VH CDR3 amino acid sequences which one may expect to exist in the expressed human antibody repertoire as well. Any such sequence(s) of human or non-human origin which may be expected to exist in the expressed human repertoire would also be considered "human" for the purposes of the present invention.

As used herein, the term "humanized", "humanization", "human-like" or grammatically related variants thereof are used interchangeably to refer to a bispecific single chain antibody comprising in at least one of its binding domains at least one complementarity determining region ("CDR") from a non-human antibody or fragment thereof. Humanization approaches are described for example in WO 91/09968 and US 6,407,213. As non-limiting examples, the term encompasses the case in which a variable region of at least one binding domain comprises a single CDR region, for example the third CDR region of the VH (CDRH3), from another non-human animal, for example a rodent, as well as the case in which a or both variable region/s comprise at each of their respective first, second and third CDRs the CDRs from said non-human animal. In the event that all CDRs of a binding domain of the bispecific single chain antibody have been replaced by their corresponding equivalents from, for example, a rodent, one typically speaks of "CDR-grafting", and this term is to be understood as being encompassed by the term "humanized" or grammatically related

variants thereof as used herein. The term "humanized" or grammatically related variants thereof also encompasses cases in which, in addition to replacement of one or more CDR regions within a VH and/or VL of the first and/or second binding domain further mutation/s (e.g. substitutions) of at least one single amino acid residue/s within the framework ("FR") regions between the CDRs has/have been effected such that the amino acids at that/those positions correspond/s to the amino acid/s at that/those position/s in the animal from which the CDR regions used for replacement is/are derived. As is known in the art, such individual mutations are often made in the framework regions following CDR-grafting in order to restore the original binding affinity of the non-human antibody used as a CDR-donor for its target molecule. The term "humanized" may further encompass (an) amino acid substitution(s) in the CDR regions from a non-human animal to the amino acid(s) of a corresponding CDR region from a human antibody, in addition to the amino acid substitutions in the framework regions as described above.

As used herein, the term "homolog" or "homology" is to be understood as follows: Homology among proteins and DNA is often concluded on the basis of sequence similarity, especially in bioinformatics. For example, in general, if two or more genes have highly similar DNA sequences, it is likely that they are homologous. But sequence similarity may arise from different ancestors: short sequences may be similar by chance, and sequences may be similar because both were selected to bind to a particular protein, such as a transcription factor. Such sequences are similar but not homologous. Sequence regions that are homologous are also called conserved. This is not to be confused with conservation in amino acid sequences in which the amino acid at a specific position has changed but the physio-chemical properties of the amino acid remain unchanged. Homologous sequences are of two types: orthologous and paralogous. Homologous sequences are orthologous if they were separated by a speciation event: when a species diverges into two separate species, the divergent copies of a single gene in the resulting species are said to be orthologous. Orthologs, or orthologous genes, are genes in different species that are similar to each other because they originated from a common ancestor. The strongest evidence that two similar genes are orthologous is the result of a phylogenetic analysis of the gene lineage. Genes that are found within one clade are orthologs, descended from a common ancestor. Orthologs often, but not always, have the same function. Orthologous sequences provide useful information in

taxonomic classification studies of organisms. The pattern of genetic divergence can be used to trace the relatedness of organisms. Two organisms that are very closely related are likely to display very similar DNA sequences between two orthologs. Conversely, an organism that is further removed evolutionarily from another organism is likely to display a greater divergence in the sequence of the orthologs being studied. Homologous sequences are paralogous if they were separated by a gene duplication event: if a gene in an organism is duplicated to occupy two different positions in the same genome, then the two copies are paralogous. A set of sequences that are paralogous are called paralogs of each other. Paralogs typically have the same or similar function, but sometimes do not: due to lack of the original selective pressure upon one copy of the duplicated gene, this copy is free to mutate and acquire new functions. An example can be found in rodents such as rats and mice. Rodents have a pair of paralogous insulin genes, although it is unclear if any divergence in function has occurred. Paralogous genes often belong to the same species, but this is not necessary: for example, the hemoglobin gene of humans and the myoglobin gene of chimpanzees are paralogs. This is a common problem in bioinformatics: when genomes of different species have been sequenced and homologous genes have been found, one can not immediately conclude that these genes have the same or similar function, as they could be paralogs whose function has diverged.

As used herein, a "non-chimpanzee primate" or "non-chimp primate" or grammatical variants thereof refers to any primate animal (i.e. not human) other than chimpanzee, i.e. other than an animal of belonging to the genus *Pan*, and including the species *Pan paniscus* and *Pan troglodytes*, also known as *Anthropopithecus troglodytes* or *Simia satyrus*. It will be understood, however, that it is possible that the antibodies of the invention can also bind with their first and/or second binding domain to the respective epitopes/fragments etc. of said chimpanzees. The intention is merely to avoid animal tests which are carried out with chimpanzees, if desired. It is thus also envisaged that in another embodiment the antibodies of the present invention also bind with their first and/or second binding domain to the respective epitopes of chimpanzees. A "primate", "primate species", "primates" or grammatical variants thereof denote/s an order of eutherian mammals divided into the two suborders of prosimians and anthropoids and comprising apes, monkeys and lemurs. Specifically, "primates" as used herein comprises the suborder *Strepsirrhini* (non-tarsier

prosimians), including the infraorder *Lemuriformes* (itself including the superfamilies *Cheirogaleoidea* and *Lemuroidea*), the infraorder *Chiromyiformes* (itself including the family *Daubentoniidae*) and the infraorder *Lorisiformes* (itself including the families *Lorisidae* and *Galagidae*). "Primates" as used herein also comprises the suborder *Haplorrhini*, including the infraorder *Tarsiiformes* (itself including the family *Tarsiidae*), the infraorder *Simiiformes* (itself including the *Platyrrhini*, or New-World monkeys, and the *Catarrhini*, including the *Cercopithecidea*, or Old-World Monkeys).

The non-chimpanzee primate species may be understood within the meaning of the invention to be a lemur, a tarsier, a gibbon, a marmoset (belonging to New-World Monkeys of the family *Cebidae*) or an Old-World Monkey (belonging to the superfamily *Cercopithecoidea*).

As used herein, an "Old-World Monkey" comprises any monkey falling in the superfamily *Cercopithecoidea*, itself subdivided into the families: the *Cercopithecinae*, which are mainly African but include the diverse genus of macaques which are Asian and North African; and the *Colobinae*, which include most of the Asian genera but also the African colobus monkeys.
Specifically, within the subfamily *Cercopithecinae*, an advantageous non-chimpanzee primate may be from the Tribe *Cercopithecini*, within the genus *Allenopithecus* (Allen's Swamp Monkey, *Allenopithecus nigroviridis*); within the genus *Miopithecus* (Angolan Talapoin, *Miopithecus talapoin*; Gabon Talapoin, *Miopithecus ogouensis*); within the genus *Erythrocebus* (Patas Monkey, *Erythrocebus patas*); within the genus *Chlorocebus* (Green Monkey, *Chlorocebus sabaceus*; Grivet, *Chlorocebus aethiops*; Bale Mountains Vervet, *Chlorocebus djamdjamensis*; Tantalus Monkey, *Chlorocebus tantalus*; Vervet Monkey, *Chlorocebus pygerythrus*; Malbrouck, *Chlorocebus cynosuros*); or within the genus *Cercopithecus* (Dryas Monkey or Salongo Monkey, *Cercopithecus dryas*; Diana Monkey, *Cercopithecus diana*; Roloway Monkey, *Cercopithecus roloway*; Greater Spot-nosed Monkey, *Cercopithecus nictitans*; Blue Monkey, *Cercopithecus mitis*; Silver Monkey, *Cercopithecus doggetti*; Golden Monkey, *Cercopithecus kandti*; Sykes's Monkey, *Cercopithecus albogularis*; Mona Monkey, *Cercopithecus mona*; Campbell's Mona Monkey, *Cercopithecus campbelli*; Lowe's Mona Monkey, *Cercopithecus lowei*; Crested Mona Monkey, *Cercopithecus pogonias*; Wolf's Mona Monkey, *Cercopithecus wolfi*; Dent's Mona Monkey,

Cercopithecus denti; Lesser Spot-nosed Monkey, *Cercopithecus petaurista*; White-throated Guenon, *Cercopithecus erythrogaster*; Sclater's Guenon, *Cercopithecus sclateri*; Red-eared Guenon, *Cercopithecus erythrotis*; Moustached Guenon, *Cercopithecus cephus*; Red-tailed Monkey, *Cercopithecus ascanius*; L'Hoest's Monkey, *Cercopithecus lhoesti*; Preuss's Monkey, *Cercopithecus preussi*; Sun-tailed Monkey, *Cercopithecus solatus*; Hamlyn's Monkey or Owl-faced Monkey, *Cercopithecus hamlyni*; De Brazza's Monkey, *Cercopithecus neglectus*).

Alternatively, an advantageous non-chimpanzee primate, also within the subfamily *Cercopithecinae* but within the Tribe *Papionini*, may be from within the genus *Macaca* (Barbary Macaque, *Macaca sylvanus*; Lion-tailed Macaque, *Macaca silenus*; Southern Pig-tailed Macaque or Beruk, *Macaca nemestrina*; Northern Pig-tailed Macaque, *Macaca leonina*; Pagai Island Macaque or Bokkoi, *Macaca pagensis*; Siberut Macaque, *Macaca siberu*; Moor Macaque, *Macaca maura*; Booted Macaque, *Macaca ochreata*; Tonkean Macaque, *Macaca tonkeana*; Heck's Macaque, *Macaca hecki*; Gorontalo Macaque, *Macaca nigriscens*; Celebes Crested Macaque or Black "Ape", *Macaca nigra*; Cynomolgus monkey or Crab-eating Macaque or Long-tailed Macaque or Kera, *Macaca fascicularis*; Stump-tailed Macaque or Bear Macaque, *Macaca arctoides*; Rhesus Macaque, *Macaca mulatta*; Formosan Rock Macaque, *Macaca cyclopis*; Japanese Macaque, *Macaca fuscata*; Toque Macaque, *Macaca sinica*; Bonnet Macaque, *Macaca radiata*; Barbary Macaque, *Macaca sylvanmus*; Assam Macaque, *Macaca assamensis*; Tibetan Macaque or Milne-Edwards' Macaque, *Macaca thibetana*; Arunachal Macaque or Munzala, *Macaca munzala*); within the genus *Lophocebus* (Gray-cheeked Mangabey, *Lophocebus albigena*; *Lophocebus albigena albigena*; *Lophocebus albigena osmani*; *Lophocebus albigena johnstoni*; Black Crested Mangabey, *Lophocebus aterrimus*; Opdenbosch's Mangabey, *Lophocebus opdenboschi*; Highland Mangabey, *Lophocebus kipunji*); within the genus *Papio* (Hamadryas Baboon, *Papio hamadryas*; Guinea Baboon, *Papio papio*; Olive Baboon, *Papio anubis*; Yellow Baboon, *Papio cynocephalus*; Chacma Baboon, *Papio ursinus*); within the genus *Theropithecus* (Gelada, *Theropithecus gelada*); within the genus *Cercocebus* (Sooty Mangabey, *Cercocebus atys*; *Cercocebus atys atys*; *Cercocebus atys lunulatus*; Collared Mangabey, *Cercocebus torquatus*; Agile Mangabey, *Cercocebus agilis*; Golden-bellied Mangabey, *Cercocebus chrysogaster*; Tana River Mangabey, *Cercocebus galeritus*; Sanje Mangabey, *Cercocebus sanjei*); or within the genus *Mandrillus* (Mandrill,

Mandrillus sphinx; Drill, *Mandrillus leucophaeus*).

Most preferred is *Macaca fascicularis* (also known as Cynomolgus monkey and, therefore, in the Examples named "Cynomolgus") and *Macaca mulatta* (rhesus monkey, named "rhesus").

Within the subfamily *Colobinae*, an advantageous non-chimpanzee primate may be from the African group, within the genus *Colobus* (Black Colobus, *Colobus satanas*; Angola Colobus, *Colobus angolensis*; King Colobus, *Colobus polykomos*; Ursine Colobus, *Colobus vellerosus*; Mantled Guereza, *Colobus guereza*); within the genus *Piliocolobus* (Western Red Colobus, *Piliocolobus badius*; *Piliocolobus badius badius*; *Piliocolobus badius temminckii*; *Piliocolobus badius waldronae*; Pennant's Colobus, *Piliocolobus pennantii*; *Piliocolobus pennantii pennantii*; *Piliocolobus pennantii epieni*; *Piliocolobus pennantii bouvieri*; Preuss's Red Colobus, *Piliocolobus preussi*; Thollon's Red Colobus, *Piliocolobus tholloni*; Central African Red Colobus, *Piliocolobus foai*; *Piliocolobus foai foai*; *Piliocolobus foai ellioti*; *Piliocolobus foai oustaleti*; *Piliocolobus foai semlikiensis*; *Piliocolobus foai parmentierorum*; Ugandan Red Colobus, *Piliocolobus tephrosceles*; Uzyngwa Red Colobus, *Piliocolobus gordonorum*; Zanzibar Red Colobus, *Piliocolobus kirkii*; Tana River Red Colobus, *Piliocolobus rufomitratus*); or within the genus *Procolobus* (Olive Colobus, *Procolobus verus*).

Within the subfamily *Colobinae*, an advantageous non-chimpanzee primate may alternatively be from the Langur (leaf monkey) group, within the genus *Semnopithecus* (Nepal Gray Langur, *Semnopithecus schistaceus*; Kashmir Gray Langur, *Semnopithecus ajax*; Tarai Gray Langur, *Semnopithecus hector*; Northern Plains Gray Langur, *Semnopithecus entellus*; Black-footed Gray Langur, *Semnopithecus hypoleucos*; Southern Plains Gray Langur, *Semnopithecus dussumieri*; Tufted Gray Langur, *Semnopithecus priam*); within the *T. vetulus* group or the genus *Trachypithecus* (Purple-faced Langur, *Trachypithecus vetulus*; Nilgiri Langur, *Trachypithecus johnii*); within the *T. cristatus* group of the genus *Trachypithecus* (Javan Lutung, *Trachypithecus auratus*; Silvery Leaf Monkey or Silvery Lutung, *Trachypithecus cristatus*; Indochinese Lutung, *Trachypithecus germaini*; Tenasserim Lutung, *Trachypithecus barbei*); within the *T. obscurus* group of the genus *Trachypithecus* (Dusky Leaf Monkey or Spectacled Leaf Monkey, *Trachypithecus obscurus*; Phayre's Leaf Monkey, *Trachypithecus phayrei*); within the *T. pileatus* group of the genus *Trachypithecus* (Capped Langur, *Trachypithecus pileatus*; Shortridge's Langur, *Trachypithecus shortridgei*; Gee's Golden Langur,

Trachypithecus geei); within the *T. francoisi* group of the genus *Trachypithecus* (Francois' Langur, *Trachypithecus francoisi*; Hatinh Langur, *Trachypithecus hatinhensis*; White-headed Langur, *Trachypithecus poliocephalus*; Laotian Langur, *Trachypithecus laotum*; Delacour's Langur, *Trachypithecus delacouri*; Indochinese Black Langur, *Trachypithecus ebenus*); or within the genus *Presbytis* (Sumatran Surili, *Presbytis melalophos*; Banded Surili, *Presbytis femoralis*; Sarawak Surili, *Presbytis chrysomelas*; White-thighed Surili, *Presbytis siamensis*; White-fronted Surili, *Presbytis frontata*; Javan Surili, *Presbytis comata*; Thomas's Langur, *Presbytis thomasi*; Hose's Langur, *Presbytis hosei*; Maroon Leaf Monkey, *Presbytis rubicunda*; Mentawai Langur or Joja, *Presbytis potenziani*; Natuna Island Surili, *Presbytis natunae*).

Within the subfamily *Colobinae*, an advantageous non-chimpanzee primate may alternatively be from the Odd-Nosed group, within the genus *Pygathrix* (Red-shanked Douc, *Pygathrix nemaeus*; Black-shanked Douc, *Pygathrix nigripes*; Gray-shanked Douc, *Pygathrix cinerea*); within the genus *Rhinopithecus* (Golden Snub-nosed Monkey, *Rhinopithecus roxellana*; Black Snub-nosed Monkey, *Rhinopithecus bieti*; Gray Snub-nosed Monkey, *Rhinopithecus brelichi*; Tonkin Snub-nosed Langur, *Rhinopithecus avunculus*); within the genus *Nasalis* (Proboscis Monkey, *Nasalis larvatus*); or within the genus *Simias* (Pig-tailed Langur, *Simias concolor*).

As used herein, the term “marmoset” denotes any New-World Monkeys of the genus *Callithrix*, for example belonging to the Atlantic marmosets of subgenus *Callithrix* (sic!) (Common Marmoset, *Callithrix (Callithrix) jacchus*; Black-tufted Marmoset, *Callithrix (Callithrix) penicillata*; Wied's Marmoset, *Callithrix (Callithrix) kuhlii*; White-headed Marmoset, *Callithrix (Callithrix) geoffroyi*; Buffy-headed Marmoset, *Callithrix (Callithrix) flaviceps*; Buffy-tufted Marmoset, *Callithrix (Callithrix) aurita*); belonging to the Amazonian marmosets of subgenus *Mico* (Rio Acari Marmoset, *Callithrix (Mico) acariensis*; Manicore Marmoset, *Callithrix (Mico) manicorensis*; Silvery Marmoset, *Callithrix (Mico) argentata*; White Marmoset, *Callithrix (Mico) leucippe*; Emilia's Marmoset, *Callithrix (Mico) emiliae*; Black-headed Marmoset, *Callithrix (Mico) nigriceps*; Marca's Marmoset, *Callithrix (Mico)marcai*; Black-tailed Marmoset, *Callithrix (Mico) melanura*; Santarem Marmoset, *Callithrix (Mico) humeralifera*; Maués Marmoset, *Callithrix (Mico) mauesi*; Gold-and-white Marmoset, *Callithrix (Mico) chrysoleuca*; Hershkovitz's Marmoset, *Callithrix (Mico) intermedia*; Satéré Marmoset,

Callithrix (Mico) saterei); Roosmalens' Dwarf Marmoset belonging to the subgenus Callibella (*Callithrix (Callibella) humilis*); or the Pygmy Marmoset belonging to the subgenus Cebuella (*Callithrix (Cebuella) pygmaea*).
Other genera of the New-World Monkeys comprise tamarins of the genus *Saguinus* (comprising the *S. oedipus*-group, the *S. midas* group, the *S. nigricollis* group, the *S. mystax* group, the *S. bicolor* group and the *S. inustus* group) and squirrel monkeys of the genus *Samiri* (e.g. *Saimiri sciureus, Saimiri oerstedii, Saimiri ustus, Saimiri boliviensis, Saimiri vanzolini*)

In a preferred embodiment of the bispecific single chain antibody molecule of the invention, the non-chimpanzee primate is an old world monkey. In a more preferred embodiment of the polypeptide, the old world monkey is a monkey of the Papio genus Macaque genus. Most preferably, the monkey of the Macaque genus is Assamese macaque (*Macaca assamensis*), Barbary macaque (*Macaca sylvanus*), Bonnet macaque (*Macaca radiata*), Booted or Sulawesi-Booted macaque (*Macaca ochreata*), Sulawesi-crested macaque (*Macaca nigra*), Formosan rock macaque (*Macaca cyclopsis*), Japanese snow macaque or Japanese macaque (*Macaca fuscata*), Cynomologus monkey or crab-eating macaque or long-tailed macaque or Java macaque (*Macaca fascicularis*), Lion-tailed macaque (*Macaca silenus*), Pigtailed macaque (*Macaca nemestrina*), Rhesus macaque (*Macaca mulatta*), Tibetan macaque (*Macaca thibetana*), Tonkean macaque (*Macaca tonkeana*), Toque macaque (*Macaca sinica*), Stump-tailed macaque or Red-faced macaque or Bear monkey (*Macaca arctoides*), or Moor macaque (*Macaca maurus*). Most preferably, the monkey of the Papio genus is *Hamadryas Baboon, Papio hamadryas; Guinea Baboon, Papio papio; Olive Baboon, Papio anubis; Yellow Baboon, Papio cynocephalus; Chacma Baboon, Papio ursinus.*

In an alternatively preferred embodiment of the bispecific single chain antibody molecule of the invention, the non-chimpanzee primate is a new world monkey. In a more preferred embodiment of the polypeptide, the new world monkey is a monkey of the Callithrix genus (marmoset), the Saguinus genus or the Samiri genus. Most preferably, the monkey of the Callithrix genus is *Callithrix jacchus*, the monkey of the Saguinus genus is *Saguinus oedipus* and the monkey of the Samiri genus is *Saimiri sciureus*.

The term "cell surface antigen" as used herein denotes a molecule, which is displayed on the surface of a cell. In most cases, this molecule will be located in or on the plasma membrane of the cell such that at least part of this molecule remains accessible from outside the cell in tertiary form. A non-limiting example of a cell surface molecule, which is located in the plasma membrane is a transmembrane protein comprising, in its tertiary conformation, regions of hydrophilicity and hydrophobicity. Here, at least one hydrophobic region allows the cell surface molecule to be embedded, or inserted in the hydrophobic plasma membrane of the cell while the hydrophilic regions extend on either side of the plasma membrane into the cytoplasm and extracellular space, respectively. Non-limiting examples of cell surface molecules which are located on the plasma membrane are proteins which have been modified at a cysteine residue to bear a palmitoyl group, proteins modified at a C-terminal cysteine residue to bear a farnesyl group or proteins which have been modified at the C-terminus to bear a glycosyl phosphatidyl inositol ("GPI") anchor. These groups allow covalent attachment of proteins to the outer surface of the plasma membrane, where they remain accessible for recognition by extracellular molecules such as antibodies. Examples of cell surface antigens are CD3 epsilon and PSMA. As described herein above, PSMA is a cell surface antigen which is a target for therapy of cancer, including, but not limited to solid tumors, preferably carcinomas and prostate cancer.

In light of this, PSMA can also be characterized as a tumor antigen. The term „tumor antigen" as used herein may be understood as those antigens that are presented on tumor cells. These antigens can be presented on the cell surface with an extracellular part, which is often combined with a transmembrane and cytoplasmic part of the molecule. These antigens can sometimes be presented only by tumor cells and never by the normal ones. Tumor antigens can be exclusively expressed on tumor cells or might represent a tumor specific mutation compared to normal cells. In this case, they are called tumor-specific antigens. More common are antigens that are presented by tumor cells and normal cells, and they are called tumor-associated antigens. These tumor-associated antigens can be overexpressed compared to normal cells or are accessible for antibody binding in tumor cells due to the less

compact structure of the tumor tissue compared to normal tissue. One example for a tumor antigen in line with the present invention is PSMA.

As described herein above the bispecific single chain antibody molecule of the invention binds with the first binding domain to an epitope of human and non-chimpanzee primate CD3ε (epsilon) chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of 27 amino acid residues as depicted in SEQ ID NOs. 2, 4, 6, or 8 or a functional fragment thereof.
In line with the present invention it is preferred for the bispecific single chain antibody molecule of the invention that said epitope is part of an amino acid sequence comprising 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6 or 5 amino acids.
More preferably, wherein said epitope comprises at least the amino acid sequence Gln-Asp-Gly-Asn-Glu (Q-D-G-N-E).
Within the present invention, a functional fragment of the N-terminal 1-27 amino acid residues means that said functional fragment is still a context-independent epitope maintaining its three-dimensional structural integrity when taken out of its native environment in the CD3 complex (and fused to a heterologous amino acid sequence such as EpCAM or an immunoglobulin Fc part, e.g. as shown in Example 3.1). The maintenance of the three-dimensional structure within the 27 amino acid N-terminal polypeptide or functional fragment thereof of CD3 epsilon can be used for the generation of binding domains which bind to the N-terminal CD3 epsilon polypeptide fragment *in vitro* and to the native (CD3 epsilon subunit of the) CD3 complex on T cells *in vivo* with the same binding affinity. Within the present invention, a functional fragment of the N-terminal 1-27 amino acid residues means that CD3 binding domains provided herein can still bind to such functional fragments in a context-independent manner. The person skilled in the art is aware of methods for epitope mapping to determine which amino acid residues of an epitope are recognized by such anti-CD3 binding domains (e.g. alanine scanning; see appended examples).

In one embodiment of the invention, the bispecific single chain antibody molecule of the invention comprises a (first) binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain and a second binding domain capable of binding to the cell surface antigen PSMA.

Within the present invention it is further preferred that the second binding domain binds to the human cell surface antigen PSMA and/or a non-chimpanzee primate PSMA. Particularly preferred, the second binding domain binds to the human PSMA and a non-chimpanzee primate PSMA, preferably a macaque PSMA. It is to be understood, that the second binding domain binds to at least one non-chimpanzee primate PSMA, however, it may also bind to two, three or more, non-chimpanzee primate PSMA homologs. For example, the second binding domain may bind to the Cynomolgus monkey PSMA and to the Rhesus monkey PSMA.

The present invention including all methods, uses, kits etc. described herein, also relates to the seconed binding domains as such (i.e. not in the context of a bispecific single chain antibody). "As such" further includes antibody formats other than the bispecific single chain antibodies as described herein, for example antibody fragments (comprising the second domain), humanized antibodies, fusion proteins comprising the second domain etc. Antibody formats other than the bispecific single chain antibodies of the present invention are also described herein above.

For the generation of the second binding domain of the bispecific single chain antibody molecule of the invention, e.g. bispecific single chain antibodies as defined herein, monoclonal antibodies binding to both of the respective human and/or non-chimpanzee primate cell surface antigen such as PSMA can be utilized. Appropriate binding domains for the bispecific polypeptide as defined herein e.g. can be derived from cross-species specific monoclonal antibodies by recombinant methods described in the art. A monoclonal antibody binding to a human cell surface antigen and to the homolog of said cell surface antigen in a non-chimpanzee primate can be tested by FACS assays as set forth above. It is evident to those skilled in the art that cross-species specific antibodies can also be generated by hybridoma techniques described in the literature (Milstein and Köhler, Nature 256 (1975), 495-7). For example, mice may be alternately immunized with human and non-chimpanzee primate cell surface antigen, such as PSMA. From these mice, cross-species specific antibody-producing hybridoma cells are isolated via hybridoma technology and analysed by FACS as set forth above. The generation and analysis of bispecific polypeptides such as bispecific single chain antibodies exhibiting cross-species

specificity as described herein is shown in the following examples. The advantages of the bispecific single chain antibodies exhibiting cross-species specificity include the points enumerated herein.

It is particularly preferred for the bispecific single chain antibody molecule of the invention that the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region comprising CDR-L1, CDR-L2 and CDR-L3 selected from:

(a) CDR-L1 as depicted in SEQ ID NO. 27, CDR-L2 as depicted in SEQ ID NO. 28 and CDR-L3 as depicted in SEQ ID NO. 29;

(b) CDR-L1 as depicted in SEQ ID NO. 117, CDR-L2 as depicted in SEQ ID NO. 118 and CDR-L3 as depicted in SEQ ID NO. 119; and

(c) CDR-L1 as depicted in SEQ ID NO. 153, CDR-L2 as depicted in SEQ ID NO. 154 and CDR-L3 as depicted in SEQ ID NO. 155.

The variable regions, i.e. the variable light chain ("L" or "VL") and the variable heavy chain ("H" or "VH") are understood in the art to provide the binding domain of an antibody. This variable regions harbor the complementary determining regions.
The term "complementary determining region" (CDR) is well known in the art to dictate the antigen specificity of an antibody. The term "CDR-L" or "L CDR" or "LCDR" refers to CDRs in the VL, whereas the term "CDR-H" or "H CDR" or HCDR" refers to the CDRs in the VH.

In an alternatively preferred embodiment of the bispecific single chain antibody molecule of the invention the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region comprising CDR-H 1, CDR-H2 and CDR-H3 selected from:

(a) CDR-H1 as depicted in SEQ ID NO. 12, CDR-H2 as depicted in SEQ ID NO. 13 and CDR-H3 as depicted in SEQ ID NO. 14;

(b) CDR-H1 as depicted in SEQ ID NO. 30, CDR-H2 as depicted in SEQ ID NO. 31 and CDR-H3 as depicted in SEQ ID NO. 32;

(c) CDR-H1 as depicted in SEQ ID NO. 48, CDR-H2 as depicted in SEQ ID NO. 49 and CDR-H3 as depicted in SEQ ID NO. 50;

(d) CDR-H1 as depicted in SEQ ID NO. 66, CDR-H2 as depicted in SEQ ID NO. 67 and CDR-H3 as depicted in SEQ ID NO. 68;

(e) CDR-H1 as depicted in SEQ ID NO. 84, CDR-H2 as depicted in SEQ ID NO. 85 and CDR-H3 as depicted in SEQ ID NO. 86;

(f) CDR-H1 as depicted in SEQ ID NO. 102, CDR-H2 as depicted in SEQ ID NO. 103 and CDR-H3 as depicted in SEQ ID NO. 104;

(g) CDR-H1 as depicted in SEQ ID NO. 120, CDR-H2 as depicted in SEQ ID NO. 121 and CDR-H3 as depicted in SEQ ID NO. 122;

(h) CDR-H1 as depicted in SEQ ID NO. 138, CDR-H2 as depicted in SEQ ID NO. 139 and CDR-H3 as depicted in SEQ ID NO. 140;

(i) CDR-H1 as depicted in SEQ ID NO. 156, CDR-H2 as depicted in SEQ ID NO. 157 and CDR-H3 as depicted in SEQ ID NO. 158; and

(j) CDR-H1 as depicted in SEQ ID NO. 174, CDR-H2 as depicted in SEQ ID NO. 175 and CDR-H3 as depicted in SEQ ID NO. 176.

It is further preferred that the binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region selected from the group consisting of a VL region as depicted in SEQ ID NO. 35, 39, 125, 129, 161 or 165.

It is alternatively preferred that the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region selected from the group consisting of a VH region as depicted in SEQ ID NO. 15, 19, 33, 37, 51, 55, 69, 73, 87, 91, 105, 109, 123, 127, 141, 145, 159, 163, 177 or 181.

More preferably, the bispecific single chain antibody molecule of the invention is characterized by the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain, which comprises a VL region and a VH region selected from the group consisting of:

(a) a VL region as depicted in SEQ ID NO. 17 or 21 and a VH region as depicted in SEQ ID NO. 15 or 19;

(b) a VL region as depicted in SEQ ID NO. 35 or 39 and a VH region as depicted in SEQ ID NO. 33 or 37;

(c) a VL region as depicted in SEQ ID NO. 53 or 57 and a VH region as depicted in SEQ ID NO. 51 or 55;

(d) a VL region as depicted in SEQ ID NO. 71 or 75 and a VH region as depicted in SEQ ID NO. 69 or 73;

(e) a VL region as depicted in SEQ ID NO. 89 or 93 and a VH region as depicted in SEQ ID NO. 87 or 91;

(f) a VL region as depicted in SEQ ID NO. 107 or 111 and a VH region as depicted in SEQ ID NO. 105 or 109;

(g) a VL region as depicted in SEQ ID NO. 125 or 129 and a VH region as depicted in SEQ ID NO. 123 or 127;

(h) a VL region as depicted in SEQ ID NO. 143 or 147 and a VH region as depicted in SEQ ID NO. 141 or 145;

(i) a VL region as depicted in SEQ ID NO. 161 or 165 and a VH region as depicted in SEQ ID NO. 159 or 163; and

(j) a VL region as depicted in SEQ ID NO. 179 or 183 and a VH region as depicted in SEQ ID NO. 177 or 181.

According to a preferred embodiment of the bispecific single chain antibody molecule of the invention the pairs of VH-regions and VL-regions in the first binding domain binding to CD3 epsilon are in the format of a single chain antibody (scFv). The VH and VL regions are arranged in the order VH-VL or VL-VH. It is preferred that the VH-region is positioned N-terminally to a linker sequence. The VL-region is positioned C-terminally of the linker sequence. Put in other words, the domain arrangement in the CD3 binding domain of the bispecific single chain antibody molecule of the invention is preferably VH-VL, with said CD3 binding domain located C-terminally to the second (cell surface antigen, such as PSMA) binding domain. Preferably the VH-VL comprises or is SEQ ID NO. 185.

A preferred embodiment of the above described bispecific single chain antibody molecule of the invention is characterized by the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 23, 25, 41, 43, 59, 61, 77, 79, 95, 97, 113, 115, 131, 133, 149, 151, 167, 169, 185 or 187.

The invention further relates to an above described bispecific single chain antibody, wherein the second binding domain binds to the cell surface antigen PSMA.

According to a preferred embodiment of the invention an above characterized bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from the group consisting of:

a) CDR H1-3 of SEQ ID NO: 394 – 396 and CDR L1-3 of SEQ ID NO: 389 – 391;

b) CDR H1-3 of SEQ ID NO: 408 – 410 and CDR L1-3 of SEQ ID NO: 403 – 405;

c) CDR H1-3 of SEQ ID NO: 422 – 424 and CDR L1-3 of SEQ ID NO: 417 – 419;

d) CDR H1-3 of SEQ ID NO: 436 – 438 and CDR L1-3 of SEQ ID NO: 431 – 433;

e) CDR H1-3 of SEQ ID NO: 445 – 447 and CDR L1-3 of SEQ ID NO: 450 – 452;

f) CDR H1-3 of SEQ ID NO: 464 – 466 and CDR L1-3 of SEQ ID NO: 459 – 461;

g) CDR H1-3 of SEQ ID NO: 478 – 480 and CDR L1-3 of SEQ ID NO: 473 – 475;

h) CDR H1-3 of SEQ ID NO: 492 – 494 and CDR L1-3 of SEQ ID NO: 487 – 489;

i) CDR H1-3 of SEQ ID NO: 506 – 508 and CDR L1-3 of SEQ ID NO: 501 – 503;

j) CDR H1-3 of SEQ ID NO: 520 – 522 and CDR L1-3 of SEQ ID NO: 515 – 517;

k) CDR H1-3 of SEQ ID NO: 534 – 536 and CDR L1-3 of SEQ ID NO: 529 – 531;

l) CDR H1-3 of SEQ ID NO: 548 – 550 and CDR L1-3 of SEQ ID NO: 543 – 545;

m) CDR H1-3 of SEQ ID NO: 562 – 564 and CDR L1-3 of SEQ ID NO: 557 – 559;

n) CDR H1-3 of SEQ ID NO: 576 – 578 and CDR L1-3 of SEQ ID NO: 571 – 573;

o) CDR H1-3 of SEQ ID NO: 590 – 592 and CDR L1-3 of SEQ ID NO: 585 – 587;

p) CDR H1-3 of SEQ ID NO: 604 – 606 and CDR L1-3 of SEQ ID NO: 599 – 601;

q) CDR H1-3 of SEQ ID NO: 618 – 620 and CDR L1-3 of SEQ ID NO: 613 – 615;

r) CDR H1-3 of SEQ ID NO: 632 – 634 and CDR L1-3 of SEQ ID NO: 627 – 629;

s) CDR H1-3 of SEQ ID NO: 646 – 648 and CDR L1-3 of SEQ ID NO: 641 – 643;

t) CDR H1-3 of SEQ ID NO: 660 – 662 and CDR L1-3 of SEQ ID NO: 655 – 657;

u) CDR H1-3 of SEQ ID NO: 674 – 676 and CDR L1-3 of SEQ ID NO: 669 – 671;

v) CDR H1-3 of SEQ ID NO: 688 – 690 and CDR L1-3 of SEQ ID NO: 683 – 685;

w) CDR H1-3 of SEQ ID NO: 702 – 704 and CDR L1-3 of SEQ ID NO: 697 – 699;

x) CDR H1-3 of SEQ ID NO: 716 – 718 and CDR L1-3 of SEQ ID NO: 711 – 713; and

y) CDR H1-3 of SEQ ID NO: 729 – 731 and CDR L1-3 of SEQ ID NO: 724 – 726.

The sequences of the corresponding VL- and VH-regions of the second binding domain of the bispecific single chain antibody molecule of the invention as well as of the respective scFvs are shown in the sequence listing.

In the bispecific single chain antibody molecule of the invention the binding domains are arranged in the order VL-VH-VH-VL, VL-VH-VL-VH, VH-VL-VH-VL or VH-VL-VL-VH, as exemplified in the appended examples. Preferably, the binding domains are arranged in the order VH PSMA-VL PSMA-VH CD3-VL CD3 or VL PSMA-VH PSMA-VH CD3-VL CD3.

A particularly preferred embodiment of the invention concerns an above characterized polypeptide, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 399, 413, 427, 441, 455, 469, 483, 497, 511, 525, 539, 553, 567, 581, 595, 609, 623, 637, 651, 665, 679, 693, 707, 721, 734, 799, 817, 863, 849, 835, 785, 899, 935, 1017, 1031, 917, 1003, 953, 971 or 989;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 400, 414, 428, 442, 456, 470, 484, 498, 512, 526, 540, 554, 568, 582, 596, 610, 624, 638, 652, 666, 680, 694, 708, 736 735, 800, 818, 864, 850, 836, 786, 882, 900, 936, 1018, 1032, 918, 1004, 954, 972, 990, 804, 822, 868, 886, 904, 940, 922, 958 or 976;

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

The invention relates to a bispecific single chain antibody molecule comprising an amino acid sequence as depicted in any of SEQ ID NOs: 399, 413, 427, 441, 455, 469, 483, 497, 511, 525, 539, 553, 567, 581, 595, 609, 623, 637, 651, 665, 679, 693, 707, 721, 734, 799, 817, 863, 849, 835, 785, 899, 935, 1017, 1031, 917, 1003, 953, 971 or 989, as well as to amino acid sequences at least 85% identical, preferably 90 %, more preferred at least 95 % identical, most preferred at least 96, 97, 98, or 99 % identical to the amino acid sequence of SEQ ID NOs: 399, 413, 427, 441, 455, 469, 483, 497, 511, 525, 539, 553, 567, 581, 595, 609, 623, 637, 651, 665, 679, 693, 707, 721, 734, 799, 817, 863, 849, 835, 785, 899, 935, 1017, 1031, 917, 1003, 953, 971 or 989. The invention relates also to the corresponding nucleic acid sequences as depicted in any of SEQ ID NOs: 400, 414, 428, 442, 456, 470, 484, 498, 512, 526, 540, 554, 568, 582, 596, 610, 624, 638, 652, 666, 680, 694, 708, 736 735, 800, 818, 864, 850, 836, 786, 882, 900, 936, 1018, 1032, 918, 1004, 954, 972, 990, 804, 822, 868, 886, 904, 940, 922, 958 or 976 as well as to nucleic acid sequences at least 85% identical, preferably 90 %, more preferred at least 95 % identical, most preferred at least 96, 97, 98, or 99 % identical to the nucleic acid sequences shown in SEQ ID

NOs: 400, 414, 428, 442, 456, 470, 484, 498, 512, 526, 540, 554, 568, 582, 596, 610, 624, 638, 652, 666, 680, 694, 708, 736, 735, 800, 818, 864, 850, 836, 786, 882, 900, 936, 1018, 1032, 918, 1004, 954, 972, 990, 804, 822, 868, 886, 904, 940, 922, 958 or 976. It is to be understood that the sequence identity is determined over the entire nucleotide or amino acid sequence. For sequence alignments, for example, the programs Gap or BestFit can be used (Needleman and Wunsch J. Mol. Biol. 48 (1970), 443-453; Smith and Waterman, Adv. Appl. Math 2 (1981), 482-489), which is contained in the GCG software package (Genetics Computer Group, 575 Science Drive, Madison, Wisconsin, USA 53711 (1991). It is a routine method for those skilled in the art to determine and identify a nucleotide or amino acid sequence having e.g. 85% (90%, 95%, 96%, 97%, 98% or 99%) sequence identity to the nucleotide or amino acid sequences of the bispecific single single chain antibody of the invention by using e.g. one of the above mentioned programs. For example, according to Crick's Wobble hypothesis, the 5' base on the anti-codon is not as spatially confined as the other two bases, and could thus have non-standard base pairing. Put in other words: the third position in a codon triplet may vary so that two triplets which differ in this third position may encode the same amino acid residue. Said hypothesis is well known to the person skilled in the art (see e.g. http://en.wikipedia.org/wiki/Wobble_Hypothesis; Crick, J Mol Biol 19 (1966): 548–55).

Preferred domain arrangements in the PSMAxCD3 bispecific single chain antibody constructs of the invention are shown in the following examples.

In a preferred embodiment of the invention, the bispecific single chain antibodies are cross-species specific for CD3 epsilon and for the human and non-chimpanzee primate cell surface antigen PSMA, recognized by their second binding domain.

In an alternative embodiment the present invention provides a nucleic acid sequence encoding an above described bispecific single chain antibody molecule of the invention.

The present invention also relates to a vector comprising the nucleic acid molecule of the present invention.

Many suitable vectors are known to those skilled in molecular biology, the choice of which would depend on the function desired and include plasmids, cosmids, viruses,

bacteriophages and other vectors used conventionally in genetic engineering. Methods which are well known to those skilled in the art can be used to construct various plasmids and vectors; see, for example, the techniques described in Sambrook et al. (loc cit.) and Ausubel, Current Protocols in Molecular Biology, Green Publishing Associates and Wiley Interscience, N.Y. (1989), (1994). Alternatively, the polynucleotides and vectors of the invention can be reconstituted into liposomes for delivery to target cells. As discussed in further details below, a cloning vector was used to isolate individual sequences of DNA. Relevant sequences can be transferred into expression vectors where expression of a particular polypeptide is required. Typical cloning vectors include pBluescript SK, pGEM, pUC9, pBR322 and pGBT9. Typical expression vectors include pTRE, pCAL-n-EK, pESP-1, pOP13CAT.

Preferably said vector comprises a nucleic acid sequence which is a regulatory sequence operably linked to said nucleic acid sequence defined herein.

The term "regulatory sequence" refers to DNA sequences, which are necessary to effect the expression of coding sequences to which they are ligated. The nature of such control sequences differs depending upon the host organism. In prokaryotes, control sequences generally include promoter, ribosomal binding site, and terminators. In eukaryotes generally control sequences include promoters, terminators and, in some instances, enhancers, transactivators or transcription factors. The term "control sequence" is intended to include, at a minimum, all components the presence of which are necessary for expression, and may also include additional advantageous components.

The term "operably linked" refers to a juxtaposition wherein the components so described are in a relationship permitting them to function in their intended manner. A control sequence "operably linked" to a coding sequence is ligated in such a way that expression of the coding sequence is achieved under conditions compatible with the control sequences. In case the control sequence is a promoter, it is obvious for a skilled person that double-stranded nucleic acid is preferably used.

Thus, the recited vector is preferably an expression vector. An "expression vector" is a construct that can be used to transform a selected host and provides for expression of a coding sequence in the selected host. Expression vectors can for instance be cloning vectors, binary vectors or integrating vectors. Expression comprises transcription of the nucleic acid molecule preferably into a translatable mRNA.

Regulatory elements ensuring expression in prokaryotes and/or eukaryotic cells are well known to those skilled in the art. In the case of eukaryotic cells they comprise normally promoters ensuring initiation of transcription and optionally poly-A signals ensuring termination of transcription and stabilization of the transcript. Possible regulatory elements permitting expression in prokaryotic host cells comprise, e.g., the P_L, *lac*, *trp* or *tac* promoter in *E. coli*, and examples of regulatory elements permitting expression in eukaryotic host cells are the *AOX1* or *GAL1* promoter in yeast or the CMV-, SV40-, RSV-promoter (Rous sarcoma virus), CMV-enhancer, SV40-enhancer or a globin intron in mammalian and other animal cells.

Beside elements, which are responsible for the initiation of transcription such regulatory elements may also comprise transcription termination signals, such as the SV40-poly-A site or the tk-poly-A site, downstream of the polynucleotide. Furthermore, depending on the expression system used leader sequences capable of directing the polypeptide to a cellular compartment or secreting it into the medium may be added to the coding sequence of the recited nucleic acid sequence and are well known in the art; see also the appended Examples. The leader sequence(s) is (are) assembled in appropriate phase with translation, initiation and termination sequences, and preferably, a leader sequence capable of directing secretion of translated protein, or a portion thereof, into the periplasmic space or extracellular medium. Optionally, the heterologous sequence can encode a fusion protein including an N-terminal identification peptide imparting desired characteristics, e.g., stabilization or simplified purification of expressed recombinant product; see supra. In this context, suitable expression vectors are known in the art such as Okayama-Berg cDNA expression vector pcDV1 (Pharmacia), pCDM8, pRc/CMV, pcDNA1, pcDNA3 (In-vitrogene), pEF-DHFR, pEF-ADA or pEF-neo (Mack et al. PNAS (1995) 92, 7021-7025 and Raum et al. Cancer Immunol Immunother (2001) 50(3), 141-150) or pSPORT1 (GIBCO BRL).

Preferably, the expression control sequences will be eukaryotic promoter systems in vectors capable of transforming of transfecting eukaryotic host cells, but control sequences for prokaryotic hosts may also be used. Once the vector has been incorporated into the appropriate host, the host is maintained under conditions suitable for high level expression of the nucleotide sequences, and as desired, the collection and purification of the bispecific single chain antibody molecule of the invention may follow; see, e.g., the appended examples.

An alternative expression system, which can be used to express a cell cycle interacting protein is an insect system. In one such system, *Autographa californica* nuclear polyhedrosis virus (AcNPV) is used as a vector to express foreign genes in *Spodoptera frugiperda* cells or in *Trichoplusia* larvae. The coding sequence of a recited nucleic acid molecule may be cloned into a nonessential region of the virus, such as the polyhedrin gene, and placed under control of the polyhedrin promoter. Successful insertion of said coding sequence will render the polyhedrin gene inactive and produce recombinant virus lacking coat protein coat. The recombinant viruses are then used to infect *S. frugiperda* cells or *Trichoplusia* larvae in which the protein of the invention is expressed (Smith, J. Virol. 46 (1983), 584; Engelhard, Proc. Nat. Acad. Sci. USA 91 (1994), 3224-3227).

Additional regulatory elements may include transcriptional as well as translational enhancers. Advantageously, the above-described vectors of the invention comprise a selectable and/or scorable marker.

Selectable marker genes useful for the selection of transformed cells and, e.g., plant tissue and plants are well known to those skilled in the art and comprise, for example, antimetabolite resistance as the basis of selection for dhfr, which confers resistance to methotrexate (Reiss, Plant Physiol. (Life Sci. Adv.) 13 (1994), 143-149); npt, which confers resistance to the aminoglycosides neomycin, kanamycin and paromycin (Herrera-Estrella, EMBO J. 2 (1983), 987-995) and hygro, which confers resistance to hygromycin (Marsh, Gene 32 (1984), 481-485). Additional selectable genes have been described, namely trpB, which allows cells to utilize indole in place of tryptophan; hisD, which allows cells to utilize histinol in place of histidine (Hartman, Proc. Natl. Acad. Sci. USA 85 (1988), 8047); mannose-6-phosphate isomerase which allows cells to utilize mannose (WO 94/20627) and ODC (ornithine decarboxylase) which confers resistance to the ornithine decarboxylase inhibitor, 2-(difluoromethyl)-DL-ornithine, DFMO (McConlogue, 1987, In: Current Communications in Molecular Biology, Cold Spring Harbor Laboratory ed.) or deaminase from Aspergillus terreus which confers resistance to Blasticidin S (Tamura, Biosci. Biotechnol. Biochem. 59 (1995), 2336-2338).

Useful scorable markers are also known to those skilled in the art and are commercially available. Advantageously, said marker is a gene encoding luciferase (Giacomin, Pl. Sci. 116 (1996), 59-72; Scikantha, J. Bact. 178 (1996), 121), green fluorescent protein (Gerdes, FEBS Lett. 389 (1996), 44-47) or ß-glucuronidase

(Jefferson, EMBO J. 6 (1987), 3901-3907). This embodiment is particularly useful for simple and rapid screening of cells, tissues and organisms containing a recited vector.

As described above, the recited nucleic acid molecule can be used alone or as part of a vector to express the bispecific single chain antibody molecule of the invention in cells, for, e.g., purification but also for gene therapy purposes. The nucleic acid molecules or vectors containing the DNA sequence(s) encoding any one of the above described bispecific single chain antibody molecule of the invention is introduced into the cells which in turn produce the polypeptide of interest. Gene therapy, which is based on introducing therapeutic genes into cells by ex-vivo or in-vivo techniques is one of the most important applications of gene transfer. Suitable vectors, methods or gene-delivery systems for in-vitro or in-vivo gene therapy are described in the literature and are known to the person skilled in the art; see, e.g., Giordano, Nature Medicine 2 (1996), 534-539; Schaper, Circ. Res. 79 (1996), 911-919; Anderson, Science 256 (1992), 808-813; Verma, Nature 389 (1994), 239; Isner, Lancet 348 (1996), 370-374; Muhlhauser, Circ. Res. 77 (1995), 1077-1086; Onodera, Blood 91 (1998), 30-36; Verma, Gene Ther. 5 (1998), 692-699; Nabel, Ann. N.Y. Acad. Sci. 811 (1997), 289-292; Verzeletti, Hum. Gene Ther. 9 (1998), 2243-51; Wang, Nature Medicine 2 (1996), 714-716; WO 94/29469; WO 97/00957, US 5,580,859; US 5,589,466; or Schaper, Current Opinion in Biotechnology 7 (1996), 635-640; dos Santos Coura and Nardi Virol J. (2007), 4:99. The recited nucleic acid molecules and vectors may be designed for direct introduction or for introduction via liposomes, or viral vectors (e.g., adenoviral, retroviral) into the cell. Preferably, said cell is a germ line cell, embryonic cell, or egg cell or derived there from, most preferably said cell is a stem cell. An example for an embryonic stem cell can be, inter alia, a stem cell as described in Nagy, Proc. Natl. Acad. Sci. USA 90 (1993), 8424-8428.

The invention also provides for a host transformed or transfected with a vector of the invention. Said host may be produced by introducing the above described vector of the invention or the above described nucleic acid molecule of the invention into the host. The presence of at least one vector or at least one nucleic acid molecule in the host may mediate the expression of a gene encoding the above described single chain antibody constructs.

The described nucleic acid molecule or vector of the invention, which is introduced in the host may either integrate into the genome of the host or it may be maintained extrachromosomally.

The host can be any prokaryote or eukaryotic cell.

The term "prokaryote" is meant to include all bacteria, which can be transformed or transfected with DNA or RNA molecules for the expression of a protein of the invention. Prokaryotic hosts may include gram negative as well as gram positive bacteria such as, for example, E. coli, S. typhimurium, Serratia marcescens and Bacillus subtilis. The term "eukaryotic" is meant to include yeast, higher plant, insect and preferably mammalian cells. Depending upon the host employed in a recombinant production procedure, the protein encoded by the polynucleotide of the present invention may be glycosylated or may be non-glycosylated. Especially preferred is the use of a plasmid or a virus containing the coding sequence of the bispecific single chain antibody molecule of the invention and genetically fused thereto an N-terminal FLAG-tag and/or C-terminal His-tag. Preferably, the length of said FLAG-tag is about 4 to 8 amino acids, most preferably 8 amino acids. An above described polynucleotide can be used to transform or transfect the host using any of the techniques commonly known to those of ordinary skill in the art. Furthermore, methods for preparing fused, operably linked genes and expressing them in, e.g., mammalian cells and bacteria are well-known in the art (Sambrook, loc cit.).

Preferably, said the host is a bacterium or an insect, fungal, plant or animal cell.

It is particularly envisaged that the recited host may be a mammalian cell. Particularly preferred host cells comprise CHO cells, COS cells, myeloma cell lines like SP2/0 or NS/0. As illustrated in the appended examples, particularly preferred are CHO-cells as hosts.

More preferably said host cell is a human cell or human cell line, e.g. per.c6 (Kroos, Biotechnol. Prog., 2003, 19:163-168).

In a further embodiment, the present invention thus relates to a process for the production of a bispecific single chain antibody molecule of the invention, said process comprising culturing a host of the invention under conditions allowing the expression of the bispecific single chain antibody molecule of the invention and recovering the produced polypeptide from the culture.

The transformed hosts can be grown in fermentors and cultured according to techniques known in the art to achieve optimal cell growth. The bispecific single chain antibody molecule of the invention can then be isolated from the growth medium, cellular lysates, or cellular membrane fractions. The isolation and purification of the, e.g., microbially expressed bispecific single chain antibody molecules may be by any conventional means such as, for example, preparative chromatographic separations and immunological separations such as those involving the use of monoclonal or polyclonal antibodies directed, e.g., against a tag of the bispecific single chain antibody molecule of the invention or as described in the appended examples.

The conditions for the culturing of a host, which allow the expression are known in the art to depend on the host system and the expression system/vector used in such process. The parameters to be modified in order to achieve conditions allowing the expression of a recombinant polypeptide are known in the art. Thus, suitable conditions can be determined by the person skilled in the art in the absence of further inventive input.

Once expressed, the bispecific single chain antibody molecule of the invention can be purified according to standard procedures of the art, including ammonium sulfate precipitation, affinity columns, column chromatography, gel electrophoresis and the like; see, Scopes, "Protein Purification", Springer-Verlag, N.Y. (1982). Substantially pure polypeptides of at least about 90 to 95% homogeneity are preferred, and 98 to 99% or more homogeneity are most preferred, for pharmaceutical uses. Once purified, partially or to homogeneity as desired, the bispecific single chain antibody molecule of the invention may then be used therapeutically (including extracorporeally) or in developing and performing assay procedures. Furthermore, examples for methods for the recovery of the bispecific single chain antibody molecule of the invention from a culture are described in detail in the appended examples. The recovery can also be achieved by a method for the isolation of the bispecific single chain antibody molecule of the invention capable of binding to an epitope of human and non-chimpanzee primate CD3 epsilon (CD3ε, the method comprising the steps of:

(a) contacting the polypeptide(s) with an N-terminal fragment of the extracellular domain of CD3ε of maximal 27 amino acids comprising the amino acid sequence

Gln-Asp-Gly-Asn-Glu-Glu-Met-Gly (SEQ ID NO. 341) or Gln-Asp-Gly-Asn-Glu-Glu-Ile-Gly (SEQ ID NO. 342), fixed via its C-terminus to a solid phase;

(b) eluting the bound polypeptide(s) from said fragment; and

(c) isolating the polypeptide(s) from the eluate of (b).

It is preferred that the polypeptide(s) isolated by the above method of the invention are of human origin.

This method or the isolation of the bispecific single chain antibody molecule of the invention is understood as a method for the isolation of one or more different polypeptides with the same specificity for the fragment of the extracellular domain of CD3ε comprising at its N-terminus the amino acid sequence Gln-Asp-Gly-Asn-Glu-Glu-Met-Gly (SEQ ID NO. 341) or Gln-Asp-Gly-Asn-Glu-Glu-Ile-Gly (SEQ ID NO. 342) from a plurality of polypeptide candidates as well as a method for the purification of a polypeptide from a solution. A non-limiting example for the latter method for the purification of a bispecific single chain antibody molecule from a solution is e.g. the purification of a recombinantly expressed bispecific single chain antibody molecule from a culture supernatant or a preparation from such culture.

As stated above the fragment used in this method is an N-terminal fragment of the extracellular domain of the primate CD3ε molecule. The amino acid sequence of the extracellular domain of the CD3ε molecule of different species is depicted in SEQ ID NOs: 1, 3, 5 and 7. The two forms of the N-terminal octamer are depicted in SEQ ID NOs: 341 and 342. It is preferred that this N-terminus is freely available for binding of the polypeptides to be identified by the method of the invention. The term "freely available" is understood in the context of the invention as free of additional motives such as a His-tag. The interference of such a His-tag with a binding molecule identified by the method of the invention is described in the appended Examples 6 and 20.

According to this method said fragment is fixed via its C-terminus to a solid phase. The person skilled in the art will easily and without any inventive ado elect a suitable solid phase support dependent from the used embodiment of the method of the invention. Examples for a solid support comprise but are not limited to matrices like beads (e.g. agarose beads, sepharose beads, polystyrol beads, dextran beads), plates (culture plates or MultiWell plates) as well as chips known e.g. from Biacore®. The selection of the means and methods for the fixation/immobilization of the fragment to said solid support depend on the election of the solid support. A

commonly used method for the fixation/immobilization is a coupling via an N-hydroxysuccinimide (NHS) ester. The chemistry underlying this coupling as well as alternative methods for the fixation/immobilization are known to the person skilled in the art, e.g. from Hermanson "Bioconjugate Techniques", Academic Press, Inc. (1996). For the fixation to/immobilization on chromatographic supports the following means are commonly used: NHS-activated sepharose (e.g. HiTrap-NHS of GE Life Science-Amersham), CnBr-activated sepharose (e.g. GE Life Science-Amersham), NHS-activated dextran beads (Sigma) or activated polymethacrylate. These reagents may also be used in a batch approach. Moreover, dextran beads comprising iron oxide (e.g. available from Miltenyi) may be used in a batch approach. These beads may be used in combination with a magnet for the separation of the beads from a solution. Polypeptides can be immobilized on a Biacore chip (e.g. CM5 chips) by the use of NHS activated carboxymethyldextran. Further examples for an appropriate solid support are amine reactive MultiWell plates (e.g. Nunc Immobilizer^{TM} plates). According to this method said fragment of the extracellular domain of CD3 epsilon can be directly coupled to the solid support or via a stretch of amino acids, which might be a linker or another protein/polypeptide moiety. Alternatively, the extracellular domain of CD3 epsilon can be indirectly coupled via one or more adaptor molecule(s).

Means and methods for the eluation of a peptide or polypeptide bound to an immobilized epitope are well known in the art. The same holds true for methods for the isolation of the identified polypeptide(s) from the eluate.

A method for the isolation of one or more different bispecific single chain antibody molecule(s) with the same specificity for the fragment of the extracellular domain of CD3ε comprising at its N-terminus the amino acid sequence Gln-Asp-Gly-Asn-Glu-Glu-X-Gly (with X being Met or Ile) from a plurality of polypeptide candidates may comprise one or more steps of the following methods for the selection of antigen-specific entities:

CD3ε specific binding domains can be selected from antibody derived repertoires. A phage display library can be constructed based on standard procedures, as for example disclosed in "Phage Display: A Laboratory Manual"; Ed. Barbas, Burton, Scott & Silverman; Cold Spring Harbor Laboratory Press, 2001. The format of the antibody fragments in the antibody library can be scFv, but may generally also be a Fab fragment or even a single domain antibody fragment. For the isolation of

antibody fragments naïve antibody fragment libraries may be used. For the selection of potentially low immunogenic binding entities in later therapeutic use, human antibody fragment libraries may be favourable for the direct selection of human antibody fragments. In some cases they may form the basis for synthetic antibody libraries (Knappik et al. J Mol. Biol. 2000, 296:57 ff). The corresponding format may be Fab, scFv (as described below) or domain antibodies (dAbs, as reviewed in Holt et al., Trends Biotechnol. 2003, 21:484 ff).

It is also known in the art that in many cases there is no immune human antibody source available against the target antigen. Therefore animals are immunized with the target antigen and the respective antibody libraries isolated from animal tissue as e.g. spleen or PBMCs. The N-terminal fragment may be biotinylated or covalently linked to proteins like KLH or bovine serum albumin (BSA). According to common approaches rodents are used for immunization. Some immune antibody repertoires of non-human origin may be especially favourable for other reasons, e.g. for the presence of single domain antibodies (VHH) derived from cameloid species (as described in Muyldermans, J Biotechnol. 74:277; De Genst et al. Dev Como Immunol. 2006, 30:187 ff). Therefore a corresponding format of the antibody library may be Fab, scFv (as described below) or single domain antibodies (VHH).

In one possible approach ten weeks old F1 mice from balb/c x C57black crossings can be immunized with whole cells e.g. expressing transmembrane EpCAM N-terminally displaying as translational fusion the N-terminal amino acids 1 to 27 of the mature CD3ε chain. Alternatively, mice can be immunized with 1-27 CD3 epsilon-Fc fusion protein (a corresponding approach is described in the appended Example 2). After booster immunization(s), blood samples can be taken and antibody serum titer against the CD3-positive T cells can be tested e.g. in FACS analysis. Usually, serum titers are significantly higher in immunized than in non-immunized animals.

Immunized animals may form the basis for the construction of immune antibody libraries. Examples of such libraries comprise phage display libraries. Such libraries may be generally constructed based on standard procedures, as for example disclosed in "Phage Display: A Laboratory Manual"; Ed. Barbas, Burton, Scott & Silverman; Cold Spring Harbor Laboratory Press, 2001.

The non-human antibodies can also be humanized via phage display due to the generation of more variable antibody libraries that can be subsequently enriched for binders during selection.

In a phage display approach any one of the pools of phages that displays the antibody libraries forms a basis to select binding entities using the respective antigen as target molecule. The central step in which antigen specific, antigen bound phages are isolated is designated as panning. Due to the display of the antibody fragments on the surface of the phages, this general method is called phage display. One preferred method of selection is the use of small proteins such as the filamentous phage N2 domain translationally fused to the N-terminus of the scFv displayed by the phage. Another display method known in the art, which may be used to isolate binding entities is the ribosome display method (reviewed in Groves & Osbourn, Expert Opin Biol Ther. 2005, 5:125 ff; Lipovsek & Pluckthun, J Immunol Methods 2004, 290:52 ff). In order to demonstrate binding of scFv phage particles to a 1-27 CD3ε-Fc fusion protein a phage library carrying the cloned scFv-repertoire can be harvested from the respective culture supernatant by PEG (polyethyleneglycole). ScFv phage particles may be incubated with immobilized CD3ε Fc fusion protein. The immobilized CD3ε Fc fusion protein may be coated to a solid phase. Binding entities can be eluted and the eluate can be used for infection of fresh uninfected bacterial hosts. Bacterial hosts successfully transduced with a phagemid copy, encoding a human scFv-fragment, can be selected again for carbenicillin resistance and subsequently infected with e.g. VCMS 13 helper phage to start the second round of antibody display and in vitro selection. A total of 4 to 5 rounds of selections is carried out, normally. The binding of isolated binding entities can be tested on CD3 epsilon positive Jurkat cells, HPBall cells, PBMCs or transfected eukaryotic cells that carry the N-terminal CD3ε sequence fused to surface displayed EpCAM using a flow cytometric assay (see appended Example 4).

Preferably, the above method may be a method, wherein the fragment of the extracellular domain of CD3ε consists of one or more fragments of a polypeptide having an amino acid sequence of any one depicted in SEQ ID NOs. 2, 4, 6 or 8. More preferably, said fragment is 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 amino acid residues in length.

This method of identification of a bispecific single chain antibody molecule may be a method of screening a plurality of bispecific single chain antibody molecules comprising a cross-species specific binding domain binding to an epitope of human and non-chimpanzee primate CD3ε. Alternatively, the method of identification is a method of purification/isolation of a bispecific single chain antibody molecule

comprising a cross-species specific binding domain binding to an epitope of human and non-chimpanzee primate CD3ε.

Furthermore, the invention provides for a composition comprising a bispecific single chain antibody molecule of the invention or a bispecific single chain antibody as produced by the process disclosed above. Preferably, said composition is a pharmaceutical composition.

The invention provides also for a bispecific single chain antibody molecule as defined herein, or produced according to the process as defined herein, wherein said bispecific single chain antibody molecule is for use in the prevention, treatment or amelioration of cancer. Preferably, said cancer is a solid tumor, more preferably a carcinoma or prostate cancer. It is preferred that the bispecific single chain is further comprising suitable formulations of carriers, stabilizers and/or excipients. Moreover, it is preferred that said bispecific single chain antibody molecule is suitable to be administered in combination with an additional drug. Said drug may be a non-proteinaceous compound or a proteinaceous compound and may be administered simultaneously or non-simultaneously with the bispecific single chain antibody molecule as defined herein.

In accordance with the invention, the term "pharmaceutical composition" relates to a composition for administration to a patient, preferably a human patient. The particular preferred pharmaceutical composition of this invention comprises bispecific single chain antibodies directed against and generated against context-independent CD3 epitopes. Preferably, the pharmaceutical composition comprises suitable formulations of carriers, stabilizers and/or excipients. In a preferred embodiment, the pharmaceutical composition comprises a composition for parenteral, transdermal, intraluminal, intraarterial, intrathecal and/or intranasal administration or by direct injection into tissue. It is in particular envisaged that said composition is administered to a patient via infusion or injection. Administration of the suitable compositions may be effected by different ways, e.g., by intravenous, intraperitoneal, subcutaneous, intramuscular, topical or intradermal administration. In particular, the present invention provides for an uninterrupted administration of the suitable composition. As a non-limiting example, uninterrupted, i.e. continuous administration may be realized

by a small pump system worn by the patient for metering the influx of therapeutic agent into the body of the patient. The pharmaceutical composition comprising the bispecific single chain antibodies directed against and generated against context-independent CD3 epitopes of the invention can be administered by using said pump systems. Such pump systems are generally known in the art, and commonly rely on periodic exchange of cartridges containing the therapeutic agent to be infused. When exchanging the cartridge in such a pump system, a temporary interruption of the otherwise uninterrupted flow of therapeutic agent into the body of the patient may ensue. In such a case, the phase of administration prior to cartridge replacement and the phase of administration following cartridge replacement would still be considered within the meaning of the pharmaceutical means and methods of the invention together make up one "uninterrupted administration" of such therapeutic agent.

The continuous or uninterrupted administration of these bispecific single chain antibodies directed against and generated against context-independent CD3 epitopes of this invention may be intravenuous or subcutaneous by way of a fluid delivery device or small pump system including a fluid driving mechanism for driving fluid out of a reservoir and an actuating mechanism for actuating the driving mechanism. Pump systems for subcutaneous administration may include a needle or a cannula for penetrating the skin of a patient and delivering the suitable composition into the patient's body. Said pump systems may be directly fixed or attached to the skin of the patient independently of a vein, artery or blood vessel, thereby allowing a direct contact between the pump system and the skin of the patient. The pump system can be attached to the skin of the patient for 24 hours up to several days. The pump system may be of small size with a reservoir for small volumes. As a non-limiting example, the volume of the reservoir for the suitable pharmaceutical composition to be administered can be between 0.1 and 50 ml.

The continuous administration may be transdermal by way of a patch worn on the skin and replaced at intervals. One of skill in the art is aware of patch systems for drug delivery suitable for this purpose. It is of note that transdermal administration is especially amenable to uninterrupted administration, as exchange of a first exhausted patch can advantageously be accomplished simultaneously with the placement of a new, second patch, for example on the surface of the skin immediately adjacent to the first exhausted patch and immediately prior to removal of the first exhausted patch. Issues of flow interruption or power cell failure do not arise.

The composition of the present invention, comprising in particular bispecific single chain antibodies directed against and generated against context-independent CD3 epitopes may further comprise a pharmaceutically acceptable carrier. Examples of suitable pharmaceutical carriers are well known in the art and include solutions, e.g. phosphate buffered saline solutions, water, emulsions, such as oil/water emulsions, various types of wetting agents, sterile solutions, liposomes, etc. Compositions comprising such carriers can be formulated by well known conventional methods. Formulations can comprise carbohydrates, buffer solutions, amino acids and/or surfactants. Carbohydrates may be non-reducing sugars, preferably trehalose, sucrose, octasulfate, sorbitol or xylitol. Such formulations may be used for continuous administrations which may be intravenuous or subcutaneous with and/or without pump systems. Amino acids may be charged amino acids, preferably lysine, lysine acetate, arginine, glutamate and/or histidine. Surfactants may be detergents, preferably with a molecular weight of >1.2 KD and/or a polyether, preferably with a molecular weight of >3 KD. Non-limiting examples for preferred detergents are Tween 20, Tween 40, Tween 60, Tween 80 or Tween 85. Non-limiting examples for preferred polyethers are PEG 3000, PEG 3350, PEG 4000 or PEG 5000. Buffer systems used in the present invention can have a preferred pH of 5-9 and may comprise citrate, succinate, phosphate, histidine and acetate. The compositions of the present invention can be administered to the subject at a suitable dose which can be determined e.g. by dose escalating studies by administration of increasing doses of the bispecific single chain antibody molecule of the invention exhibiting cross-species specificity described herein to non-chimpanzee primates, for instance macaques. As set forth above, the bispecific single chain antibody molecule of the invention exhibiting cross-species specificity described herein can be advantageously used in identical form in preclinical testing in non-chimpanzee primates and as drug in humans. These compositions can also be administered in combination with other proteinaceous and non-proteinaceous drugs. These drugs may be administered simultaneously with the composition comprising the bispecific single chain antibody molecule of the invention as defined herein or separately before or after administration of said polypeptide in timely defined intervals and doses. The dosage regimen will be determined by the attending physician and clinical factors. As is well known in the medical arts, dosages for any one patient depend upon many factors,

including the patient's size, body surface area, age, the particular compound to be administered, sex, time and route of administration, general health, and other drugs being administered concurrently. Preparations for parenteral administration include sterile aqueous or non-aqueous solutions, suspensions, and emulsions. Examples of non-aqueous solvents are propylene glycol, polyethylene glycol, vegetable oils such as olive oil, and injectable organic esters such as ethyl oleate. Aqueous carriers include water, alcoholic/aqueous solutions, emulsions or suspensions, including saline and buffered media. Parenteral vehicles include sodium chloride solution, Ringer's dextrose, dextrose and sodium chloride, lactated Ringer's, or fixed oils. Intravenous vehicles include fluid and nutrient replenishers, electrolyte replenishers (such as those based on Ringer's dextrose), and the like. Preservatives and other additives may also be present such as, for example, antimicrobials, anti-oxidants, chelating agents, inert gases and the like. In addition, the composition of the present invention might comprise proteinaceous carriers, like, e.g., serum albumin or immunoglobulin, preferably of human origin. It is envisaged that the composition of the invention might comprise, in addition to the bispecific single chain antibody molecule of the invention defined herein, further biologically active agents, depending on the intended use of the composition. Such agents might be drugs acting on the gastro-intestinal system, drugs acting as cytostatica, drugs preventing hyperurikemia, drugs inhibiting immunoreactions (e.g. corticosteroids), drugs modulating the inflammatory response, drugs acting on the circulatory system and/or agents such as cytokines known in the art.

The biological activity of the pharmaceutical composition defined herein can be determined for instance by cytotoxicity assays, as described in the following examples, in WO 99/54440 or by Schlereth et al. (Cancer Immunol. Immunother. 20 (2005), 1 – 12). "Efficacy" or "in vivo efficacy" as used herein refers to the response to therapy by the pharmaceutical composition of the invention, using e.g. standardized NCI response criteria. The success or *in vivo* efficacy of the therapy using a pharmaceutical composition of the invention refers to the effectiveness of the composition for its intended purpose, i.e. the ability of the composition to cause its desired effect, i.e. depletion of pathologic cells, e.g. tumor cells. The *in vivo* efficacy may be monitored by established standard methods for the respective disease entities including, but not limited to white blood cell counts, differentials, Fluorescence Activated Cell Sorting, bone marrow aspiration. In addition, various

disease specific clinical chemistry parameters and other established standard methods may be used. Furthermore, computer-aided tomography, X-ray, nuclear magnetic resonance tomography (e.g. for National Cancer Institute-criteria based response assessment [Cheson BD, Horning SJ, Coiffier B, Shipp MA, Fisher RI, Connors JM, Lister TA, Vose J, Grillo-Lopez A, Hagenbeek A, Cabanillas F, Klippensten D, Hiddemann W, Castellino R, Harris NL, Armitage JO, Carter W, Hoppe R, Canellos GP. Report of an international workshop to standardize response criteria for non-Hodgkin's lymphomas. NCI Sponsored International Working Group. J Clin Oncol. 1999 Apr;17(4):1244]), positron-emission tomography scanning, white blood cell counts, differentials, Fluorescence Activated Cell Sorting, bone marrow aspiration, lymph node biopsies/histologies, and various cancer specific clinical chemistry parameters (e.g. lactate dehydrogenase) and other established standard methods may be used.

Another major challenge in the development of drugs such as the pharmaceutical composition of the invention is the predictable modulation of pharmacokinetic properties. To this end, a pharmacokinetic profile of the drug candidate, i.e. a profile of the pharmacokinetic parameters that effect the ability of a particular drug to treat a given condition, is established. Pharmacokinetic parameters of the drug influencing the ability of a drug for treating a certain disease entity include, but are not limited to: half-life, volume of distribution, hepatic first-pass metabolism and the degree of blood serum binding. The efficacy of a given drug agent can be influenced by each of the parameters mentioned above.

"Half-life" means the time where 50% of an administered drug are eliminated through biological processes, e.g. metabolism, excretion, etc.

By "hepatic first-pass metabolism" is meant the propensity of a drug to be metabolized upon first contact with the liver, i.e. during its first pass through the liver.

"Volume of distribution" means the degree of retention of a drug throughout the various compartments of the body, like e.g. intracellular and extracellular spaces, tissues and organs, etc. and the distribution of the drug within these compartments.

"Degree of blood serum binding" means the propensity of a drug to interact with and bind to blood serum proteins, such as albumin, leading to a reduction or loss of biological activity of the drug.

Pharmacokinetic parameters also include bioavailability, lag time (Tlag), Tmax, absorption rates, more onset and/or Cmax for a given amount of drug administered.
"Bioavailability" means the amount of a drug in the blood compartment.
"Lag time" means the time delay between the administration of the drug and its detection and measurability in blood or plasma.
"Tmax" is the time after which maximal blood concentration of the drug is reached, and "Cmax" is the blood concentration maximally obtained with a given drug. The time to reach a blood or tissue concentration of the drug which is required for its biological effect is influenced by all parameters. Pharmacokinetik parameters of bispecific single chain antibodies exhibiting cross-species specificity, which may be determined in preclinical animal testing in non-chimpanzee primates as outlined above are also set forth e.g. in the publication by Schlereth et al. (Cancer Immunol. Immunother. 20 (2005), 1 – 12).

The term "toxicity" as used herein refers to the toxic effects of a drug manifested in adverse events or severe adverse events. These side events might refer to a lack of tolerability of the drug in general and/or a lack of local tolerance after administration. Toxicity could also include teratogenic or carcinogenic effects caused by the drug.

The term "safety", "in vivo safety" or "tolerability" as used herein defines the administration of a drug without inducing severe adverse events directly after administration (local tolerance) and during a longer period of application of the drug. "Safety", "in vivo safety" or "tolerability" can be evaluated e.g. at regular intervals during the treatment and follow-up period. Measurements include clinical evaluation, e.g. organ manifestations, and screening of laboratory abnormalities. Clinical evaluation may be carried out and deviating to normal findings recorded/coded according to NCI-CTC and/or MedDRA standards. Organ manifestations may include criteria such as allergy/immunology, blood/bone marrow, cardiac arrhythmia, coagulation and the like, as set forth e.g. in the Common Terminology Criteria for adverse events v3.0 (CTCAE). Laboratory parameters which may be tested include for instance haematology, clinical chemistry, coagulation profile and urine analysis and examination of other body fluids such as serum, plasma, lymphoid or spinal fluid, liquor and the like. Safety can thus be assessed e.g. by physical examination, imaging techniques (i.e. ultrasound, x-ray, CT scans, Magnetic Resonance Imaging

(MRI), other measures with technical devices (i.e. electrocardiogram), vital signs, by measuring laboratory parameters and recording adverse events. For example, adverse events in non-chimpanzee primates in the uses and methods according to the invention may be examined by histopathological and/or histochemical methods.

The term "effective and non-toxic dose" as used herein refers to a tolerable dose of the bispecific single chain antibody as defined herein which is high enough to cause depletion of pathologic cells, tumor elimination, tumor shrinkage or stabilization of disease without or essentially without major toxic effects. Such effective and non-toxic doses may be determined e.g. by dose escalation studies described in the art and should be below the dose inducing severe adverse side events (dose limiting toxicity, DLT).

The above terms are also referred to e.g. in the Preclinical safety evaluation of biotechnology-derived pharmaceuticals S6; ICH Harmonised Tripartite Guideline; ICH Steering Committee meeting on July 16, 1997.

Moreover, the invention relates to a pharmaceutical composition comprising a bispecific single chain antibody molecule of this invention or produced according to the process according to the invention for the prevention, treatment or amelioration of cancer. Preferably, said cancer is a solid tumor, preferably a carcinoma or prostate cancer. Preferably, said pharmaceutical composition further comprises suitable formulations of carriers, stabilizers and/or excipients.

A further aspect of the invention relates to a use of a bispecific single chain antibody molecule/polypeptide as defined herein above or produced according to a process defined herein above, for the preparation of a pharmaceutical composition for the prevention, treatment or amelioration of a disease. Preferably, said disease is cancer. More preferably, said cancer is a solid tumor, preferably a carcinoma or prostate cancer.

In another preferred embodiment of use of the bispecific single chain antibody molecule of the invention said pharmaceutical composition is suitable to be administered in combination with an additional drug, i.e. as part of a co-therapy. In

said co-therapy, an active agent may be optionally included in the same pharmaceutical composition as the bispecific single chain antibody molecule of the invention, or may be included in a separate pharmaceutical composition. In this latter case, said separate pharmaceutical composition is suitable for administration prior to, simultaneously as or following administration of said pharmaceutical composition comprising the bispecific single chain antibody molecule of the invention. The additional drug or pharmaceutical composition may be a non-proteinaceous compound or a proteinaceous compound. In the case that the additional drug is a proteinaceous compound, it is advantageous that the proteinaceous compound be capable of providing an activation signal for immune effector cells.
Preferably, said proteinaceous compound or non-proteinaceous compound may be administered simultaneously or non-simultaneously with the bispecific single chain antibody molecule of the invention, a nucleic acid molecule as defined hereinabove, a vector as defined as defined hereinabove, or a host as defined as defined hereinabove.

Another aspect of the invention relates to a method for the prevention, treatment or amelioration of a disease in a subject in the need thereof, said method comprising the step of administration of an effective amount of a pharmaceutical composition of the invention. Preferably, said disease is cancer. Preferably, said cancer is a solid tumor, preferably a carcinoma or prostate cancer.

In another preferred embodiment of the method of the invention said pharmaceutical composition is suitable to be administered in combination with an additional drug, i.e. as part of a co-therapy. In said co-therapy, an active agent may be optionally included in the same pharmaceutical composition as the bispecific single chain antibody molecule of the invention, or may be included in a separate pharmaceutical composition. In this latter case, said separate pharmaceutical composition is suitable for administration prior to, simultaneously as or following administration of said pharmaceutical composition comprising the bispecific single chain antibody molecule of the invention. The additional drug or pharmaceutical composition may be a non-proteinaceous compound or a proteinaceous compound. In the case that the additional drug is a proteinaceous compound, it is advantageous that the

proteinaceous compound be capable of providing an activation signal for immune effector cells.

Preferably, said proteinaceous compound or non-proteinaceous compound may be administered simultaneously or non-simultaneously with the bispecific single chain antibody molecule of the invention, a nucleic acid molecule as defined hereinabove, a vector as defined as defined hereinabove, or a host as defined as defined hereinabove.

It is preferred for the above described method of the invention that said subject is a human.

In a further aspect, the invention relates to a kit comprising a bispecific single chain antibody molecule of the invention, a nucleic acid molecule of the invention, a vector of the invention, or a host of the invention.

These and other embodiments are disclosed and encompassed by the description and Examples of the present invention. Recombinant techniques and methods in immunology are described e.g. in Sambrook et al. Molecular Cloning: A Laboratory Manual; Cold Spring Harbor Laboratory Press, 3rd edition 2001; Lefkovits; Immunology Methods Manual; The Comprehensive Sourcebook of Techniques; Academic Press, 1997; Golemis; Protein-Protein Interactions: A Molecular Cloning Manual; Cold Spring Laboratory Press, 2002. Further literature concerning any one of the antibodies, methods, uses and compounds to be employed in accordance with the present invention may be retrieved from public libraries and databases, using for example electronic devices. For example, the public database "Medline", available on the Internet, may be utilized, for example under http://www.ncbi.nlm.nih.gov/PubMed/medline.html. Further databases and addresses such as http://www.ncbi.nlm.nih.gov/ or listed at the EMBL-services homepage under http://www.embl.de/services/index.html are known to the person skilled in the art and can also be obtained using, e. g., http://www. google.com.

The figures show:

Figure 1

Fusion of the N-terminal amino acids 1-27 of primate CD3 epsilon to a heterologous soluble protein.

Figure 2

The figure shows the average absorption values of quadruplicate samples measured in an ELISA assay detecting the presence of a construct consisting of the N-terminal amino acids 1-27 of the mature human CD3 epsilon chain fused to the hinge and Fc gamma portion of human IgG1 and a C-terminal 6 Histidine tag in a supernatant of transiently transfected 293 cells. The first column labeled "27 aa huCD3E" shows the average absorption value for the construct, the second column labeled "irrel. SN" shows the average value for a supernatant of 293 cells transfected with an irrelevant construct as negative control. The comparison of the values obtained for the construct with the values obtained for the negative control clearly demonstrates the presence of the recombinant construct.

Figure 3

The figure shows the average absorption values of quadruplicate samples measured in an ELISA assay detecting the binding of the cross species specific anti-CD3 binding molecules in form of crude preparations of periplasmatically expressed single-chain antibodies to a construct comprising the N-terminal 1-27 amino acids of the mature human CD3 epsilon chain fused to the hinge and Fc gamma portion of human IgG1 and a C-terminal His6 tag. The columns show from left to right the average absorption values for the specificities designated as A2J HLP, I2C HLP E2M HLP, F7O HLP, G4H HLP, H2C HLP, E1L HLP, F12Q HLP, F6A HLP and H1E HLP. The rightmost column labelled "neg. contr." shows the average absorption value for the single-chain preparation of a murine anti-human CD3 antibody as negative control. The comparison of the values obtained for the anti-CD3 specificities with the values obtained for the negative control clearly demonstrates the strong binding of the anti-CD3 specificities to the N-terminal 1-27 amino acids of the mature human CD3 epsilon chain.

Figure 4

Fusion of the N-terminal amino acids 1-27 of primate CD3 epsilon to a heterologous membrane bound protein.

Figure 5

Histogram overlays of different transfectants tested in a FACS assay detecting the presence of recombinant transmembrane fusion proteins consisting of cynomolgus

EpCAM and the N-terminal 1-27 amino acids of the human, marmoset, tamarin, squirrel monkey and domestic swine CD3 epsilon chain respectively. The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the constructs comprising the human 27 mer, marmoset 27 mer, tamarin 27 mer, squirrel monkey 27 mer and swine 27 mer respectively. In the individual overlays the thin line represents a sample incubated with PBS with 2% FCS instead of anti-Flag M2 antibody as negative control and the bold line shows a sample incubated with the anti-Flag M2 antibody. For each construct the overlay of the histograms shows binding of the anti-Flag M2 antibody to the transfectants, which clearly demonstrates the expression of the recombinant constructs on the transfectants.

Figure 6

Histogram overlays of different transfectants tested in a FACS assay detecting the binding of the cross-species specific anti-CD3 binding molecules in form of crude preparations of periplasmatically expressed single-chain antibodies to the N-terminal amino acids 1-27 of the human, marmoset, tamarin and squirrel monkey CD3 epsilon chain respectively fused to cynomolgus EpCAM.

Figure 6A:

The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the 1-27 CD3-EpCAM comprising the human 27 mer tested with the CD3 specific binding molecules designated H2C HLP, F12Q HLP, E2M HLP and G4H HLP respectively.

Figure 6B:

The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the 1-27 CD3-EpCAM comprising the marmoset 27 mer tested with the CD3 specific binding molecules designated H2C HLP, F12Q HLP, E2M HLP and G4H HLP respectively.

Figure 6C:

The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the 1-27 CD3-EpCAM comprising the tamarin 27 mer tested with the CD3 specific binding molecules designated H2C HLP, F12Q HLP, E2M HLP and G4H HLP respectively.

Figure 6D:

The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the 1-27 CD3-EpCAM comprising the squirrel monkey 27 mer tested with the CD3 specific binding molecules designated H2C HLP, F12Q HLP, E2M HLP and G4H HLP respectively.

Figure 6E:

The histogram overlays from left to right and top to bottom show the results for the transfectants expressing the 1-27 CD3-EpCAM comprising the swine 27 mer tested with the CD3 specific binding molecules designated H2C HLP, F12Q HLP, E2M HLP and G4H HLP respectively.

In the individual overlays the thin line represents a sample incubated with a single-chain preparation of a murine anti-human CD3-antibody as negative control and the bold line shows a sample incubated with the respective anti-CD3 binding molecules indicated. Considering the lack of binding to the swine 27 mer transfectants and the expression levels of the constructs shown in Figure 5 the overlays of the histograms show specific and strong binding of the tested anti-CD3 specificities of the fully cross-species specific human bispecific single chain antibodies to cells expressing the recombinant transmembrane fusion proteins comprising the N-terminal amino acids 1-27 of the human, marmoset, tamarin and squirrel monkey CD3 epsilon chain respectively fused to cynomolgus EpCAM and show therefore multi primate cross-species specificity of the anti-CD3 binding molecules.

Figure 7

FACS assay for detection of human CD3 epsilon on transfected murine EL4 T cells. Graphical analysis shows an overlay of histograms. The bold line shows transfected cells incubated with the anti-human CD3 antibody UCHT-1. The thin line represents cells incubated with a mouse IgG1 isotype control. Binding of the anti CD3 antibody UCHT1 clearly shows expression of the human CD3 epsilon chain on the cell surface of transfected murine EL4 T cells.

Figure 8

Binding of cross-species specific anti CD3 antibodies to alanine-mutants in an alanine scanning experiment. In the individual Figures the columns show from left to right the calculated binding values in arbitrary units in logarithmic scale for the wild-type transfectant (WT) and for all alanine-mutants from the position 1 to 27. The binding values are calculated using the following formula:

$$value_Sample(x,y) = \frac{Sample(x,y) - neg_Contr.(x)}{(UCHT-1(x) - neg_Contr.(x)) * \frac{WT(y) - neg_Contr.(wt)}{UCHT-1(wt) - neg_Contr.(wt)}}$$

In this equation *value_Sample* means the value in arbitrary units of binding depicting the degree of binding of a specific anti-CD3 antibody to a specific alanine-mutant as shown in the Figure, *Sample* means the geometric mean fluorescence value obtained for a specific anti-CD3 antibody assayed on a specific alanine-scanning transfectant, *neg_Contr.* means the geometric mean fluorescence value obtained for the negative control assayed on a specific alanine-mutant, *UCHT-1* means the geometric mean fluorescence value obtained for the UCHT-1 antibody assayed on a specific alanine-mutant, *WT* means the geometric mean fluorescence value obtained for a specific anti-CD3 antibody assayed on the wild-type transfectant, *x* specifies the respective transfectant, *y* specifies the respective anti-CD3 antibody and *wt* specifies that the respective transfectant is the wild-type. Individual alanine-mutant positions are labelled with the single letter code of the wild-type amino acid and the number of the position.

Figure 8A:

The figure shows the results for cross-species specific anti CD3 antibody A2J HLP expressed as chimeric IgG molecule. Reduced binding activity is observed for mutations to alanine at position 4 (asparagine), at position 23 (threonine) and at position 25 (isoleucine). Complete loss of binding is observed for mutations to alanine at position 1 (glutamine), at position 2 (aspartate), at position 3 (glycine) and at position 5 (glutamate).

Figure 8B:

The figure shows the results for cross-species specific anti CD3 antibody E2M HLP, expressed as chimeric IgG molecule. Reduced binding activity is observed for mutations to alanine at position 4 (asparagine), at position 23 (threonine) and at position 25 (isoleucine). Complete loss of binding is observed for mutations to alanine at position 1 (glutamine), at position 2 (aspartate), at position 3 (glycine) and at position 5 (glutamate).

Figure 8C:

The figure shows the results for cross-species specific anti CD3 antibody H2C HLP, expressed as chimeric IgG molecule. Reduced binding activity is observed for mutations to alanine at position 4 (asparagine). Complete loss of binding is observed

for mutations to alanine glutamine at position 1 (glutamine), at position 2 (aspartate), at position 3 (glycine) and at position 5 (glutamate).

Figure 8D:

shows the results for cross-species specific anti CD3 antibody F12Q HLP, tested as periplasmatically expressed single-chain antibody. Complete loss of binding is observed for mutations to alanine at position 1 (glutamine), at position 2 (aspartate), at position 3 (glycine) and at position 5 (glutamate).

Figure 9

FACS assay detecting the binding of the cross-species specific anti-CD3 binding molecule H2C HLP to human CD3 with and without N-terminal His6 tag.

Histogram overlays are performed of the EL4 cell line transfected with wild-type human CD3 epsilon chain (left histogram) or the human CD3 epsilon chain with N-terminal His6 tag (right histogram) tested in a FACS assay detecting the binding of cross-species specific binding molecule H2C HLP. Samples are incubated with an appropriate isotype control as negative control (thin line), anti-human CD3 antibody UCHT-1 as positive control (dotted line) and cross-species specific anti-CD3 antibody H2C HLP in form of a chimeric IgG molecule (bold line).

Histogram overlays show comparable binding of the UCHT-1 antibody to both transfectants as compared to the isotype control demonstrating expression of both recombinant constructs. Histogram overlays also show binding of the anti-CD3 binding molecule H2C HLP only to the wild-type human CD3 epsilon chain but not to the His6-human CD3 epsilon chain. These results demonstrate that a free N-terminus is essential for binding of the cross-species specific anti-CD3 binding molecule H2C HLP.

Figure 10

FACS binding analysis of designated cross-species specific bispecific single chain constructs to CHO cells transfected with the human MCSP D3, human CD3+ T cell line HPB-ALL, CHO cells transfected with cynomolgus MCSP D3 and a macaque T cell line 4119 LnPx. The FACS staining is performed as described in Example 10. The thick line represents cells incubated with 2 µg/ml purified protein that are subsequently incubated with the anti-his antibody and the PE labeled detection antibody. The thin histogram line reflects the negative control: cells only incubated with the anti-his antibody and the detection antibody.

Figure 11

FACS binding analysis of designated cross-species specific bispecific single chain constructs CHO cells transfected with the human MCSP D3, human CD3+ T cell line HPB-ALL, CHO cells transfected with cynomolgus MCSP D3 and a macaque T cell line 4119 LnPx. The FACS staining is performed as described in Example 10. The thick line represents cells incubated with 2 µg/ml purified protein that are subsequently incubated with the anti-his antibody and the PE labeled detection antibody. The thin histogram line reflects the negative control: cells only incubated with the anti-his antibody and the detection antibody.

Figure 12

FACS binding analysis of designated cross-species specific bispecific single chain constructs CHO cells transfected with the human MCSP D3, human CD3+ T cell line HPB-ALL, CHO cells transfected with cynomolgus MCSP D3 and a macaque T cell line 4119 LnPx. The FACS staining is performed as described in Example 10. The thick line represents cells incubated with 2 µg/ml purified monomeric protein that are subsequently incubated with the anti-his antibody and the PE labeled detection antibody. The thin histogram line reflects the negative control: cells only incubated with the anti-his antibody and the detection antibody.

Figure 13

Cytotoxicity activity induced by designated cross-species specific MCSP specific single chain constructs redirected to indicated target cell lines. A) Stimulated CD4-/CD56- human PBMCs are used as effector cells, CHO cells transfected with human MCSP D3 as target cells. B) The macaque T cell line 4119 LnPx are used as effector cells, CHO cells transfected with cynomolgus MCSP D3 as target cells. The assay is performed as described in Example 11.

Figure 14

Cytotoxicity activity induced by designated cross-species specific MCSP specific single chain constructs redirected to indicated target cell lines. A) and B) The macaque T cell line 4119 LnPx are used as effector cells, CHO cells transfected with cynomolgus MCSP D3 as target cells. The assay is performed as described in Example 11.

Figure 15

Cytotoxicity activity induced by designated cross-species specific MCSP specific single chain constructs redirected to indicated target cell lines. A) and B) Stimulated CD4-/CD56- human PBMCs are used as effector cells, CHO cells transfected with

human MCSP D3 as target cells. The assay is performed as described in Example 11.

Figure 16

Cytotoxicity activity induced by designated cross-species specific MCSP specific single chain constructs redirected to indicated target cell lines. A) Stimulated CD4-/CD56- human PBMCs are used as effector cells, CHO cells transfected with human MCSP D3 as target cells. B) The macaque T cell line 4119 LnPx are used as effector cells, CHO cells transfected with cynomolgus MCSP D3 as target cells. The assay is performed as described in Example 11.

Figure 17

Cytotoxicity activity induced by designated cross-species specific MCSP specific single chain constructs redirected to indicated target cell lines. A) Stimulated CD4-/CD56- human PBMCs are used as effector cells, CHO cells transfected with human MCSP D3 as target cells. B) The macaque T cell line 4119 LnPx are used as effector cells, CHO cells transfected with cynomolgus MCSP D3 as target cells. The assay is performed as described in Example 11.

Figure 18

Plasma stability of MCSP and CD3 cross-species specific bispecific single chain antibodies tested by the measurement of cytotoxicity activity induced by samples of the designated single chain constructs incubated with 50% human plasma at 37°C and 4°C for 24 hours respectively or with addition of 50% human plasma immediately prior to cytotoxicity testing or without addition of plasma. CHO cells transfected with human MCSP are used as target cell line and stimulated CD4-/CD56- human PBMCs are used as effector cells. The assay is performed as described in Example 12.

Figure 19

Initial drop and recovery (i.e. redistribution) of absolute T cell counts (open squares), in peripheral blood of B-NHL patients (patent numbers 1, 7, 23, 30, 31, and 33 of Table 4), who had essentially no circulating CD19-positive target B cells (filled triangles), during the starting phase of intravenous infusion with the CD3 binding molecule CD19xCD3 recognizing a conventional context dependent CD3 epitope. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. The CD19xCD3 dose is given in parentheses beside the patient number.

Figure 20

(A) Repeated T cell redistribution (open squares) in B-NHL patient #19 (Table 4) who had no circulating CD19-positive target B cells (filled triangles) and developed CNS symptoms under continuous intravenous infusion with CD19xCD3 at a starting dose of 5µg/m^2/24h for one day followed by a sudden dose increase to 15µg/m^2/24h. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. After recovery of circulating T cells from the first episode of redistribution triggered by the treatment start at 5µg/m^2/24h the stepwise dose increase from 5 to 15µg/m^2/24h triggered a second episode of T cell redistribution that was associated with the development of CNS symptoms dominated by confusion and disorientation.

(B) Repeated T cell redistribution in a B-NHL patient, who developed CNS symptoms under repeated intravenous bolus infusion with CD19xCD3 at 1.5µg/m^2. Absolute cell counts are given in 1000 cells per microliter blood. The infusion time for each bolus administration was 2 to 4 hours. Vertical arrows indicate the start of bolus infusions. Data points at the beginning of each bolus administration show the T cell counts immediately prior to start of bolus infusion. Each bolus infusion triggered an episode of T cell redistribution followed by recovery of the T cell counts prior to the next bolus infusion. Finally the third episode of T cell redistribution was associated with the development of CNS symptoms in this patient.

Figure 21

Complex T cell redistribution pattern (open squares) in B-NHL patient #20 (Table 4) without circulating CD19-positive target B cells (filled triangles), during ramp initiation of the CD19xCD3 infusion i.e. even gradual increase of flow-rate from almost zero to 15µg/m^2/24h during the first 24 hours of treatment. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. The CD19xCD3 dose is given in parentheses beside the patient number. T cells reappearing in the circulating blood after the initial redistribution triggered by the first exposure to CD19xCD3 are partially induced to redisappear from circulating blood again by still increasing levels of CD19xCD3 during the ramp phase.

Figure 22

T and B cell counts during treatment with CD19xCD3 of B-NHL patient #13 (Table 4) who had a significant number of circulating CD19-positive target B (lymphoma) cells (filled triangles). Absolute cell counts are given in 1000 cells per microliter blood. The

first data point shows baseline counts immediately prior to the start of infusion. The CD19xCD3 dose is given in parentheses beside the patient number. T cells (open squares) disappear completely from the circulation upon start of CD19xCD3 infusion and do not reappear until the circulating CD19-positive B (lymphoma) cells (filled triangles) are depleted from the peripheral blood.

Figure 23

Repeated T cell redistribution (open squares) in B-NHL patient #24 (Table 4), who had essentially no circulating CD19-positive target B cells (filled triangles) and developed CNS symptoms upon initiation of CD19xCD3 infusion without additional HSA as required for stabilisation of the drug (upper panel). After first recovery of circulating T cells from initial redistribution the uneven drug flow due to the lack of stabilizing HSA triggered a second episode of T cell redistribution that was associated with the development of CNS symptoms dominated by confusion and disorientation. When the same patient was restarted correctly with CD19xCD3 solution containing additional HSA for drug stabilisation, no repeated T cell redistribution was observed (lower panel) and the patient did not again develop any CNS symptoms. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. The CD19xCD3 dose is given in parentheses beside the patient number.

Figure 24

Model of T cell adhesion to endothelial cells induced by monovalent binding to context dependent CD3 epitopes. Monovalent interaction of a conventional CD3 binding molecule to its context dependent epitope on CD3 epsilon can lead to an allosteric change in the conformation of CD3 followed by the recruitment of Nck2 to the cytoplasmic domain of CD3 epsilon (Gil et al. (2002) Cell 109: 901). As Nck2 is directly linked to integrins via PINCH and ILK (Legate et al. (2006) Nat Rev Mol Cell Biol 7: 20), recruitment of Nck2 to the cytoplasmic domain of CD3 epsilon following an allosteric change in the conformation of CD3 through binding of a conventional CD3 binding molecule (like the CD19xCD3 of example 13) to its context dependent epitope on CD3 epsilon, can increase the adhesiveness of T cells to endothelial cells by transiently switching integrins on the T cell surface into their more adhesive isoform via inside-out-signalling.

Figure 25

Cytotoxic activity of CD33-AF5 VH-VL x I2C VH-VL test material used for the in vivo study in cynomolgus monkeys as described in Example 14. Specific lysis of CD33-positive target cells was determined in a standard ^{51}Chromium release assay at increasing concentrations of CD33-AF5 VH-VL x I2C VH-VL. Assay duration was 18 hours. The macaque T cell line 4119 LnPx was used as source of effector cells. CHO cells transfected with cynomolgus CD33 served as target cells. Effector- to target cell ratio (E:T-ratio) was 10:1. The concentration of CD33-AF5 VH-VL x I2C VH-VL required for half-maximal target cell lysis (EC50) was calculated from the dose response curve with a value of 2.7 ng/ml.

Figure 26

(A) Dose- and time-dependent depletion of CD33-positive monocytes from the peripheral blood of cynomolgus monkeys through intravenous continuous infusion of CD33-AF5 VH-VL x I2C VH-VL as described in Example 14. The percentage relative to baseline (i.e. 100%) of absolute circulating CD33-positive monocyte counts after the duration of treatment as indicated above the columns is shown for each of two cynomolgus monkeys per dose level. The dose level (i.e. infusion flow-rate) is indicated below the columns. No depletion of circulating CD33-positive monocytes was observed in animals 1 and 2 treated for 7 days at a dose of 30 µg/m^2/24h. In animals 3 and 4 treated for 7 days at a dose of 60 µg/m^2/24h circulating CD33-positive monocyte counts were reduced to 68% and 40% of baseline, respectively. At 240 µg/m^2/24h circulating CD33-positive monocytes were almost completely depleted from the peripheral blood after 3 days of treatment (animals 5 and 6). At 1000 µg/m^2/24h depletion of circulating CD33-positive monocytes from the peripheral blood was completed already after 1 day of treatment (animals 7 and 8).

(B) Course of T cell and CD33-monocyte counts in peripheral blood of two cynomolgus monkeys during continuous infusion of CD33-AF5 VH-VL x I2C VH-VL for 14 days at 120 µg/m^2/24h. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. After initial mobilisation of CD33-monocytes during the first 12 hours upon start of infusion CD33-monocytes in peripheral blood (filled triangles) are depleted by two thirds (animal 10) and 50% (animal 9) relative to the respective baseline counts during the further course of infusion. Circulating T cell counts (open squares) show a limited initial drop followed by recovery still during the presence of circulating CD33-positive monocytic target cells.

Figure 27

Cytotoxic activity of MCSP-G4 VH-VL x I2C VH-VL test material used for the in vivo study in cynomolgus monkeys as described in Example 15. Specific lysis of MCSP-positive target cells was determined in a standard ^{51}Chromium release assay at increasing concentrations of MCSP-G4 VH-VL x I2C VH-VL. Assay duration was 18 hours. The macaque T cell line 4119 LnPx was used as source of effector cells. CHO cells transfected with cynomolgus MCSP served as target cells. Effector- to target cell ratio (E:T-ratio) was 10:1. The concentration of MCSP-G4 VH-VL x I2C VH-VL required for half-maximal target cell lysis (EC50) was calculated from the dose response curve with a value of 1.9 ng/ml.

Figure 28

Absence of initial episodes of drop and subsequent recovery of absolute T cell counts (i.e. redistribution) in peripheral blood of cynomolgus monkeys during the starting phase of intravenous infusion with the CD3 binding molecule MCSP-G4 VH-VL x I2C VH-VL recognizing an essentially context independent CD3 epitope. Absolute cell counts are given in 1000 cells per microliter blood. The first data point shows baseline counts immediately prior to the start of infusion. The MCSP-G4 VH-VL x I2C VH-VL dose is given in parentheses beside the animal number. In the known absence of MCSP-positive target cells from the circulating blood of cynomolgus monkeys there is no induction of T cell redistribution (i.e. an initial episode of drop and subsequent recovery of absolute T cell counts) through target cell mediated crosslinking of CD3. Moreover, induction of T cell redistribution (i.e. an initial episode of drop and subsequent recovery of absolute T cell counts) through a signal, which the T cells may receive through exclusive interaction with a CD3 binding site only, can be avoided by the use of CD3 binding molecules like MCSP-G4 VH-VL x I2C VH-VL recognizing an essentially context independent CD3 epitope.

Figure 29

FACS binding analysis of designated cross-species specific bispecific constructs to CHO cells transfected with human CD33, the human CD3+ T cell line HPB-ALL, CHO cells transfected with macaque CD33 and macaque PBMC respectively. The FACS staining is performed as described in Example 16.4. The bold lines represent cells incubated with 5 µg/ml purified bispecific single chain construct or cell culture supernatant of transfected cells expressing the cross-species specific bispecific antibody constructs. The filled histograms reflect the negative controls. Supernatant

of untransfected CHO cells was used as negative control. For each cross-species specific bispecific single chain construct the overlay of the histograms shows specific binding of the construct to human and macaque CD33 and human and macaque CD3.

Figure 30

The diagrams show results of chromium release assays measuring cytotoxic activity induced by designated cross-species specific CD33 specific single chain constructs redirected to the indicated target cell lines. Effector cells were also used as indicated. The assays are performed as described in Example 16.5. The diagrams clearly demonstrate for each construct the potent recruitment of cytotoxic activity of human and macaque effector cells against human and macaque CD33 transfected CHO cells, respectively.

Figure 31

SDS PAGE gel and Western blot monitoring the purification of the cross-species specific bispecific single chain molecule designated E292F3 HL x I2C HL. Samples from the eluate, the cell culture supernatant (SN) and the flow through of the column (FT) were analyzed as indicated. A protein marker (M) was applied as size reference. A strong protein band with a molecular weight between 50 and 60 kDa in the SDS PAGE gel demonstrates the efficient purification of the cross-species specific bispecific single chain molecule to a very high degree of purity with the one-step purification method described in Example 17.2. The Western blot detecting the histidine$_6$ tag confirms the identity of the protein band in the eluate as the cross-species specific bispecific single chain molecule. The faint signal for the flow through sample in this sensitive detection method further shows the nearly complete capture of bispecific single chain molecules by the purification method.

Figure 32

SDS PAGE gel and Western blot monitoring the purification of the cross-species specific bispecific single chain molecule designated V207C12 HL x H2C HL. Samples from the eluate, the cell culture supernatant (SN) and the flow through of the column (FT) were analyzed as indicated. A protein marker (M) was applied as size reference. A strong protein band with a molecular weight between 50 and 60 kDa in the SDS PAGE gel demonstrates the efficient purification of the cross-species specific bispecific single chain molecule to a very high degree of purity with the one-step purification method described in Example 17.2. The Western blot detecting

the histidine$_6$ tag confirms the identity of the protein band in the eluate as the cross-species specific bispecific single chain molecule. The faint signal for the flow through sample in this sensitive detection method further shows the nearly complete capture of bispecific single chain molecules by the purification method.

Figure 33

SDS PAGE gel and Western blot monitoring the purification of the cross-species specific bispecific single chain molecule designated AF5HLxF12QHL. Samples from the eluate, the cell culture supernatant (SN) and the flow through of the column (FT) were analyzed as indicated. A protein marker (M) was applied as size reference. A strong protein band with a molecular weight between 50 and 60 kDa in the SDS PAGE gel demonstrates the efficient purification of the cross-species specific bispecific single chain molecule to a very high degree of purity with the one-step purification method described in Example 17.2. The Western blot detecting the histidine$_6$ tag confirms the identity of the protein band in the eluate as the cross-species specific bispecific single chain molecule. The signal in the flow through sample in this sensitive detection method is explained by saturation of the affinity column due to the high concentration of bispecific single chain molecules in the supernatant.

Figure 34

Standard curve of AF5HLxI2CHL in 50% macaque monkey serum. The upper diagram shows the standard curve generated for the assay as described in Example 18.2.

The lower diagram shows results for quality control samples of AF5HLxI2CHL in 50% macaque monkey serum. The recovery rates are above 90% for the high and mid QC sample and above 80% for the low QC sample.

Thus the assay allows for detection of AF5HLxI2CHL in serum samples in the range from 10 ng/ml to 200 ng/ml (before dilution).

Figure 35

Standard curve of MCSP-G4 HL x I2C HL in 50% macaque monkey serum. The upper diagram shows the standard curve generated for the assay as described in Example 18.2.

The lower diagram shows results for quality control samples of MCSP-G4 HL x I2C HL in 50% macaque monkey serum. The recovery rates are above 98% for the high and mid QC sample and above 85% for the low QC sample.

Thus the assay allows for detection of MCSP-G4 HL x I2C HL in serum samples in the range from 10 ng/ml to 200 ng/ml (before dilution).

Figure 36

FACS binding analysis of an anti-Flag antibody to CHO cells transfected with the 1-27 N-terminal amino acids of CD3 epsilon of the designated species fused to cynomolgus EpCAM. The FACS staining was performed as described in Example 19.1. The bold lines represent cells incubated with the anti-Flag antibody. The filled histograms reflect the negative controls. PBS with 2 % FCS was used as negative control. The histograms show strong and comparable binding of the anti-Flag antibody to all transfectants indicating strong and equal expression of the transfected constructs.

Figure 37

FACS binding analysis of the I2C IgG1 construct to CHO cells expressing the 1-27 N-terminal amino acids of CD3 epsilon of the designated species fused to cynomolgus EpCAM. The FACS staining is performed as described in Example 19.3. The bold lines represent cells incubated with 50 µl cell culture supernatant of cells expressing the I2C IgG1 construct. The filled histograms reflect the negative control. Cells expressing the 1-27 N-terminal amino acids of CD3 epsilon of swine fused to cynomolgus EpCAM were used as negative control. In comparison with the negative control the histograms clearly demonstrate binding of the I2C IgG1 construct to 1-27 N-terminal amino acids of CD3 epsilon of human, marmoset, tamarin and squirrel monkey.

Figure 38

FACS binding analysis of the I2C IgG1 construct as described in Example 19.2 to human CD3 with and without N-terminal His6 tag as described in Examples 6.1 and 5.1 respectively. The bold lines represent cells incubated with the anti-human CD3 antibody UCHT-1, the penta-His antibody (Qiagen) and cell culture supernatant of cells expressing the I2C IgG1 construct respectively as indicated. The filled histograms reflect cells incubated with an irrelevant murine IgG1 antibody as negative control.

The upper two histogram overlays show comparable binding of the UCHT-1 antibody to both transfectants as compared to the isotype control demonstrating expression of both recombinant constructs. The centre histogram overlays show binding of the penta his antibody to the cells expressing the His6-human CD3 epsilon chain (His6-

CD3) but not to the cells expressing the wild-type CD3 epsilon chain (WT-CD3). The lower Histogram overlays show binding of the I2C IgG1 construct to the wild-type human CD3 epsilon chain but not to the His6-human CD3 epsilon chain. These results demonstrate that a free N-terminus is essential for binding of the cross-species specific anti-CD3 binding molecule I2C to the CD3 epsilon chain.

Figure 39

FACS binding analysis of designated cross-species specific bispecific single chain constructs to CHO cells transfected with human MCSP D3, the human CD3+ T cell line HPB-ALL, CHO cells transfected with macaque MCSP D3 and the macaque T cell line 4119 LnPx respectively. The FACS staining was performed as described in Example 10. The bold lines represents cells incubated with 2 µg/ml purified bispecific single chain construct or cell supernatant containing the bispecific single chain construct respectively. The filled histograms reflect the negative controls. Supernatant of untransfected CHO cells was used as negative control for binding to the T cell lines. A single chain construct with irrelevant target specificity was used as negative control for binding to the MCSP D3 transfected CHO cells. For each cross-species specific bispecific single chain construct the overlay of the histograms shows specific binding of the construct to human and macaque MCSP D3 and human and macaque CD3.

Figure 40

Cytotoxic activity induced by designated cross-species specific MCSP D3 specific single chain constructs redirected to the indicated target cell lines. Effector cells and effector to target ratio were also used as indicated. The assay is performed as described in Example 11. The diagrams clearly demonstrate potent cross-species specific recruitment of cytotoxic activity by each construct.

Figure 41

FACS binding analysis of designated cross-species specific bispecific single chain constructs to CHO cells transfected with human CD33, the human CD3+ T cell line HPB-ALL, CHO cells transfected with macaque CD33 and macaque PBMC respectively. The FACS staining was performed as described in Example 21.2. The bold lines represent cells incubated with cell culture supernatant of transfected cells expressing the cross-species specific bispecific antibody constructs. The filled histograms reflect the negative controls. Supernatant of untransfected CHO cells was used as negative control. For each cross-species specific bispecific single chain

construct the overlay of the histograms shows specific binding of the construct to human and macaque CD33 and human and macaque CD3.

Figure 42

The diagrams show results of chromium release assays measuring cytotoxic activity induced by designated cross-species specific CD33 specific single chain constructs redirected to the indicated target cell lines. Effector cells were also used as indicated. The assays are performed as described in Example 21.3. The diagrams clearly demonstrate for each construct the potent recruitment of cytotoxic activity of human and macaque effector cells against human and macaque CD33 transfected CHO cells, respectively.

Figure 43

T cell redistribution in a chimpanzee under weekly intravenous bolus infusion with PBS/5% HSA and PBS/5% HSA plus single-chain EpCAM/CD3-bispecific antibody construct at doses of 1.6, 2.0, 3.0 and 4.5 µg/kg. The infusion time for each bolus administration was 2 hours. Vertical arrows indicate the start of bolus infusions. Data points at the beginning of each bolus administration show the T cell counts immediately prior to start of bolus infusion. Each bolus infusion of the single-chain EpCAM/CD3-bispecific antibody construct, which recognizes a conventional context dependent CD3 epitope, triggered an episode of T cell redistribution followed by recovery of T cells to baseline values prior to the next bolus infusion.

Figure 44

CD3 specific ELISA analysis of periplasmic preparations containing Flag tagged scFv protein fragments from selected clones. Periplasmic preparations of soluble scFv protein fragments were added to wells of an ELISA plate, which had been coated with soluble human CD3 epsilon (aa 1-27)- Fc fusion protein and had been additionally blocked with PBS 3% BSA. Detection was performed by a monoclonal anti Flag-Biotin-labeled antibody followed by peroxidase-conjugated Streptavidin. The ELISA was developed by an ABTS substrate solution. The OD values (y axis) were measured at 405 nm by an ELISA reader. Clone names are presented on the x axis.

Figure 45

ELISA analysis of periplasmic preparations containing Flag tagged scFv protein fragments from selected clones. The same periplasmic preparations of soluble scFv protein fragments as in Figure 44 were added to wells of an ELISA plate which had

not been coated with human CD3 epsilon (aa 1-27)- Fc fusion protein but with hulgG1 (Sigma) and blocked with 3% BSA in PBS.
Detection was performed by a monoclonal anti Flag-Biotin-labeled antibody followed by peroxidase-conjugated Streptavidin. The ELISA was developed by an ABTS substrate solution. The OD values (y axis) were measured at 405 nm by an ELISA reader. Clone names are presented on the x axis.

Figure 46

FACS binding analysis of the designated cross-species specific bispecific single chain constructs to CHO cells transfected with the human PSMA, human CD3+ T cell line HPB-ALL, CHO cells transfected with macaque PSMA and a macaque T cell line 4119 LnPx. The FACS staining is performed as described in Example 24.4. The thick line represents cells incubated with cell culture supernatant that are subsequently incubated with the anti-his antibody and the PE labeled detection antibody. The thin histogram line reflects the negative control: cells only incubated with the anti-his antibody and the detection antibody.

Figure 47

Cytotoxic activity induced by the designated cross-species specific bispecific single chain constructs redirected to indicated target cell lines. A) and B) Stimulated CD4-/CD56- human PBMCs are used as effector cells, CHO cells transfected with human PSMA as target cells. The assay is performed as described in Example 24.5.

Figure 48

Cytotoxic activity induced by the designated cross-species specific bispecific single chain constructs redirected to indicated target cell lines. A) and B) The macaque T cell line 4119 LnPx is used as effector cells, CHO cells transfected with macaque PSMA as target cells. The assay is performed as described in Example 24.5.

Figure 49

FACS binding analysis of the designated cross-species specific bispecific single chain constructs to the human PSMA positive prostate cancer cell line LNCaP, the human CD3+ T cell line HPB-ALL and to the macaque T cell line 4119LnPx respectively. The FACS staining was performed as described in Example 24.7. The bold lines represent cells incubated with cell culture supernatant of transfected cells expressing the cross-species specific bispecific antibody constructs. The filled histograms reflect the negative controls. Cell culture medium was used as a negative control. For each cross-species specific bispecific single chain construct shown the

overlay of the histograms demonstrates binding of the construct to human PSMA and human and macaque CD3.

Figure 50

The diagrams show results of chromium release assays measuring cytotoxic activity induced by designated cross-species specific bispecific single chain constructs redirected to the indicated target cell line. Effector cells were also used as indicated. The assays were performed as described in Example 24.8. The diagrams clearly demonstrate for the shown constructs the potent recruitment of cytotoxic activity of human or macaque effector T cells against PSMA-positive cancer cells by the example of the human prostate cancer cell line LNCaP or the macaque cell line 4119LnPx.

Figure 51

FACS binding analysis of the designated cross-species specific bispecific single chain constructs to PSMA positive cells. The FACS staining was performed as described in Example 24.7. For each cross-species specific bispecific single chain construct shown the overlay of the histograms demonstrates binding of the construct to human PSMA and human and macaque CD3.

Figure 52

The diagrams show results of chromium release assays measuring cytotoxic activity induced by designated cross-species specific bispecific single chain constructs redirected to the indicated target cell line. Effector cells were also used as indicated. The assays were performed as described in Example 24.8. The diagrams clearly demonstrate for the shown constructs the potent recruitment of cytotoxic activity of human or macaque effector T cells against PSMA-positive cells.

Figure 53

FACS binding analysis of designated bispecific single chain constructs to CHO cells expressing designated human / rat PSMA chimeras as described in Example 25.1. The FACS staining was performed as described in Example 25.2. The bold lines represent cells incubated with cell culture supernatant of transfected cells expressing the bispecific antibody constructs. The filled histograms show the negative controls. Supernatant of untransfected CHO cells was used as negative control. For each bispecific single chain construct the overlays of the histograms show specific binding of the construct to to the chimeric constructs huPSMArat140-169, huPSMArat191-258, huPSMArat281-284, huPSMArat683-690 and huPSMArat716-750. Compared

with the signals obtained for the other bispecific single chain construct there is a clear lack of binding for the bispecific single chain antibody constructs PM84-D7 x I2C, PM29-G1 x I2C and PM49-B9 x I2C to the chimeric construct huPSMArat300-344. Furthermore compared with the signals obtained for the other bispecific single chain constructs there is a clear lack of binding for the bispecific single chain antibody construct PM34-C7 x I2C to the construct huPSMArat598-617.

Figure 54

Binding of scFv MP9076-A9, the PSMA target binder of PSMA BiTE antibody PM 76-A9 x I2C to 15-mer peptides spanning over the extracellular domain of human PSMA and overlapping with their neighboring peptides by 14 amino acids. Peptide numbers are plotted on the X-axis. ELISA signals using His detection are plotted on the Y-axis.

Figure 55

Binding of scFv MP9076-B10, the PSMA target binder of PSMA BiTE antibody PM 76-B10 x I2C to 15-mer peptides spanning over the extracellular domain of human PSMA and overlapping with their neighboring peptides by 14 amino acids. Peptide numbers are plotted on the X-axis. ELISA signals using His detection are plotted on the Y-axis.

Figure 56

Binding of scFv F1-A10, the PSMA target binder of PSMA BiTE antibody PM F1-A10 x I2C to 15-mer peptides spanning over the extracellular domain of human PSMA and overlapping with their neighboring peptides by 14 amino acids. Peptide numbers are plotted on the X-axis. ELISA signals using His detection are plotted on the Y-axis.

Figure 57

Potential dominant epitopes of scFvs MP 9076-A9, MP 9076-B10 and F1-A10. The potential core binding amino acids in the three-dimensional structure of human PSMA are encircled by a dotted line. Color codes depict scFvs and the respective epitopes. The crystal structure of human PSMA was reported by Davis et al. in 2005 (PNAS, 102: 5981-6).

The present invention is additionally described by way of the following illustrative non-limiting examples that provide a better understanding of the present invention and of its many advantages.

EXAMPLES

1. Identification of CD3epsilon sequences from blood samples of non-human primates

Blood samples of the following non-human primates were used for CD3epsilon-identification: *Callithrix jacchus*, *Saguinus oedipus* and *Saimiris ciureus*. Fresh heparin-treated whole blood samples were prepared for isolating total cellular RNA according to manufacturer's protocol (QIAamp RNA Blood Mini Kit, Qiagen). The extracted mRNA was transcribed into cDNA according to published protocols. In brief, 10 µl of precipitated RNA was incubated with 1.2 µl of 10x hexanucleotide mix (Roche) at 70 °C for 10 minutes and stored on ice. A reaction mix consisting of 4 µl of 5x superscript II buffer, 0.2 µl of 0.1M dithiothreitole, 0.8 µl of superscript II (Invitrogen), 1.2 µl of desoxyribonucleoside triphosphates (25 µM), 0.8 µl of RNase Inhibitor (Roche) and 1.8 µl of DNase and RNase free water (Roth) was added. The reaction mix was incubated at room temperature for 10 minutes followed by incubation at 42 °C for 50 minutes and at 90 °C for 5 minutes. The reaction was cooled on ice before adding 0.8 µl of RNaseH (1 U/µl, Roche) and incubated for 20 minutes at 37 °C.

The first-strand cDNAs from each species were subjected to separate 35-cycle polymerase chain reactions using Taq DNA polymerase (Sigma) and the following primer combination designed on database research: forward primer 5'-AGAGTTCTGGGCCTCTGC-3' (SEQ ID NO: 253); reverse primer 5'-CGGATGGGCTCATAGTCTG-3' (SEQ ID NO: 254);. The amplified 550 bp-bands were gel purified (Gel Extraction Kit, Qiagen) and sequenced (Sequiserve, Vaterstetten/Germany, see sequence listing).

CD3epsilon *Callithrix jacchus*

Nucleotides

CAGGACGGTAATGAAGAAATGGGTGATACTACACAGAACCCATATAAAGTTTCCATCTCAGG
AACCACAGTAACACTGACATGCCCTCGGTATGATGGACATGAAATAAAATGGCTCGTAAATA
GTCAAAACAAAGAAGGTCATGAGGACCACCTGTTACTGGAGGACTTTTCGGAAATGGAGCAA
AGTGGTTATTATGCCTGCCTCTCCAAAGAGACTCCCGCAGAAGAGGCGAGCCATTATCTCTA
CCTGAAGGCAAGAGTGTGTGAGAACTGCGTGGAGGTGGAT

Amino acids (SEQ ID NO: 3)

QDGNEEMGDTTQNPYKVSISGTTVTLTCPRYDGHEIKWLVNSQNKEGHEDHLLLEDFSEMEQ
SGYYACLSKETPAEEASHYLYLKARVCENCVEVD

CD3epsilon *Saguinus oedipus*

Nucleotides

CAGGACGGTAATGAAGAAATGGGTGATACTACACAGAACCCATATAAAGTTTCCATCTCAGG
AACCACAGTAACACTGACATGCCCTCGGTATGATGGACATGAAATAAAATGGCTTGTAAATA
GTCAAAACAAAGAAGGTCATGAGGACCACCTGTTACTGGAGGATTTTTCGGAAATGGAGCAA
AGTGGTTATTATGCCTGCCTCTCCAAAGAGACTCCCGCAGAAGAGGCGAGCCATTATCTCTA
CCTGAAGGCAAGAGTGTGTGAGAACTGCGTGGAGGTGGAT

Amino acids (SEQ ID NO: 5)

QDGNEEMGDTTQNPYKVSISGTTVTLTCPRYDGHEIKWLVNSQNKEGHEDHLLLEDFSEMEQ
SGYYACLSKETPAEEASHYLYLKARVCENCVEVD

CD3epsilon *Saimiris ciureus*

Nucleotides

CAGGACGGTAATGAAGAGATTGGTGATACTACCCAGAACCCATATAAAGTTTCCATCTCAGG
AACCACAGTAACACTGACATGCCCTCGGTATGATGGACAGGAAATAAAATGGCTCGTAAATG
ATCAAAACAAAGAAGGTCATGAGGACCACCTGTTACTGGAAGATTTTTCAGAAATGGAACAA
AGTGGTTATTATGCCTGCCTCTCCAAAGAGACCCCCACAGAAGAGGCGAGCCATTATCTCTA
CCTGAAGGCAAGAGTGTGTGAGAACTGCGTGGAGGTGGAT

Amino acids (SEQ ID NO: 7)

QDGNEEIGDTTQNPYKVSISGTTVTLTCPRYDGQEIKWLVNDQNKEGHEDHLLLEDFSEMEQ
SGYYACLSKETPTEEASHYLYLKARVCENCVEVD

2. Generation of cross-species specific single chain antibody fragments (scFv) binding to the N-terminal amino acids 1-27 of CD3epsilon of man and different non-chimpanzee primates

2.1. Immunization of mice using the N-terminus of CD3epsilon separated from its native CD3-context by fusion to a heterologous soluble protein

Ten weeks old F1 mice from balb/c x C57black crossings were immunized with the CD3epsilon-Fc fusion protein carrying themost N-terminal amino acids 1-27 of the mature CD3epsilon chain (1-27 CD3-Fc) of man and/or saimiris ciureus. To this end 40 µg of the 1-27 CD3-Fc fusion protein with 10 nmol of a thioate-modified CpG-Oligonucleotide (5'-tccatgacgttcctgatgct-3') (SEQ ID No. 343) in 300 ul PBS were injected per mouse intra-peritoneally. Mice receive booster immunizations after 21, 42 and optionally 63 days in the same way. Ten days after the first booster immunization, blood samples were taken and antibody serum titer against 1-27 CD3-Fc fusion protein iwa tested by ELISA. Additionally, the titer against the CD3-positive

human T cell line HPBall was tested in flow cytometry according to standard protocols. Serum titers were significantly higher in immunized than in non-immunized animals.

2.2. Generation of an immune murine antibody scFv library: Construction of a combinatorial antibody library and phage display

Three days after the last injection the murine spleen cells were harvested for the preparation of total RNA according to standard protocols.

A library of murine immunoglobuline (Ig) light chain (kappa) variable region (VK) and Ig heavy chain variable region (VH) DNA-fragments was constructed by RT-PCR on murine spleen RNA using VK-and VH specific primer. cDNA was synthesized according to standard protocols.

The primers were designed in a way to give rise to a 5'-XhoI and a 3'-BstEII recognition site for the amplified heavy chain V-fragments and to a 5'-SacI and a 3'-SpeI recognition site for amplified VK DNA fragments.

For the PCR-amplification of the VH DNA-fragments eight different 5'-VH-family specific primers (MVH1(GC)AG GTG CAG CTC GAG GAG TCA GGA CCT (SEQ ID No. 344); MVH2 GAG GTC CAG CTC GAG CAG TCT GGA CCT (SEQ ID No. 345); MVH3 CAG GTC CAA CTC GAG CAG CCT GGG GCT (SEQ ID No. 346); MVH4 GAG GTT CAG CTC GAG CAG TCT GGG GCA (SEQ ID No. 347); MVH5 GA(AG) GTG AAG CTC GAG GAG TCT GGA GGA (SEQ ID No. 348); MVH6 GAG GTG AAG CTT CTC GAG TCT GGA GGT (SEQ ID No. 349); MVH7 GAA GTG AAG CTC GAG GAG TCT GGG GGA (SEQ ID No. 350); MVH8 GAG GTT CAG CTC GAG CAG TCT GGA GCT (SEQ ID No. 351)) were each combined with one 3'-VH primer (3'MuVHBstEII tga gga gac ggt gac cgt ggt ccc ttg gcc cca g (SEQ ID No. 352)); for the PCR amplification of the VK-chain fragments seven different 5'-VK-family specific primers (MUVK1 CCA GTT CCG AGC TCG TTG TGA CTC AGG AAT CT (SEQ ID No. 353); MUVK2 CCA GTT CCG AGC TCG TGT TGA CGC AGC CGC CC (SEQ ID No. 354); MUVK3 CCA GTT CCG AGC TCG TGC TCA CCC AGT CTC CA (SEQ ID No. 355); MUVK4 CCA GTT CCG AGC TCC AGA TGA CCC AGT CTC CA (SEQ ID No. 356); MUVK5 CCA GAT GTG AGC TCG TGA TGA CCC AGA CTC CA (SEQ ID No. 357); MUVK6 CCA GAT GTG AGC TCG TCA TGA CCC AGT CTC CA (SEQ ID No. 358); MUVK7 CCA GTT CCG AGC TCG TGA TGA CAC AGT CTC CA (SEQ ID No. 359)) were each combined with one 3'-VK primer

(3'MuVkHindIII/BsiW1 tgg tgc act agt cgt acg ttt gat ctc aag ctt ggt ccc (SEQ ID No. 360)).

The following PCR program was used for amplification: denaturation at 94°C for 20 sec; primer annealing at 52°C for 50 sec and primer extension at 72°C for 60 sec and 40 cycles, followed by a 10 min final extension at 72°C.

450 ng of the kappa light chain fragments (SacI-SpeI digested) were ligated with 1400 ng of the phagemid pComb3H5Bhis (SacI-SpeI digested; large fragment). The resulting combinatorial antibody library was then transformed into 300 ul of electrocompetent Escherichia coli XL1 Blue cells by electroporation (2.5 kV, 0.2 cm gap cuvette, 25 uFD, 200 Ohm, Biorad gene-pulser) resulting in a library size of more than 10^7 independent clones. After one hour of phenotype expression, positive transformants were selected for carbenicilline resistance encoded by the pComb3H5BHis vector in 100 ml of liquid super broth (SB)-culture over night. Cells were then harvested by centrifugation and plasmid preparation was carried out using a commercially available plasmid preparation kit (Qiagen).

2800 ng of this plasmid-DNA containing the VK-library (XhoI-BstEII digested; large fragment) were ligated with 900 ng of the heavy chain V-fragments (XhoI-BstEII digested) and again transformed into two 300 ul aliquots of electrocompetent E. coli XL1 Blue cells by electroporation (2.5 kV, 0.2 cm gap cuvette, 25 uFD, 200 Ohm) resulting in a total VH-VK scFv (single chain variable fragment) library size of more than 10^7 independent clones.

After phenotype expression and slow adaptation to carbenicillin, the E. coli cells containing the antibody library were transferred into SB-Carbenicillin (50 ug/mL) selection medium. The E. coli cells containing the antibody library wass then infected with an infectious dose of 10^{12} particles of helper phage VCSM13 resulting in the production and secretion of filamentous M13 phage, wherein phage particle contains single stranded pComb3H5BHis-DNA encoding a murine scFv-fragment and displayed the corresponding scFv-protein as a translational fusion to phage coat protein III. This pool of phages displaying the antibody library was later used for the selection of antigen binding entities.

2.3. Phage display based selection of CD3-specific binders

The phage library carrying the cloned scFv-repertoire was harvested from the respective culture supernatant by PEG8000/NaCl precipitation and centrifugation. Approximately $10^{11}$to 10^{12} scFv phage particles were resuspended in 0.4 ml of

PBS/0.1% BSA and incubated with 10^5 to 10^7 Jurkat cells (a CD3-positive human T-cell line) for 1 hour on ice under slow agitation. These Jurkat cells were grown beforehand in RPMI medium enriched with fetal calf serum (10 %), glutamine and penicillin/streptomycin, harvested by centrifugation, washed in PBS and resuspended in PBS/1 % FCS (containing Na Azide). scFv phage which do not specifically bind to the Jurkat cells were eliminated by up to five washing steps with PBS/1 % FCS (containing Na Azide). After washing, binding entities were eluted from the cells by resuspending the cells in HCl-glycine pH 2.2 (10 min incubation with subsequent vortexing) and after neutralization with 2 M Tris pH 12, the eluate was used for infection of a fresh uninfected E. coli XL1 Blue culture (OD600 > 0.5). The E. coli culture containing E. coli cells successfully transduced with a phagemid copy, encoding a human scFv-fragment, were again selected for carbenicillin resistance and subsequently infected with VCMS 13 helper phage to start the second round of antibody display and in vitro selection. A total of 4 to 5 rounds of selections were carried out, normally.

2.4. Screening for CD3-specific binders

Plasmid DNA corresponding to 4 and 5 rounds of panning was isolated from E. coli cultures after selection. For the production of soluble scFv-protein, VH-VL-DNA fragments were excised from the plasmids (XhoI-SpeI). These fragments were cloned via the same restriction sites in the plasmid pComb3H5BFlag/His differing from the original pComb3H5BHis in that the expression construct (e.g. scFv) includes a Flag-tag (TGD YKDDDDK) between the scFv and the His6-tag and the additional phage proteins were deleted. After ligation, each pool (different rounds of panning) of plasmid DNA was transformed into 100 µl heat shock competent E. coli TG1 or XLI blue and plated onto carbenicillin LB-agar. Single colonies were picked into 100 ul of LB carb (50 ug/ml).

E. coli transformed with pComb3H5BHis containing a VL-and VH-segment produce soluble scFv in sufficient amounts after excision of the gene III fragment and induction with 1 mM IPTG. Due to a suitable signal sequence, the scFv-chain was exported into the periplasma where it folds into a functional conformation.

Single E. coli TG1 bacterial colonies from the transformation plates were picked for periplasmic small scale preparations and grown in SB-medium (e.g. 10 ml) supplemented with 20 mM MgCl2 and carbenicillin 50µg/ml (and re-dissolved in PBS (e.g. 1 ml) after harvesting. By four rounds of freezing at –70°C and thawing at 37°C,

the outer membrane of the bacteria was destroyed by temperature shock and the soluble periplasmic proteins including the scFvs were released into the supernatant. After elimination of intact cells and cell-debris by centrifugation, the supernatant containing the human anti-human CD3-scFvs was collected and used for further examination.

2.5. Identification of CD3-specific binders

Binding of the isolated scFvs was tested by flow cytometry on eukaryotic cells, which on their surface express a heterologous protein displaying at its N-terminus the first 27 N-terminal amino acids of CD3epsilon.

As described in Example 4, the first amino acids 1-27 of the N-terminal sequence of the mature CD3 epsilon chain of the human T cell receptor complex (amino acid sequence: QDGNEEMGGITQTPYKVSISGTTVILT SEQ ID NO: 2) were fused to the N-terminus of the transmembrane protein EpCAM so that the N-terminus was located at the outer cell surface. Additionally, a FLAG epitope was inserted between the N-terminal 1-27 CD3epsilon sequence and the EpCAM sequence. This fusion product was expressed in human embryonic kidney (HEK) and chinese hamster ovary (CHO) cells.

Eukaryotic cells displaying the 27 most N-terminal amino acids of mature CD3epsilon of other primate species were prepared in the same way for Saimiri ciureus (Squirrel monkey) (CD3epsilon N-terminal amino acid sequence: QDGNEEIGDTTQNPYKVSISGTTVTLT SEQ ID NO: 8), for Callithrix jacchus (CD3epsilon N-terminal amino acid sequence: QDGNEEMGDTTQNPYKVSISGTTVTLT SEQ ID NO: 4) and for Saguinus oedipus (CD3epsilon N-terminal amino acid sequence: QDGNEEMGDTTQNPYKVSISGTTVTLT SEQ ID NO: 6).

For flow cytometry 2,5x10^5 cells are incubated with 50 ul supernatant or with 5 µg/ml of the purified constructs in 50 µl PBS with 2% FCS. The binding of the constructs was detected with an anti-His antibody (Penta-His Antibody, BSA free, Qiagen GmbH, Hilden, FRG) at 2 µg/ml in 50 µl PBS with 2% FCS. As a second step reagent a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG (Fc-gamma fragment specific), diluted 1:100 in 50 µl PBS with 2% FCS (Dianova, Hamburg, FRG) was used. The samples were measured on a FACSscan (BD biosciences, Heidelberg, FRG).

Binding was always confirmed by flowcytometry as described in the foregoing paragraph on primary T cells of man and different primates (e.g. saimiris ciureus, callithrix jacchus, saguinus oedipus).

2.6. Generation of human/humanized equivalents of non-human CD3epsilon specific scFvs

The VH region of the murine anti-CD3 scFv was aligned against human antibody germline amino acid sequences. The human antibody germline VH sequence was chosen which has the closest homology to the non-human VH and a direct alignment of the two amino acid sequences was performed. There were a number of framework residues of the non-human VH that differ from the human VH framework regions ("different framework positions"). Some of these residues may contribute to the binding and activity of the antibody to its target.

To construct a library that contain the murine CDRs and at every framework position that differs from the chosen human VH sequence both possibilities (the human and the maternal murine amino acid residue), degenerated oligonucleotides were synthesized. These oligonucleotides incorporate at the differing positions the human residue with a probability of 75 % and the murine residue with a probability of 25 %. For one human VH e.g. six of these oligonucleotides had to be synthesized that overlap in a terminal stretch of approximately 20 nucleotides. To this end every second primer was an antisense primer. Restriction sites needed for later cloning within the oligonucleotides were deleted.

These primers may have a length of 60 to 90 nucleotides, depending on the number of primers that were needed to span over the whole V sequence.

These e.g. six primers were mixed in equal amounts (e.g. 1 µl of each primer (primer stocks 20 to 100 µM) to a 20 µl PCR reaction) and added to a PCR mix consisting of PCR buffer, nucleotides and Taq polymerase. This mix was incubated at 94 °C for 3 minutes, 65 °C for 1 minute, 62°C for 1 minute, 59 °C for 1 minute, 56 °C for 1 minute, 52 °C for 1 minute, 50 °C for 1 minute and at 72°C for 10 minutes in a PCR cycler. Subsequently the product was run in an agarose gel electrophoresis and the product of a size from 200 to 400 isolated from the gel according to standard methods.

This PCR product was then used as a template for a standard PCR reaction using primers that incorporate N-terminal and C-terminal suitable cloning restriction sites. The DNA fragment of the correct size (for a VH approximately 350 nucleotides) was

isolated by agarose gel electrophoresis according to standard methods. In this way sufficient VH DNA fragment was amplified. This VH fragment was now a pool of VH fragments that have each one a different amount of human and murine residues at the respective differing framework positions (pool of humanized VH). The same procedure was performed for the VL region of the murine anti-CD3 scFv (pool of humanized VL).

The pool of humanized VH was then combined with the pool of humanized VL in the phage display vector pComb3H5Bhis to form a library of functional scFvs from which – after display on filamentous phage - anti-CD3 binders were selected, screened, identified and confirmed as described above for the parental non-human (murine) anti-CD3 scFv. Single clones were then analyzed for favorable properties and amino acid sequence. Those scFvs which were closest in amino acid sequence homology to human germline V-segments are preferred particularly those wherein at least one CDR among CDR I and II of VH and CDR I and II of VLkappa or CDR I and II of VLlambda shows more than 80% amino acid sequence identity to the closest respective CDR of all human germline V-segments. Anti-CD3 scFvs were converted into recombinant bispecific single chain antibodies as described in the following Examples 9, 16, and 24.

3. Generation of a recombinant fusion protein of the N-terminal amino acids 1-27 of the human CD3 epsilon chain fused to the Fc-part of an IgG1 (1-27 CD3-Fc).

3.1. Cloning and expression of 1-27 CD3-Fc

The coding sequence of the 1-27 N-terminal amino acids of the human CD3 epsilon chain fused to the hinge and Fc gamma region of human immunoglobulin IgG1 as well as an 6 Histidine Tag were obtained by gene synthesis according to standard protocols (cDNA sequence and amino acid sequence of the recombinant fusion protein are listed under SEQ ID NOs 230 and 229). The gene synthesis fragment was designed as to contain first a Kozak site for eukaryotic expression of the construct, followed by an 19 amino acid immunoglobulin leader peptide, followed in frame by the coding sequence of the first 27 amino acids of the extracellular portion of the mature human CD3 epsilon chain, followed in frame by the coding sequence of the hinge region and Fc gamma portion of human IgG1, followed in frame by the coding sequence of a 6 Histidine tag and a stop codon (Figure 1). The gene

synthesis fragment was also designed as to introduce restriction sites at the beginning and at the end of the cDNA coding for the fusion protein. The introduced restriction sites, EcoRI at the 5' end and SalI at the 3' end, are utilized in the following cloning procedures. The gene synthesis fragment was cloned via EcoRI and SalI into a plasmid designated pEF-DHFR (pEF-DHFR is described in Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025 and Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) following standard protocols. A sequence verified plasmid was used for transfection in the FreeStyle 293 Expression System (Invitrogen GmbH, Karlsruhe, Germany) according to the manufacturers protocol. After 3 days cell culture supernatants of the transfectants were harvested and tested for the presence of the recombinant construct in an ELISA assay. Goat anti-human IgG, Fc-gamma fragment specific antibody (obtained from Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK) was diluted in PBS to 5 µg/ml and coated with 100 µl per well onto a MaxiSorp 96-well ELISA plate (Nunc GmbH & Co. KG, Wiesbaden, Germany) over night at 4 °C. Wells were washed with PBS with 0,05 % Tween 20 (PBS/Tween and blocked with 3 % BSA in PBS (bovine Albumin, fraction V, Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) for 60 minutes at room temperature (RT). Subsequently, wells were washed again PBS/Tween and then incubated with cell culture supernatants for 60 minutes at RT. After washing wells were incubated with a peroxidase conjugated anti-His6 antibody (Roche Diagnostics GmbH, Roche Applied Science, Mannheim, Germany) diluted 1:500 in PBS with 1 % BSA for 60 minutes at RT. Subsequently, wells were washed with 200 µl PBS/Tween and 100 µl of the SIGMAFAST OPD (SIGMAFAST OPD [o-Phenylenediamine dihydrochloride] substrate solution (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) was added according to the manufacturers protocol. The reaction was stopped by adding 100 µl 1 M H_2SO_4. Color reaction was measured on a PowerWaveX microplate spectrophotometer (BioTek Instruments, Inc., Winooski, Vermont, USA) at 490 nm and subtraction of background absorption at 620 nm. As shown in Figure 2 presence of the construct as compared to irrelevant supernatant of mock-transfected HEK 293 cells used as negative control was clearly detectable.

3.2. Binding assay of cross-species specific single chain antibodies to 1-27 CD3-Fc.

Binding of crude preparations of periplasmatically expressed cross-species specific single chain antibodies specific for CD3 epsilon to 1-27 CD3-Fc was tested in an

ELISA assay. Goat anti-human IgG, Fc-gamma fragment specific antibody (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK) was diluted in PBS to 5 µg/ml and coated with 100 µl per well onto a MaxiSorp 96-well ELISA plate (Nunc GmbH & Co. KG, Wiesbaden, Germany) over night at 4 °C. Wells were washed with PBS with 0,05 % Tween 20 (PBS/Tween and blocked with PBS with 3 % BSA (bovine Albumin, fraction V, Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) for 60 minutes at RT. Subsequently, wells were washed with PBS/Tween and incubated with supernatants of cells expressing the 1-27 CD3-Fc construct for 60 minutes at RT. Wells were washed with PBS/Tween and incubated with crude preparations of periplasmatically expressed cross-species specific single-chain antibodies as described above for 60 minutes at room temperature. After washing with PBS/Tween wells were incubated with peroxidase conjugated anti-Flag M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) diluted 1:10000 in PBS with 1 % BSA for 60 minutes at RT. Wells were washed with PBS/Tween and incubated with 100 µl of the SIGMAFAST OPD (OPD [o-Phenylenediamine dihydrochloride] substrate solution (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) according to the manufacturers protocol. Color reaction was stopped with 100 µl 1 M H_2SO_4 and measured on a PowerWaveX microplate spectrophotometer (BioTek Instruments, Inc., Winooski, Vermont, USA) at 490 nm and subtraction of background absorption at 620 nm. Strong binding of cross-species specific human single chain antibodies specific for CD3 epsilon to the 1-27 CD3-Fc construct compared to a murine anti CD3 single-chain antibody was observed (Figure 3).

4. Generation of recombinant transmembrane fusion proteins of the N-terminal amino acids 1-27 of CD3 epsilon from different non-chimpanzee primates fused to EpCAM from cynomolgus monkey (1-27 CD3-EpCAM).

4.1. Cloning and expression of 1-27 CD3-EpCAM

CD3 epsilon was isolated from different non-chimpanzee primates (marmoset, tamarin, squirrel monkey) and swine. The coding sequences of the 1-27 N-terminal amino acids of CD3 epsilon chain of the mature human, common marmoset (*Callithrix jacchus*), cottontop tamarin (*Saguinus oedipus),* common squirrel monkey (*Saimiri sciureus*) and domestic swine (*Sus scrofa;* used as negative control) fused to the N-terminus of Flag tagged cynomolgus EpCAM were obtained by gene synthesis according to standard protocols. cDNA sequence and amino acid sequence of the

recombinant fusion proteins are listed under SEQ ID NOs 231 to 240). The gene synthesis fragments were designed as to contain first a BsrGI site to allow fusion in correct reading frame with the coding sequence of a 19 amino acid immunoglobulin leader peptide already present in the target expression vector, which is followed in frame by the coding sequence of the N-terminal 1-27 amino acids of the extracellular portion of the mature CD3 epsilon chains, which is followed in frame by the coding sequence of a Flag tag and followed in frame by the coding sequence of the mature cynomolgus EpCAM transmembrane protein (Figure 4). The gene synthesis fragments were also designed to introduce a restriction site at the end of the cDNA coding for the fusion protein. The introduced restriction sites BsrGI at the 5' end and SalI at the 3' end, were utilized in the following cloning procedures. The gene synthesis fragments were then cloned via BsrGI and SalI into a derivative of the plasmid designated pEF DHFR (pEF-DHFR is described in Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025), which already contained the coding sequence of the 19 amino acid immunoglobulin leader peptide following standard protocols. Sequence verified plasmids were used to transiently transfect 293-HEK cells using the MATra-A Reagent (IBA GmbH, Göttingen, Germany) and 12 µg of plasmid DNA for adherent 293-HEK cells in 175 ml cell culture flasks according to the manufacturers protocol. After 3 days of cell culture the transfectants were tested for cell surface expression of the recombinant transmembrane protein via an FACS assay according to standard protocols. For that purpose a number of $2{,}5x10^5$ cells were incubated with the anti-Flag M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) at 5 µg/ml in PBS with 2% FCS. Bound antibody was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). The samples were measured on a FACScalibur (BD biosciences, Heidelberg, Germany). Expression of the Flag tagged recombinant transmembrane fusion proteins consisting of cynomolgus EpCAM and the 1-27 N-terminal amino acids of the human, marmoset, tamarin, squirrel monkey and swine CD3 epsilon chain respectively on transfected cells was clearly detectable (Figure 5).

4.2. Binding of cross-species specific anti-CD3 single chain antibodies to the 1-27 CD3-EpCAM

Binding of crude preparations of periplasmatically expressed cross-species specific anti CD3 single-chain antibodies to the 1-27 N-terminal amino acids of the human, marmoset, tamarin and squirrel monkey CD3 epsilon chains respectively fused to cynomolgus Ep-CAM was tested in an FACS assay according to standard protocols. For that purpose a number of $2,5x10^5$ cells were incubated with crude preparations of periplasmatically expressed cross-species specific anti CD3 single-chain antibodies (preparation was performed as described above and according to standard protocols) and a single-chain murine anti-human CD3 antibody as negative control. As secondary antibody the Penta-His antibody (Qiagen GmbH, Hildesheim, Germany) was used at 5 µg/ml in 50 µl PBS with 2% FCS. The binding of the antibody was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). The samples were measured on a FACScalibur (BD biosciences, Heidelberg, Germany). As shown in Figures 6 (A to E) binding of single chain antibodies to the transfectants expressing the recombinant transmembrane fusion proteins consisting of the 1-27 N-terminal amino acids of CD3 epsilon of the human, marmoset, tamarin or squirrel monkey fused to cynomolgus EpCAM was observed. No binding of cross-species specific single chain antibodies was observed to a fusion protein consisting of the 1-27 N-terminal CD3 epsilon of swine fused to cynomolgus EpCAM used as negative control. Multi-primate cross-species specificity of the anti-CD3 single chain antibodies was shown. Signals obtained with the anti Flag M2 antibody and the cross-species specific single chain antibodies were comparable, indicating a strong binding activity of the cross-species specific single chain antibodies to the N-terminal amino acids 1-27 of CD3 epsilon.

5. Binding analysis of cross-species specific anti-CD3 single chain antibodies by alanine-scanning of mouse cells transfected with the human CD3 epsilon chain and its alanine mutants

5.1. Cloning and expression of human wild-type CD3 epsilon

The coding sequence of the human CD3 epsilon chain was obtained by gene synthesis according to standard protocols (cDNA sequence and amino acid sequence of the human CD3 epsilon chain are listed under SEQ ID NOs 242 and 241). The gene synthesis fragment was designed as to contain a Kozak site for eukaryotic expression of the construct and restriction sites at the beginning and the

end of the cDNA coding for human CD3 epsilon. The introduced restriction sites EcoRI at the 5' end and SalI at the 3' end, were utilized in the following cloning procedures. The gene synthesis fragment was then cloned via EcoRI and SalI into a plasmid designated pEF NEO following standard protocols. pEF NEO was derived of pEF DHFR (Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025) by replacing the cDNA of the DHFR with the cDNA of the neomycin resistance by conventional molecular cloning. A sequence verified plasmid was used to transfect the murine T cell line EL4 (ATCC No. TIB-39) cultivated in RPMI with stabilized L-glutamine supplemented with 10 % FCS, 1% penicillin/streptomycin, 1% HEPES, 1% pyruvate, 1% non-essential amino acids (all Biochrom AG Berlin, Germany) at 37 °C, 95 % humidity and 7 % CO_2. Transfection was performed with the SuperFect Transfection Reagent (Qiagen GmbH, Hilden, Germany) and 2 µg of plasmid DNA according to the manufacturer's protocol. After 24 hours the cells were washed with PBS and cultivated again in the aforementioned cell culture medium with600 µg/ml G418 for selection (PAA Laboratories GmbH, Pasching, Austria). 16 to 20 days after transfection the outgrowth of resistant cells was observed. After additional 7 to 14 days cells were tested for expression of human CD3 epsilon by FACS analysis according to standard protocols. $2{,}5x10^5$ cells were incubated with anti-human CD3 antibody UCHT-1 (BD biosciences, Heidelberg, Germany) at 5 µg/ml in PBS with 2% FCS. The binding of the antibody was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). The samples were measured on a FACSCalibur (BD biosciences, Heidelberg, Germany). Expression of human wild-type CD3 on transfected EL4 cells is shown in Figure 7.

5.2. Cloning and expression of the cross-species specific anti-CD3 single chain antibodies as IgG1 antibodies

In order to provide improved means of detection of binding of the cross-species specific single chain anti-CD3 antibodies H2C HLP, A2J HLP and E2M HLP were converted into IgG1 antibodies with murine IgG1 and human lambda constant regions. cDNA sequences coding for the heavy and light chains of respective IgG antibodies were obtained by gene synthesis according to standard protocols. The gene synthesis fragments for each specificity were designed as to contain first a Kozak site to allow eukaryotic expression of the construct, which is followed by an 19

amino acid immunoglobulin leader peptide (SEQ ID NOs 244 and 243), which is followed in frame by the coding sequence of the respective heavy chain variable region or respective light chain variable region, followed in frame by the coding sequence of the heavy chain constant region of murine IgG1 (SEQ ID NOs 246 and 245) or the coding sequence of the human lambda light chain constant region (SEQ ID NO 248 and 247), respectively. Restriction sites were introduced at the beginning and the end of the cDNA coding for the fusion protein. Restriction sites EcoRI at the 5' end and SalI at the 3' end were used for the following cloning procedures. The gene synthesis fragments were cloned via EcoRI and SalI into a plasmid designated pEF DHFR (Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025) for the heavy chain constructs and pEF ADA (pEF ADA is described in Raum et al., Cancer Immunol Immunother., 50(3), (2001), 141-50) for the light chain constructs) according to standard protocols. Sequence verified plasmids were used for co-transfection of respective light and heavy chain constructs in the FreeStyle 293 Expression System (Invitrogen GmbH, Karlsruhe, Germany) according to the manufacturers protocol. After 3 days cell culture supernatants of the transfectants were harvested and used for the alanine-scanning experiment.

5.3. Cloning and expression of alanine mutants of human CD3 epsilon for alanine-scanning

27 cDNA fragments coding for the human CD3 epsilon chain with an exchange of one codon of the wild-type sequence of human CD3 epsilon into a codon coding for alanine (GCC) for each amino acid of amino acids 1-27 of the extracellular domain of the mature human CD3 epsilon chain respectively were obtained by gene synthesis. Except for the exchanged codon the cDNA fragments were identical to the aforementioned human wild-type CD3 cDNA fragment. Only one codon was replaced in each construct compared to the human wild-type CD3 cDNA fragment described above. Restriction sites EcoRI and SalI were introduced into the cDNA fragments at identical positions compared to the wild-type construct. All alanine-scanning constructs were cloned into pEF NEO and sequence verified plasmids were transfected into EL4 cells. Transfection and selection of transfectants was performed as described above. As result a panel of expressed constructs was obtained wherein the first amino acid of the human CD3 epsilon chain, glutamine (Q, Gln) at position 1 was replaced by alanine. The last amino acid replaced by alanine was the threonine (T, Thr) at position 27 of mature human wild-type CD3 epsilon. For each amino acid

between glutamine 1 and threonine 27 respective transfectants with an exchange of the wild-type amino acid into alanine were generated.

5.4. Alanine-scanning experiment

Chimeric IgG antibodies as described in 5.2 and cross-species specific single chain antibodies specific for CD3 epsilon were tested in alanine-scanning experiment. Binding of the antibodies to the EL4 cell lines transfected with the alanine-mutant constructs of human CD3 epsilon as described in 5.3 was tested by FACS assay according to standard protocols. $2,5x10^5$ cells of the respective transfectants were incubated with 50 µl of cell culture supernatant containing the chimeric IgG antibodies or with 50 µl of crude preparations of periplasmatically expressed single-chain antibodies. For samples incubated with crude preparations of periplasmatically expressed single-chain antibodies the anti-Flag M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) was used as secondary antibody at 5 µg/ml in 50 µl PBS with 2% FCS. For samples incubated with the chimeric IgG antibodies a secondary antibody was not necessary. For all samples the binding of the antibody molecules was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Samples were measured on a FACSCalibur (BD biosciences, Heidelberg, Germany). Differential binding of chimeric IgG molecules or cross-species specific single-chain antibodies to the EL4 cell lines transfected with the alanine-mutants of human CD3 epsilon was detected. As negative control either an isotype control or a crude preparation of a periplasmatically expressed single-chain antibody of irrelevant specificity was used respectively. UCHT-1 antibody was used as positive control for the expression level of the alanine-mutants of human CD3 epsilon. The EL4 cell lines transfected with the alanine-mutants for the amino acids tyrosine at position 15, valine at position 17, isoleucine at position 19, valine at position 24 or leucine at position 26 of the mature CD3 epsilon chain were not evaluated due to very low expression levels (data not shown). Binding of the cross-species specific single chain antibodies and the single chain antibodies in chimeric IgG format to the EL4 cell lines transfected with the alanine-mutants of human CD3 epsilon is shown in Figure 8 (A-D) as relative binding in arbitrary units with the geometric mean fluorescence values of the respective negative controls subtracted from all respective geometric mean fluorescence sample values. To compensate for different expression levels all

sample values for a certain transfectant were then divided through the geometric mean fluorescence value of the UCHT-1 antibody for the respective transfectant. For comparison with the wild-type sample value of a specificity all sample values of the respective specificity were finally divided through the wild-type sample value, thereby setting the wild-type sample value to 1 arbitrary unit of binding.

The calculations used are shown in detail in the following formula:

$$value_Sample(x,y) = \frac{Sample(x,y) - neg_Contr.(x)}{(UCHT-1(x) - neg_Contr.(x)) * \frac{WT(y) - neg_Contr.(wt)}{UCHT-1(wt) - neg_Contr.(wt)}}$$

In this equation *value_Sample* means the value in arbitrary units of binding depicting the degree of binding of a specific anti-CD3 antibody to a specific alanine-mutant as shown in Figure 8 (A-D), *Sample* means the geometric mean fluorescence value obtained for a specific anti-CD3 antibody assayed on a specific alanine-scanning transfectant, *neg_Contr.* means the geometric mean fluorescence value obtained for the negative control assayed on a specific alanine-mutant, *UCHT-1* means the geometric mean fluorescence value obtained for the UCHT-1 antibody assayed on a specific alanine-mutant, *WT* means the geometric mean fluorescence value obtained for a specific anti-CD3 antibody assayed on the wild-type transfectant, *x* specifies the respective transfectant, *y* specifies the respective anti-CD3 antibody and *wt* specifies that the respective transfectant is the wild-type.

As can be seen in Figure 8 (A-D) the IgG antibody A2J HLP showed a pronounced loss of binding for the amino acids asparagine at position 4, threonine at position 23 and isoleucine at position 25 of the mature CD3 epsilon chain. A complete loss of binding of IgG antibody A2J HLP was observed for the amino acids glutamine at position 1, aspartate at position 2, glycine at position 3 and glutamate at position 5 of the mature CD3 epsilon chain. IgG antibody E2M HLP showed a pronounced loss of binding for the amino acids asparagine at position 4, threonine at position 23 and isoleucine at position 25 of the mature CD3 epsilon chain. IgG antibody E2M HLP showed a complete loss of binding for the amino acids glutamine at position 1, aspartate at position 2, glycine at position 3 and glutamate at position 5 of the mature CD3 epsilon chain. IgG antibody H2C HLP showed an intermediate loss of binding for the amino acid asparagine at position 4 of the mature CD3 epsilon chain and it showed a complete loss of binding for the amino acids glutamine at position 1, aspartate at position 2, glycine at position 3 and glutamate at position 5 of the mature CD3 epsilon chain. Single chain antibody F12Q HLP showed an essentially complete

loss of binding for the amino acids glutamine at position 1, aspartate at position 2, glycine at position 3 of the mature CD3 epsilon chain and glutamate at position 5 of the mature CD3 epsilon chain.

6. Binding analysis of the cross-species specific anti-CD3 binding molecule H2C HLP to the human CD3 epsilon chain with and without N-terminal His6 tag transfected into the murine T cell line EL4

6.1. Cloning and expression of the human CD3 epsilon chain with N-terminal six histidine tag (His6 tag)

A cDNA fragment coding for the human CD3 epsilon chain with a N-terminal His6 tag was obtained by gene synthesis. The gene synthesis fragment was designed as to contain first a Kozak site for eukaryotic expression of the construct, which is followed in frame by the coding sequence of a 19 amino acid immunoglobulin leader peptide, which is followed in frame by the coding sequence of a His6 tag which is followed in frame by the coding sequence of the mature human CD3 epsilon chain (the cDNA and amino acid sequences of the construct are listed as SEQ ID NOs 256 and 255). The gene synthesis fragment was also designed as to contain restriction sites at the beginning and the end of the cDNA. The introduced restriction sites EcoRI at the 5' end and SalI at the 3' end, were used in the following cloning procedures. The gene synthesis fragment was then cloned via EcoRI and SalI into a plasmid designated pEF-NEO (as described above) following standard protocols. A sequence verified plasmid was used to transfect the murine T cell line EL4. Transfection and selection of the transfectants were performed as described above. After 34 days of cell culture the transfectants were used for the assay described below.

6.2. Binding of the cross-species specific anti-CD3 binding molecule H2C HLP to the human CD3 epsilon chain with and without N-terminal His6 tag

A chimeric IgG antibody with the binding specificity H2C HLP specific for CD3 epsilon was tested for binding to human CD3 epsilon with and without N-terminal His6 tag. Binding of the antibody to the EL4 cell lines transfected the His6-human CD3 epsilon and wild-type human CD3 epsilon respectively was tested by an FACS assay according to standard protocols. $2,5x10^5$ cells of the transfectants were incubated with 50 µl of cell culture supernatant containing the chimeric IgG antibody or 50 µl of the respective control antibodies at 5µg/ml in PBS with 2% FCS. As negative control an appropriate isotype control and as positive control for expression of the constructs

the CD3 specific antibody UCHT-1 were used respectively. The binding of the antibodies was detected with a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Samples were measured on a FACSCalibur (BD biosciences, Heidelberg, Germany). Compared to the EL4 cell line transfected with wild-type human CD3 epsilon a clear loss of binding of the chimeric IgG with binding specificity H2C HLP to human-CD3 epsilon with an N-terminal His6 tag was detected. These results showed that a free N-terminus of CD3 epsilon is essential for binding of the cross-species specific anti-CD3 binding specificity H2C HLP to the human CD3 epsilon chain (Figure 9).

7. Cloning and expression of the C-terminal, transmembrane and truncated extracellular domains of human MCSP

The coding sequence of the C-terminal, transmembrane and truncated extracellular domain of human MCSP (amino acids 1538 – 2322) was obtained by gene synthesis according to standard protocols (cDNA sequence and amino acid sequence of the recombinant construct for expression of the C-terminal, transmembrane and truncated extracellular domain of human MCSP (designated as human D3) are listed under SEQ ID NOs 250 and 249). The gene synthesis fragment was designed as to contain first a Kozak site to allow eukaryotic expression of the construct followed by the coding sequence of an 19 amino acid immunoglobulin leader peptide followed in frame by a FLAG tag, followed in frame by a sequence containing several restriction sites for cloning purposes and coding for a 9 amino acid artificial linker (SRTRSGSQL), followed in frame by the coding sequence of the C-terminal, transmembrane and truncated extracellular domain of human MCSP and a stop codon. Restriction sites were introduced at the beginning and at the end of the DNA fragment. The restriction sites EcoRI at the 5' end and SalI at the 3' end were used in the following cloning procedures. The fragment was digested with EcoRI and SalI and cloned into pEF-DHFR (pEF-DHFR is described in Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025) following standard protocols. A sequence verified plasmid was used to transfect CHO/dhfr- cells (ATCC No. CRL 9096). Cells were cultivated in RPMI 1640 with stabilized glutamine, supplemented with 10% FCS, 1% penicillin/streptomycin (all obtained from Biochrom AG Berlin, Germany) and nucleosides from a stock solution of cell culture grade reagents (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) to a final concentration of 10 µg/ml

Adenosine, 10 µg/ml Deoxyadenosine and 10 µg/ml Thymidine, in an incubator at 37 °C, 95% humidity and 7% CO_2. Transfection was performed using the PolyFect Transfection Reagent (Qiagen GmbH, Hilden, Germany) and 5 µg of plasmid DNA according to the manufacturer's protocol. After cultivation for 24 hours cells were washed once with PBS and cultivated again in RPMI 1640 with stabilized glutamine and 1% penicillin/streptomycin. Thus the cell culture medium did not contain nucleosides and thereby selection was applied on the transfected cells. Approximately 14 days after transfection the outgrowth of resistant cells was observed. After an additional 7 to 14 days the transfectants were tested for expression of the construct by FACS analysis. $2{,}5x10^5$ cells were incubated with 50 µl of an anti-Flag-M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) diluted to 5 µg/ml in PBS with 2% FCS. The binding of the antibody was detected with a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific diluted 1:100 in PBS with 2% FCS (ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). The samples were measured on a FACScalibur (BD biosciences, Heidelberg, Germany).

8. Cloning and expression of the C-terminal, transmembrane and truncated extracellular domains of macaque MCSP

The cDNA sequence of the C-terminal, transmembrane and truncated extracellular domains of macaque MCSP (designated as macaque D3) was obtained by a set of three PCRs on macaque skin cDNA (Cat No. C1534218-Cy-BC; BioCat GmbH, Heidelberg, Germany) using the following reaction conditions: 1 cycle at 94°C,3 min., 40 cycles with 94°C for 0,5 min., 52°C for 0,5 min. and 72°C for 1,75 min., terminal cycle of 72°C for 3 min.. The following primers were used:

forward primer: 5'-GATCTGGTCTACACCATCGAGC-3' (SEQ ID No. 361)
reverse primer: 5'-GGAGCTGCTGCTGGCTCAGTGAGG-3' (SEQ ID No. 362)
forward primer: 5'- TTCCAGCTGAGCATGTCTGATGG-3' (SEQ ID No. 363)
reverse primer: 5'- CGATCAGCATCTGGGCCCAGG-3' (SEQ ID No. 364)
forward primer: 5'- GTGGAGCAGTTCACTCAGCAGGACC-3' (SEQ ID No. 365)
reverse primer: 5'- GCCTTCACACCCAGTACTGGCC-3' (SEQ ID No. 366)

Those PCRs generated three overlapping fragments (A: 1-1329, B: 1229-2428, C: 1782-2547) which were isolated and sequenced according to standard protocols using the PCR primers and thereby provided a 2547 bp portion of the cDNA sequence of macaque MCSP (the cDNA sequence and amino acid sequence of this

portion of macaque MCSP are listed under SEQ ID NOs 252 and 251) from 74 bp upstream of the coding sequence of the C-terminal domain to 121 bp downstream of the stop codon. Another PCR using the following reaction conditions: 1 cycle at 94°C for 3 min, 10 cycles with 94°C for 1 min, 52°C for 1 min and 72°C for 2,5 min, terminal cycle of 72°C for 3 min was used to fuse the PCR products of the aforementioned reactions A and B. The following primers are used:

forward primer: 5'-tcccgtacgagatctggatcccaattggatggcggactcgtgctgttctcacacagagg-3' (SEQ ID No. 367)

reverse primer: 5'-agtgggtcgactcacacccagtactggccattcttaagggcaggg-3' (SEQ ID No. 368)

The primers for this PCR were designed to introduce restriction sites at the beginning and at the end of the cDNA fragment coding for the C-terminal, transmembrane and truncated extracellular domains of macaque MCSP. The introduced restriction sites MfeI at the 5' end and SalI at the 3' end, were used in the following cloning procedures. The PCR fragment was then cloned via MfeI and SalI into a Bluescript plasmid containing the EcoRI/MfeI fragment of the aforementioned plasmid pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) by replacing the C-terminal, transmembrane and truncated extracellular domains of human MCSP. The gene synthesis fragment contained the coding sequences of the immunoglobulin leader peptide and the Flag tag as well as the artificial linker (SRTRSGSQL) in frame to the 5' end of the cDNA fragment coding for the C-terminal, transmembrane and truncated extracellular domains of macaque MCSP. This vector was used to transfect CHO/dhfr- cells (ATCC No. CRL 9096). Cells were cultivated in RPMI 1640 with stabilized glutamine supplemented with 10% FCS, 1% penicillin/streptomycin (all from Biochrom AG Berlin, Germany) and nucleosides from a stock solution of cell culture grade reagents (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) to a final concentration of 10 µg/ml Adenosine, 10 µg/ml Deoxyadenosine and 10 µg/ml Thymidine, in an incubator at 37 °C, 95% humidity and 7% CO2. Transfection was performed with PolyFect Transfection Reagent (Qiagen GmbH, Hilden, Germany) and 5 µg of plasmid DNA according to the manufacturer's protocol. After cultivation for 24 hours cells were washed once with PBS and cultivated again in RPMI 1640 with stabilized glutamine and 1% penicillin/streptomycin. Thus the cell culture medium did not contain nucleosides and thereby selection was applied on the transfected cells.

Approximately 14 days after transfection the outgrowth of resistant cells is observed. After an additional 7 to 14 days the transfectants were tested for expression of the recombinant construct via FACS. $2,5x10^5$ cells were incubated with 50 µl of an anti-Flag-M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) diluted to 5 µg/ml in PBS with 2% FCS. Bound antibody was detected with a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Samples were measured on a FACScalibur (BD biosciences, Heidelberg, Germany).

9. Generation and characterisation of MCSP and CD3 cross-species specific bispecific single chain molecules

Bispecific single chain antibody molecules each comprising a binding domain cross-species specific for human and non-chimpanzee primate CD3 epsilon as well as a binding domain cross-species-specific for human and non-chimpanzee primate MCSP, are designed as set out in the following Table 1:

Table 1: Formats of MCSP and CD3 cross-species specific bispecific single chain antibodies

SEQ ID (nucl/prot)	Formats of protein constructs (N → C)
190/189	MCSP-G4 HL x H2C HL
192/191	MCSP-G4 HL x F12Q HL
194/193	MCSP-G4 HL x I2C HL
196/195	MCSP-G4 HLP x F6A HLP
198/197	MCSP-G4 HLP x H2C HLP
202/201	MCSP-G4 HLP x G4H HLP
206/205	MCSP-G4 HLP x E1L HLP
208/207	MCSP-G4 HLP x E2M HLP
212/211	MCSP-G4 HLP x F12Q HL
214/213	MCSP-G4 HLP x I2C HL
216/215	MCSP-D2 HL x H2C HL
218/217	MCSP-D2 HL x F12Q HL
220/219	MCSP-D2 HL x I2C HL
222/221	MCSP-D2 HLP x H2C HLP
224/223	MCSP-F9 HL x H2C HL
226/225	MCSP-F9 HLP x H2C HLP
228/227	MCSP-F9 HLP x G4H HLP
318/317	MCSP-A9 HL x H2C HL
320/319	MCSP-A9 HL x F12Q HL
322/321	MCSP-A9 HL x I2C HL

324/323	MCSP-C8 HL x I2C HL
328/327	MCSP-B7 HL x I2C HL
326/325	MCSP-B8 HL x I2C HL
330/329	MCSP-G8 HL x I2C HL
332/331	MCSP-D5 HL x I2C HL
334/333	MCSP-F7 HL x I2C HL
336/335	MCSP-G5 HL x I2C HL
338/337	MCSP-F8 HL x I2C HL
340/339	MCSP-G10 HL x I2C HL

The aforementioned constructs containing the variable heavy-chain (VH) and variable light-chain (VL) domains cross-species specific for human and macaque MCSP D3 and the VH and VL domains cross-species specific for human and macaque CD3 were obtained by gene synthesis. The gene synthesis fragments were designed as to contain first a Kozak site for eukaryotic expression of the construct, followed by a 19 amino acid immunoglobulin leader peptide, followed in frame by the coding sequence of the respective bispecific single chain antibody molecule, followed in frame by the coding sequence of a histidine$_6$-tag and a stop codon. The gene synthesis fragment was also designed as to introduce suitable N- and C-terminal restriction sites. The gene synthesis fragment was cloned via these restriction sites into a plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) according to standard protocols (Sambrook, Molecular Cloning; A Laboratory Manual, 3rd edition, Cold Spring Harbour Laboratory Press, Cold Spring Harbour, New York (2001)). The constructs were transfected stably or transiently into DHFR-deficient CHO-cells (ATCC No. CRL 9096) by electroporation or alternatively into HEK 293 (human embryonal kidney cells, ATCC Number: CRL-1573) in a transient manner according to standard protocols.

Eukaryotic protein expression in DHFR deficient CHO cells (ATCC No. CRL 9096) was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the constructs was induced by addition of increasing concentrations of methothrexate (MTX) up to final concentrations of 20 nM MTX. After two passages of stationary culture the cells were grown in roller bottles with nucleoside-free HyQ PF CHO liquid soy medium (with 4.0 mM L-Glutamine with 0.1% Pluronic F – 68; HyClone) for 7 days before harvest. The cells were removed by centrifugation and the supernatant containing the expressed protein is stored at –20°C.

Äkta® Explorer System (GE Health Systems) and Unicorn® Software were used for chromatography. Immobilized metal affinity chromatography ("IMAC") was performed using a Fractogel EMD chelate® (Merck) which was loaded with $ZnCl_2$ according to the protocol provided by the manufacturer. The column was equilibrated with buffer A (20 mM sodium phosphate buffer pH 7.2, 0.1 M NaCl) and the cell culture supernatant (500 ml) was applied to the column (10 ml) at a flow rate of 3 ml/min. The column was washed with buffer A to remove unbound sample. Bound protein was eluted using a two step gradient of buffer B (20 mM sodium phosphate buffer pH 7.2, 0.1 M NaCl, 0.5 M Imidazole) according to the following:

Step 1: 20% buffer B in 6 column volumes

Step 2: 100% buffer B in 6 column volumes

Eluted protein fractions from step 2 were pooled for further purification. All chemicals are of research grade and purchased from Sigma (Deisenhofen) or Merck (Darmstadt).

Gel filtration chromatography was performed on a HiLoad 16/60 Superdex 200 prep grade column (GE/Amersham) equilibrated with Equi-buffer (25 mM Citrate, 200 mM Lysine, 5% Glycerol, pH 7.2). Eluted protein samples (flow rate 1 ml/min) were subjected to standard SDS-PAGE and Western Blot for detection. Prior to purification, the column was calibrated for molecular weight determination (molecular weight marker kit, Sigma MW GF-200). Protein concentrations were determined using OD280 nm.

Purified bispecific single chain antibody protein was analyzed in SDS PAGE under reducing conditions performed with pre-cast 4-12% Bis Tris gels (Invitrogen). Sample preparation and application were performed according to the protocol provided by the manufacturer. The molecular weight was determined with MultiMark protein standard (Invitrogen). The gel was stained with colloidal Coomassie (Invitrogen protocol). The purity of the isolated protein is >95% as determined by SDS-PAGE.

The bispecific single chain antibody has a molecular weight of about 52 kDa under native conditions as determined by gel filtration in phosphate buffered saline (PBS). All constructs were purified according to this method.

Western Blot was performed using an Optitran® BA-S83 membrane and the Invitrogen Blot Module according to the protocol provided by the manufacturer. For detection of the bispecific single chain antibody protein antibodies an anti-His Tag antibody was used (Penta His, Qiagen). A Goat-anti-mouse Ig antibody labeled with

alkaline phosphatase (AP) (Sigma) was used as secondary antibody and BCIP/NBT (Sigma) as substrate. A single band was detected at 52 kD corresponding to the purified bispecific single chain antibody.

Alternatively, constructs were transiently expressed in DHFR deficient CHO cells. In brief, 4 x 105 cells per construct were cultivated in 3 ml RPMI 1640 all medium with stabilized glutamine supplemented with 10% fetal calf serum, 1% penicillin/streptomycin and nucleosides from a stock solution of cell culture grade reagents (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) to a final concentration of 10 µg/ml Adenosine, 10 µg/ml Deoxyadenosine and 10 µg/ml Thymidine, in an incubator at 37 °C, 95% humidity and 7% CO2 one day before transfection. Transfection was performed with Fugene 6 Transfection Reagent (Roche, # 11815091001) according to the manufacturer's protocol. 94 µl OptiMEM medium (Invitrogen) and 6 µl Fugene 6 are mixed and incubated for 5 minutes at room temperature. Subsequently, 1.5 µg DNA per construct were added, mixed and incubated for 15 minutes at room temperature. Meanwhile, the DHFR deficient CHO cells were washed with 1x PBS and resuspended in 1.5 ml RPMI 1640 all medium. The transfection mix was diluted with 600 µl RPMI 1640 all medium, added to the cells and incubated overnight at 37 °C, 95% humidity and 7% CO2. The day after transfection the incubation volume of each approach was extended to 5 ml RPMI 1640 all medium. Supernatant was harvested after 3 days of incubation.

10. Flow cytometric binding analysis of the MCSP and CD3 cross-species specific bispecific antibodies

In order to test the functionality of the cross-species specific bispecific antibody constructs regarding the capability to bind to human and macaque MCSP D3 and CD3, respectively, a FACS analysis was performed. For this purpose CHO cells transfected with human MCSP D3 (as described in Example 7) and the human CD3 positive T cell leukemia cell line HPB-ALL (DSMZ, Braunschweig, ACC483) were used to test the binding to human antigens. The binding reactivity to macaque antigens was tested by using the generated macaque MCSP D3 transfectant (described in Example 8) and a macaque T cell line 4119LnPx (kindly provided by Prof. Fickenscher, Hygiene Institute, Virology, Erlangen-Nuernberg; published in Knappe A, et al., and Fickenscher H., Blood 2000, 95, 3256-61). 200.000 cells of the respective cell lines were incubated for 30 min on ice with 50 µl of the purified protein

of the cross-species specific bispecific antibody constructs (2 µg/ml) or cell culture supernatant of transfected cells expressing the cross-species specific bispecific antibody constructs. The cells were washed twice in PBS with 2% FCS and binding of the construct was detected with a murine anti-His antibody (Penta His antibody; Qiagen; diluted 1:20 in 50 µl PBS with 2% FCS). After washing, bound anti-His antibodies were detected with an Fc gamma-specific antibody (Dianova) conjugated to phycoerythrin, diluted 1:100 in PBS with 2% FCS. Supernatant of untransfected CHO cells was used as negative control for binding to the T cell lines. A single chain construct with irrelevant target specificity was used as negative control for binding to the MCSP-D3 transfected CHO cells.

Flow cytometry was performed on a FACS-Calibur apparatus; the CellQuest software was used to acquire and analyze the data (Becton Dickinson biosciences, Heidelberg). FACS staining and measuring of the fluorescence intensity were performed as described in Current Protocols in Immunology (Coligan, Kruisbeek, Margulies, Shevach and Strober, Wiley-Interscience, 2002).

The bispecific binding of the single chain molecules listed above, which are cross-species specific for MCSP D3 and cross-species specific for human and macaque CD3 was clearly detectable as shown in Figures 10, 11, 12 and 39. In the FACS analysis all constructs showed binding to CD3 and MCSP D3 as compared to the respective negative controls. Cross-species specificity of the bispecific antibodies to human and macaque CD3 and MCSP D3 antigens was demonstrated.

11. Bioactivity of MCSP and CD3 cross-species specific bispecific single chain antibodies

Bioactivity of the generated bispecific single chain antibodies was analyzed by chromium 51 (^{51}Cr) release in vitro cytotoxicity assays using the MCSP D3 positive cell lines described in Examples 7 and 8. As effector cells stimulated human CD4/CD56 depleted PBMC, stimulated human PBMC or the macaque T cell line 4119LnPx are used as specified in the respective figures.

Generation of the stimulated CD4/CD56 depleted PBMC was performed as follows:

Coating of a Petri dish (145 mm diameter, Greiner bio-one GmbH, Kremsmünster) was carried out with a commercially available anti-CD3 specific antibody (e.g. OKT3, Othoclone) in a final concentration of 1 µg/ml for 1 hour at 37°C. Unbound protein was removed by one washing step with PBS. The fresh PBMC were isolated from

peripheral blood (30 – 50 ml human blood) by Ficoll gradient centrifugation according to standard protocols. 3 – 5 x 10^7 PBMC were added to the precoated petri dish in 120 ml of RPMI 1640 with stabilized glutamine / 10% FCS / IL-2 20 U/ml (Proleukin, Chiron) and stimulated for 2 days. On the third day the cells were collected and washed once with RPMI 1640. IL-2 was added to a final concentration of 20 U/ml and the cells were cultivated again for one day in the same cell culture medium as above. By depletion of CD4+ T cells and CD56+ NK cells according to standard protocols CD8+ cytotoxic T lymphocytes (CTLs) were enriched.

Target cells were washed twice with PBS and labelled with 11.1 MBq ^{51}Cr in a final volume of 100 µl RPMI with 50% FCS for 45 minutes at 37°C. Subsequently the labelled target cells were washed 3 times with 5 ml RPMI and then used in the cytotoxicity assay. The assay was performed in a 96 well plate in a total volume of 250µl supplemented RPMI (as above) with an E:T ratio 10:1. 1 µg/ml of the cross-species specific bispecific single chain antibody molecules and 20 threefold dilutions thereof were applied. If using supernatant containing the cross-species specific bispecific single chain antibody molecules, 21 two- and 20 threefold dilutions thereof were applied for the macaque and the human cytotoxicity assay, respectively. The assay time was 18 hours and cytotoxicity was measured as relative values of released chromium in the supernatant related to the difference of maximum lysis (addition of Triton-X) and spontaneous lysis (without effector cells). All measurements were done in quadruplicates. Measurement of chromium activity in the supernatants was performed with a Wizard 3" gamma counter (Perkin Elmer Life Sciences GmbH, Köln, Germany). Analysis of the experimental data was performed with Prism 4 for Windows (version 4.02, GraphPad Software Inc., San Diego, California, USA). Sigmoidal dose response curves typically have R^2 values >0.90 as determined by the software. EC_{50} values calculated by the analysis program were used for comparison of bioactivity.

As shown in Figures 13 to 17 and 40, all of the generated cross-species specific bispecific single chain antibody constructs demonstrate cytotoxic activity against human MCSP D3 positive target cells elicited by stimulated human CD4/CD56 depleted PBMC or stimulated PBMC and against macaque MCSP D3 positive target cells elicited by the macaque T cell line 4119LnPx.

12. Plasma stability of MCSP and CD3 cross-species specific bispecific single chain antibodies

Stability of the generated bispecific single chain antibodies in human plasma was analyzed by incubation of the bispecific single chain antibodies in 50% human Plasma at 37°C and 4°C for 24 hours and subsequent testing of bioactivity. Bioactivity was studied in a chromium 51 (^{51}Cr) release in vitro cytotoxicity assay using a MCSP positive CHO cell line (expressing MCSP as cloned according to example 14 or 15) as target and stimulated human CD8 positive T cells as effector cells.

EC_{50} values calculated by the analysis program as described above were used for comparison of bioactivity of bispecific single chain antibodies incubated with 50% human plasma for 24 hours at 37°C and 4°C respectively with bispecific single chain antibodies without addition of plasma or mixed with the same amount of plasma immediately prior to the assay.

As shown in Figure 18 and Table 2 the bioactivity of the G4 H-L x I2C H-L, G4 H-L x H2C H-L and G4 H-L x F12Q H-L bispecific antibodies was not significantly reduced as compared with the controls without the addition of plasma or with addition of plasma immediately before testing of bioactivity.

Table 2: bioactivity of the bispecific antibodies without or with the addition of Plasma

Construct	Without plasma	With plasma	Plasma 37°C	Plasma 4°C
G4 H-L x I2C H-L	300	796	902	867
G4 H-L x H2C H-L	496	575	2363	1449
G4 H-L x F12Q H-L	493	358	1521	1040

13. Redistribution of circulating T cells in the absence of circulating target cells by first exposure to CD3 binding molecules directed at conventional i.e. context dependent CD3 epitopes is a major risk factor for adverse events related to the initiation of treatment

T cell redistribution in patients with B-cell Non-Hodgkin-Lymphoma (B-NHL) following initiation of treatment with the conventional CD3 binding molecule

A conventional CD19xCD3 binding molecules is a CD3 binding molecule of the bispecific tandem scFv format (Loffler (2000, Blood, Volume 95, Number 6) or WO

99/54440). It consists of two different binding portions directed at (i) CD19 on the surface of normal and malignant human B cells and (ii) CD3 on human T cells. By crosslinking CD3 on T cells with CD19 on B cells, this construct triggers the redirected lysis of normal and malignant B cells by the cytotoxic activity of T cells. The CD3 epitope recognized by such a conventional CD3 binding molecule is localized on the CD3 epsilon chain, where it only takes the correct conformation if it is embedded within the rest of the epsilon chain and held in the right position by heterodimerization of the epsilon chain with either the CD3 gamma or delta chain. Interaction of this highly context dependent epitope with a conventional CD3 binding molecule (see e.g. Loffler (2000, Blood, Volume 95, Number 6) or WO 99/54440) – even when it occurs in a purely monovalent fashion and without any crosslinking - can induce an allosteric change in the conformation of CD3 leading to the exposure of an otherwise hidden proline-rich region within the cytoplasmic domain of CD3 epsilon. Once exposed, the proline-rich region can recruit the signal transduction molecule Nck2, which is capable of triggering further intracellular signals. Although this is not sufficient for full T cell activation, which definitely requires crosslinking of several CD3 molecules on the T cell surface, e.g. by crosslinking of several anti-CD3 molecules bound to several CD3 molecules on a T cell by several CD19 molecules on the surface of a B cell, pure monovalent interaction of conventional CD3 binding molecules to their context dependent epitope on CD3 epsilon is still not inert for T cells in terms of signalling. Without being bound by theory, monovalent conventional CD3 binding molecules (known in the art) may induce some T cell reactions when infused into humans even in those cases where no circulating target cells are available for CD3 crosslinking. An important T cell reaction to the intravenous infusion of monovalent conventional CD19xCD3 binding molecule into B-NHL patients who have essentially no circulating CD19-positive B cells is the redistribution of T cells after start of treatment. It has been found in a phase I clinical trial that this T cell reaction occurs during the starting phase of intravenous CD19xCD3 binding molecule infusion in all individuals without circulating CD19-positive target B cells essentially independent of the CD19xCD3 binding molecule dose (Fig. 19). However, sudden increases in CD19xCD3 binding molecule exposure have been found to trigger virtually the same redistributional T cell reaction in these patients as the initial exposure of T cells to CD19xCD3 binding molecule at treatment start (Fig. 20 A) and even gradual increases in CD19xCD3 binding molecule exposure still can have

redistributional effects on circulating T cells (Fig. 21). Moreover, it has been found that this essentially dose-independent redistributional T cell reaction in the absence of circulating target cells as triggered by conventional CD3 binding molecules like the CD19xCD3 binding molecule (e.g. disclosed in WO 99/54440) in 100% of all treated individuals is a major risk factor for adverse events related to the initiation of treatment.

According to the study protocol, patients with relapsed histologically confirmed indolent B-cell Non-Hodgkin-Lymphoma (B-NHL) including mantle cell lymphoma were recruited in an open-label, multi-center phase I interpatient dose-escalation trial. The study protocol was approved by the independent ethics committees of all participating centers and sent for notification to the responsible regulatory authority. Measurable disease (at least one lesion ≥ 1.5 cm) as documented by CT scan was required for inclusion into the study. Patients received conventional CD19xCD3 binding molecule by continuous intravenous infusion with a portable minipump system over four weeks at constant flow rate (i.e. dose level). Patients were hospitalized during the first two weeks of treatment before they were released from the hospital and continued treatment at home. Patients without evidence of disease progression after four weeks were offered to continue treatment for further four weeks. So far six different dose levels were tested without reaching a maximum tolerated dose (MTD): 0.5, 1.5, 5, 15, 30 and 60 µg/m^2/24h. Cohorts consisted of three patients each if no adverse events defined by the study protocol as DLT (dose limiting toxicity) were observed. In case of one DLT among the first three patients the cohort was expanded to six patients, which – in the absence of a second DLT – allowed further dose escalation. Accordingly, dose levels without DLT in cohorts with 3 patients or with one DLT in cohorts with 6 patients were regarded as safe. Study treatment was stopped in all patients who developed a DLT. At 15 and 30 µg/m^2/24h different modes of treatment initiation during the first 24h were tested in several additional cohorts: (i) Stepwise increase after 5 µg/m^2/24h for the first 24h to 15 µg/m^2/24h maintenance dose (patient cohort 15-step), (ii) even continuous increase of flow-rate from almost zero to 15 or 30 µg/m^2/24h (patient cohorts 15-ramp and 30-ramp) and (iii) start with the maintenance dose from the very beginning (patient cohorts 15-flat, 30-flat and 60-flat). Patient cohorts at dose levels 0.5, 1.5 and 5 µg/m^2/24h were all started with the maintenance dose from the very beginning (i.e. flat initiation).

Time courses of absolute B- and T-cell counts in peripheral blood were determined by four color FACS analysis as follows:

Collection of blood samples and routine analysis

In patient cohorts 15-ramp, 15-flat, 30-ramp, 30-flat and 60-flat blood samples (6 ml) were obtained before and 0.75, 2, 6, 12, 24, 30, 48 hours after start of CD19xCD3 binding molecule (as disclosed in WO 99/54440) infusion as well as on treatment days 8, 15, 17, 22, 24, 29, 36, 43, 50, 57 and 4 weeks after end of conventional CD19xCD3 binding molecule infusion using EDTA-containing Vacutainer™ tubes (Becton Dickinson) which were shipped for analysis at 4°C. In patient cohorts 15-step blood samples (6 ml) were obtained before and 6, 24, 30, 48 hours after start of CD19xCD3 binding molecule infusion as well as on treatment days 8, 15, 22, 29, 36, 43, 50, 57 and 4 weeks after end of CD19xCD3 binding molecule infusion. At dose levels 0.5, 1.5 and 5 µg/m^2/24h blood samples (6 ml) were obtained before and 6, 24, 48 hours after start of CD19xCD3 binding molecule infusion as well as on treatment days 8, 15, 22, 29, 36, 43, 50, 57 and 4 weeks after end of CD19xCD3 binding molecule infusion. In some cases slight variations of these time points occurred for operational reasons. FACS analysis of lymphocyte subpopulations was performed within 24 – 48 h after blood sample collection. Absolute numbers of leukocyte subpopulations in the blood samples were determined through differential blood analysis on a CoulterCounter™ (Coulter).

Isolation of PBMC from blood samples

PBMC (peripheral blood mononuclear cells) isolation was performed by an adapted Ficoll™ gradient separation protocol. Blood was transferred at room temperature into 10 ml Leucosep™ tubes (Greiner) pre-loaded with 3 ml Biocoll™ solution (Biochrom). Centrifugation was carried out in a swing-out rotor for 15 min at 1700xg and 22°C without deceleration. The PBMC above the Biocoll™ layer were isolated, washed once with FACS buffer (PBS / 2% FBS [Foetal Bovine Serum; Biochrom]), centrifuged and resuspended in FACS buffer. Centrifugation during all wash steps was carried out in a swing-out rotor for 4 min at 800xg and 4°C. If necessary, lysis of erythrocytes was performed by incubating the isolated PBMC in 3 ml erythrocyte lysis buffer (8.29 g NH_4Cl, 1.00 g $KHCO_3$, 0.037 g EDTA, ad 1.0 l H_2O_{bidest}, pH 7.5) for 5 min at room temperature followed by a washing step with FACS buffer.

Staining of PBMC with fluorescence-labeled antibodies against cell surface molecules

Monoclonal antibodies were obtained from Invitrogen ([1]Cat. No. MHCD1301, [2]Cat. No. MHCD1401), Dako ([5]Cat. No. C7224) or Becton Dickinson ([3]Cat. No. 555516, [4]Cat. No. 345766) used according to the manufacturers` recommendations. $5x10^5$ – $1x10^6$ cells were stained with the following antibody combination: anti-CD13[1] / anti-CD14[2] (FITC) x anti-CD56[3] (PE) x anti-CD3[4] (PerCP) x anti-CD19[5] (APC). Cells were pelleted in V-shaped 96 well multititer plates (Greiner) and the supernatant was removed. Cell pellets were resuspended in a total volume of 100 µl containing the specific antibodies diluted in FACS buffer. Incubation was carried out in the dark for 30 min at 4°C. Subsequently, samples were washed twice with FACS buffer and cell pellets were resuspended in FACS buffer for flowcytometric analysis.

Flowcytometric detection of stained lymphocytes by FACS

Data collection was performed with a 4 color BD FACSCalibur™ (Becton Dickinson). For each measurement $1x10^4$ cells of defined lymphocyte subpopulations were acquired. Statistical analysis was performed with the program CellQuest Pro™ (Becton Dickinson) to obtain lymphocyte subpopulation percentages and to classify cell surface molecule expression intensity. Subsequently, percentages of single lymphocyte subsets related to total lymphocytes (i.e. B plus T plus NK cells excluding any myeloid cells via CD13/14-staining) as determined by FACS were correlated with the lymphocyte count from the differential blood analysis to calculate absolute cell numbers of T cells ($CD3^+$, $CD56^-$, $CD13/14^-$) and B cells ($CD19^+$, $CD13/14^-$).

T cell redistribution during the starting phase of conventional CD19xCD3 binding molecule (e.g. disclosed in WO 99/54440) treatment in all those patients who had essentially no circulating CD19-positive B cells at treatment start is shown in (Fig. 19). For comparison, a representative example of T cell redistribution during the starting phase of CD19xCD3 binding molecule treatment in a patient with a significant number of circulating CD19-positive B cells is shown in Fig. 22.

In both cases (i.e. essentially no or many circulating B cells) circulating T cell counts rapidly decrease upon treatment start. However, in the absence of circulating B cells T cells tend to return into the circulating blood very early, while the return of T cells into the circulating blood of those patients who have a significant number of circulating B cells at treatment start is usually delayed until these circulating B cells are depleted. Thus, the T cell redistribution patterns mainly differ in the kinetics of T cell reappearance in the circulating blood.

Assessment of efficacy based on CT scan was carried out by central reference radiology after 4 weeks of treatment and in patients receiving additional 4 weeks also after 8 weeks of treatment plus in all cases four weeks after end of treatment. Disappearance and/or normalization in size of all known lesions (including an enlarged spleen) plus clearance of bone marrow from lymphoma cells in cases of bone marrow infiltration was counted as complete response (CR). Reduction by at least 50% from baseline of the sum of products of the two biggest diameters (SPD) of each predefined target lesion was defined as partial response (PR); a reduction by at least 25% was regarded a minimal response (MR). Progressive disease (PD) was defined as ≥ 50% increase of SPD from baseline. SPD deviations from baseline between +50% and –25% were regarded as stable disease (SD).

Patient demographics, doses received and clinical outcome in 34 patients are summarized in Table 3. Clinical anti-tumor activity of the CD19xCD3 binding molecule was clearly dose dependent: Consistent depletion of circulating CD19-positive B (lymphoma) cell from peripheral blood was observed from 5 µg/m^2/24h onwards. At 15 µg/m^2/24h and 30 µg/m^2/24h first objective clinical responses (PRs and CRs) were recorded as well as cases of partial and complete elimination of B lymphoma cells from infiltrated bone marrow. Finally, at 60 µg/m^2/24h the response rate increased to 100% (PRs and CRs) and bone marrow clearance from B lymphoma cells was complete in all evaluable cases.

The CD19xCD3 binding molecule was well tolerated by the majority of patients. Most frequent adverse events of grades 1-4 in 34 patients, regardless of causality are summarized in Table 4. CD19xCD3 binding molecule-related adverse events usually were transient and fully reversible. In particular, there were 2 patients (patients # 19 and # 24 in Table 3) essentially without circulating CD19-positive B cells whose treatment was stopped early because of CNS adverse events (lead symptoms: confusion and disorientation) related to repeated T cell redistribution during the starting phase of CD19xCD3 binding molecule infusion.

One of these patients (#19) was in cohort 15-step. He received 5 µg/m^2/24h CD19xCD3 binding molecule for the first 24h followed by sudden increase to 15 µg/m^2/24h maintenance dose. The corresponding T cell redistribution pattern shows that circulating T cell counts rapidly decreased upon start of infusion at 5 µg/m^2/24h followed by early reappearance of T cells in the circulating blood essentially without circulating CD19-positive B cells. As a consequence, the peripheral T cell counts had

fully recovered when the CD19xCD3 binding molecule dose was increased after 24h from 5 to 15 µg/m^2/24h. Therefore the dose step could trigger a second episode of T cell redistribution as shown in Fig. 20 A. This repeated T cell redistribution was related with CNS side effects (lead symptoms: confusion and disorientation) in this patient, which led to the stop of infusion. The relationship between repeated T cell redistribution and such CNS adverse events was also observed in previous phase I clinical trials in B-NHL patients who received CD19xCD3 binding molecule (e.g. disclosed in WO 99/54440) as repeated bolus infusion for 2 to 4 hours each usually followed by 2 days of treatment free interval (Fig. 20 B). Every single bolus infusion triggered one episode of T cell redistribution consisting of a fast decrease in circulating T cell counts and T cell recovery prior to the next bolus infusion. In total, CNS adverse events related to repeated T cell redistribution were observed in 5 out of 21 patients. Fig. 20 B shows the representative example of one patient from the bolus infusion trials, who developed CNS symptoms after the third episode of T cell redistribution. Typically, patients with CNS adverse events in the bolus infusion trials also had low circulating B cell counts.

The second patient (#24) from the continuous infusion trial, whose treatment was stopped early because of CNS adverse events (lead symptoms: confusion and disorientation) related to repeated T cell redistribution during the starting phase of CD19xCD3 binding molecule infusion, was in cohort 15-flat. By mistake, this patient received an CD19xCD3 binding molecule infusion without additional HSA as required for stabilization of the drug. The resulting uneven drug flow triggered repeated episodes of T cell redistribution instead of only one (Fig. 23 A) with the consequence that the infusion had to be stopped because of developing CNS symptoms. Yet, when the same patient was restarted correctly with CD19xCD3 binding molecule solution containing additional HSA for drug stabilization (e.g. disclosed in WO 99/54440), no repeated T cell redistribution was observed and the patient did not again develop any CNS symptoms (Fig. 23 B). Because this patient also had essentially no circulating B cells, the circulating T cells could react with fast redistribution kinetics even to subtle changes in drug exposure as observed. The CNS adverse events related to T cell redistribution in patients who have essentially no circulating target cells can be explained by a transient increase of T cell adhesiveness to the endothelial cells followed by massive simultaneous adhesion of circulating T cells to the blood vessel walls with a consecutive drop of T cell numbers

in the circulating blood as observed. The massive simultaneous attachment of T cells to the blood vessel walls can cause an increase in endothelial permeability and endothelial cell activation. The consequences of increased endothelial permeability are fluid shifts from the intravascular compartment into interstitial tissue compartments including the CNS interstitium. Endothelial cell activation by attached T cells can have procoagulatory effects (Monaco et al. J Leukoc Biol 71 (2002) 659-668) with possible disturbances in blood flow (including cerebral blood flow) particularly with regard to capillary microcirculation. Thus, CNS adverse events related to T cell redistribution in patients essentially without circulating target cells can be the consequence of capillary leak and/or disturbances in capillary microcirculation through adherence of T cells to endothelial cells. The endothelial stress caused by one episode of T cell redistribution is tolerated by the majority of patients, while the enhanced endothelial stress caused by repeated T cell redistribution frequently causes CNS adverse events. More than one episode of T cell redistribution may be less risky only in patients who have low baseline counts of circulating T cells. However, also the limited endothelial stress caused by one episode of T cell redistribution can cause CNS adverse events in rare cases of increased susceptibility for such events as observed in 1 out of 21 patients in the bolus infusion trials with the CD19xCD3 binding molecule.

Without being bound by theory, the transient increase of T cell adhesiveness to the endothelial cells in patients who have essentially no circulating target cells can be explained as T cell reaction to the monovalent interaction of a conventional CD3 binding molecule, like the CD19xCD3 binding molecule (e.g. WO 99/54440), to its context dependent epitope on CD3 epsilon resulting in an allosteric change in the conformation of CD3 followed by the recruitment of Nck2 to the cytoplasmic domain of CD3 epsilon as described above. As Nck2 is directly linked to integrins via PINCH and ILK (Fig 28), recruitment of Nck2 to the cytoplasmic domain of CD3 epsilon following an allosteric change in the conformation of CD3 through binding of a conventional CD3 binding molecule, like the CD19xCD3 binding molecule, to its context dependent epitope on CD3 epsilon, can increase the adhesiveness of T cells to endothelial cells by transiently switching integrins on the T cell surface into their more adhesive isoform via inside-out-signalling.

Table 3. Patient demographics and clinical outcome

Cohort	Patient	Age/ Sex	Disease (Ann Arbor Classification)	Dose Level [mg/m^2/Day]	Clearance of Bone Marrow	Best Response* (CR Duration in Months or Weeks)
1	1	71/m	IC, Binet C	0.0005	None	SD
	2	67/f	MCL, Stage IV/A/E	0.0005	n.d.	PD
	3	67/m	CLL, Stage IV/B/E	0.0005	n.d.	MR
2	4	69/m	MCL, Stage IV/B	0.0015	n.i.	SD
	5	49/m	MCL, Stage IV/A/S	0.0015	n.d.	SD
	6	71/m	MCL, Stage IV/B/E	0.0015	n.i.	PD
	7	77/m	MCL, Stage IV/B/E/S	0.0015	n.i.	SD
	8	65/m	CLL, Stage IV/B/E/S	0.0015	n.d.	PD
	9	75/m	FL, Stage II/B	0.0015	n.i.	SD
3	10	58/m	MCL, Stage III/B/S	0.005	n.i.	PD
	11	68/f	FL, Stage IV/B	0.005	n.d.	SD
	12	65/m	MCL, Stage III/A/E	0.005	n.i.	SD
4[a]	13	60/m	SLL, Stage IV/B/S	0.015	Complete	**PR**
	14	73/m	MCL, Stage II/A/E	0.015	n.i.	SD
	15	44/m	FL, Stage IV/B/E/S	0.015	Partial	**PR**
	16	61/m	FL, Stage IV/A/S	0.015	Complete	**CR** (7mo)
	17	67/m	MZL, Stage IV/B/S	0.015	n.i.	n.e.
	18	64/m	FL, Stage IV/A/E	0.015	n.i.	PD
	19	75/m	MCL, Stage III/A	0.015	n.i.	n.e.
	20	65/f	FL; Stage III/A	0.015	n.i.	SD
	21	60/m	MCL, Stage IV/A/E	0.015	None	SD
	22	67/f	FL, Stage IV/B	0.015	Complete	MR
	23	67/m	DLBCL, Stage III/B	0.015	n.i.	n.e.
	24	65/f	FL, Stage III/A	0.015	n.d.	SD
	25	74/f	WD, Stage IV/B	0.015	Partial	SD
5	26	67/m	MCL, Stage IV/A	0.03	Complete	SD

	27	48/m	FL, Stage III/A	0.03	n.i.	PD
	28	58/m	MCL, Stage III/A	0.03	n.i.	**CR** (10mo+)
	29	45/f	MCL, Stage IV/B	0.03	Partial	PD
	30	59/m	MZL, Stage III/A	0.03	n.i.	n.e.
	31	43/m	FL, Stage III/A	0.03	n.i.	MR
6	32	72/m	MCL, Stage IV/A	0.06	Complete	**PR**
	33	55/m	MCL, Stage IV/B	0.06	Complete	**CR** (4mo+)
	34	52/m	FL, Stage IV/A	0.06	n.i.	**CR**[b] (1w+)

*Centrally confirmed complete (CR) and partial (PR) responses by Cheson criteria in bold; MR, minimal response (≥25 to <50%); SD, stable disease; PD, progressive disease; duration from first documentation of response in parentheses; + denotes an ongoing response

[a]Cohort 4 was expanded to study three different schedules of treatment initiation

[b]PR after 8 weeks of treatment that turned into a CR after an additional treatment cycle of 4 weeks at the same dose following 7 weeks of treatment free interval

n.e.: not evaluable, because of treatment period <7 d

n.d.: not determined (infiltrated, but no second biopsy performed at end of treatment)

n.i.: not infiltrated at start of treatment

Table 4. Incidence of adverse events observed during treatment

Adverse events regardless of relationship, occuring in ≥ 3 patients (N=34)	**Grade 1-4 N (%)**	**Grade 3-4 N (%)**
Pyrexia	22 (64.7)	2 (5.9)
Leukopenia	21 (61.8)	11 (32.4)
Lymphopenia	21 (61.8)	21 (61.8)
Coagulopathy (increase in D-dimers)	16 (47.1)	6 (17.6)
Enzyme abnormality (AP, LDH, CRP)	16 (47.1)	10 (29.4)
Hepatic function abnormality (ALT, AST, GGT)	16 (47.1)	1 (2.9)
Anaemia	13 (38.2)	5 (14.7)
Chills	13 (38.2)	0 (0.0)
Headache	12 (35.3)	1 (2.9)
Hypokalaemia	12 (35.3)	2 (5.9)
Thrombocytopenia	12 (35.3)	6 (17.6)
Weight increased	12 (35.3)	0 (0.0)
Hyperglycaemia	11 (32.4)	2 (5.9)
Neutropenia	11 (32.4)	8 (23.5)

Haematuria	10 (29.4)	0 (0.0)
Oedema peripheral	10 (29.4)	2 (5.9)
Anorexia	9 (26.5)	1 (2.9)
Diarrhoea	9 (26.5)	0 (0.0)
Weight decreased	9 (26.5)	0 (0.0)
Fatigue	8 (23.5)	1 (2.9)
Proteinuria	8 (23.5)	0 (0.0)
Hypocalcaemia	7 (20.6)	2 (5.9)
Pancreatic enzyme abnormality	7 (20.6)	0 (0.0)
Cough	6 (17.6)	0 (0.0)
Dyspnoea	6 (17.6)	0 (0.0)
Back pain	5 (14.7)	0 (0.0)
Catheter site pain	5 (14.7)	0 (0.0)
Hyperbilirubinaemia	5 (14.7)	2 (5.9)
Hypoalbuminaemia	5 (14.7)	0 (0.0)
Hypogammaglobulinaemia	5 (14.7)	1 (2.9)
Hypoproteinaemia	5 (14.7)	0 (0.0)
Pleural effusion	5 (14.7)	1 (2.9)
Vomiting	5 (14.7)	0 (0.0)
Asthenia	4 (11.8)	1 (2.9)
Confusional state	4 (11.8)	0 (0.0)
Constipation	4 (11.8)	0 (0.0)
Dizziness	4 (11.8)	0 (0.0)
Hypertension	4 (11.8)	0 (0.0)
Hyponatraemia	4 (11.8)	2 (5.9)
Mucosal dryness	4 (11.8)	0 (0.0)
Muscle spasms	4 (11.8)	0 (0.0)
Nausea	4 (11.8)	0 (0.0)
Night sweats	4 (11.8)	0 (0.0)
Abdominal pain	3 (8.8)	1 (2.9)
Ascites	3 (8.8)	0 (0.0)
Hypercoagulation	3 (8.8)	0 (0.0)
Hyperhidrosis	3 (8.8)	0 (0.0)
Hypoglobulinaemia	3 (8.8)	0 (0.0)
Insomnia	3 (8.8)	0 (0.0)
Liver disorder	3 (8.8)	1 (2.9)
Nasopharyngitis	3 (8.8)	0 (0.0)
Pruritus	3 (8.8)	0 (0.0)

Abbreviations used are: AE, adverse event; AP, alkaline phosphatase; LDH, lactate dehydrogenase; CRP, C-reactive protein; ALT, alanine transaminase; AST, aspartate transaminase; GGT, gamma-glutamyl transferase; AE data from the additional treatment cycle of patient 34 not yet included.

As explained above, conventional CD3 binding molecules (e.g. disclosed in WO 99/54440) capable of binding to a context-dependent epitope, though functional, lead to the undesired effect of T cell redistribution in patients causing CNS adverse

events. In contrast, binding molecules of the present invention, by binding to the context-independent N-terminal 1-27 amino acids of the CD3 epsilon chain, do not lead to such T cell redistribution effects. As a consequence, the CD3 binding molecules of the invention are associated with a better safety profile compared to conventional CD3 binding molecules.

14. Bispecific CD3 binding molecules of the invention inducing T cell mediated target cell lysis by recognizing a surface target antigen deplete target antigen positive cells in vivo

A bispecific CD3 binding molecule of the invention recognizing CD33 as target antigen depletes CD33-positive circulating monocytes from the peripheral blood of cynomolgus monkeys

CD33-AF5 VH-VL x I2C VH-VL (amino acid sequence: SEQ ID NO.267) was produced by expression in CHO cells using the coding nucleotide sequence SEQ ID NO. 268. The coding sequences of (i) an N-terminal immunoglobulin heavy chain leader comprising a start codon embedded within a Kozak consensus sequence and (ii) a C-terminal His_6-tag followed by a stop codon were both attached in frame to the nucleotide sequence SEQ ID NO 268 prior to insertion of the resulting DNA-fragment as obtained by gene synthesis into the multiple cloning site of the expression vector pEF-DHFR (Raum et al. Cancer Immunol Immunother 50 (2001) 141-150). Stable transfection of DHFR-deficient CHO cells, selection for DHFR-positive transfectants secreting the CD3 binding molecule CD33-AF5 VH-VL x I2C VH-VL into the culture supernatant and gene amplification with methotrexat for increasing expression levels were carried out as described (Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025). The analytical SEC-profile of CD33-AF5 VH-VL x I2C VH-VL for use in cynomolgus monkeys revealed that the test material almost exclusively consisted of monomer. The potency of the test material was measured in a cytotoxicity assay as described in example 16.5 using CHO cells transfected with cynomolgus CD33 as target cells and the macaque T cell line 4119LnPx as source of effector cells (FIG. 25). The concentration of CD33-AF5 VH-VL x I2C VH-VL required for half-maximal target cell lysis by the effector T cells (EC50) was determined to be 2.7 ng/ml.

Young (approx. 3 years old) adult cynomolgus monkeys (Macaca fascicularis) were treated by continuous intravenous infusion of CD3 binding molecule CD33-AF5 VH-VL x I2C VH-VL at different flow-rates (i.e. dose levels) to study depletion of

circulating CD33-positive monocytes from the peripheral blood. This situation is equivalent to the treatment with the conventional CD3 binding molecule CD19xCD3 (specific for CD19 on B cells and CD3 on T cells) of those B-NHL patients, who have circulating CD19-positive target B cells (see e.g. WO99/54440). Depletion of circulating CD19-positive target B cells from the peripheral blood had turned out as a valid surrogate for the general clinical efficacy of the conventional CD3 binding molecule (CD19xCD3 as provided in WO99/54440) in patients with CD19-positive B-cell malignomas like B-NHL. Likewise, depletion of circulating CD33-positive monocytes from the peripheral blood is regarded as a valid surrogate of the general clinical efficacy of CD33-directed bispecific CD3 binding molecules of the invention like CD33-AF5 VH-VL x I2C VH-VL in patients with CD33-positive myeloid malignomas like AML (acute myeloid leukemia).

Continuous infusion was carried out according to the Swivel method as follows: The monkeys are catheterized via the vena femoralis into the vena cava caudalis using a vein catheter. The catheter is tunneled subcutaneously to the dorsal shoulder region and exteriorized at the caudal scapula. Then a tube is passed through a jacket and a protection spring. The jacket is fastened around the animal and the catheter, via the tube, is connected to an infusion pump.

Administration solution (1.25 M lysine, 0.1% tween 80, pH 7) without test material was infused continuously at 48 ml/24h for 7 days prior to treatment start to allow acclimatization of the animals to the infusion conditions. Treatment was started by adding CD33-AF5 VH-VL x I2C VH-VL test material to the administration solution at the amount required for each individual dose level to be tested (i.e. flow rate of CD33-AF5 VH-VL x I2C VH-VL). The infusion reservoir was changed every day throughout the whole acclimatization and treatment phase. Planned treatment duration was 7 days except for the 120µg/m^2/24h dose level, where animals received 14 days of treatment.

Time courses of absolute counts in circulating T cells and CD33-positive monocytes were determined by 4- or 3-colour FACS analysis, respectively:

Collection of blood samples and routine analysis

Blood samples (1 ml) were obtained before and 0.75, 2, 6, 12, 24, 30, 48, 72 hours after start of continuous infusion with MCSP-G4 VH-VL x I2C VH-VL as well as after 7 and 14 days (and after 9 days at the 120 µg/m^2/24h dose level) of treatment using EDTA-containing Vacutainer™ tubes (Becton Dickinson) which were shipped for

analysis at 4°C. In some cases slight variations of these time points occurred for operational reasons. FACS analysis of lymphocyte subpopulations was performed within 24 – 48 h after blood sample collection. Absolute numbers of leukocyte subpopulations in the blood samples were determined through differential blood analysis in a routine veterinary lab.

Isolation of PBMC from blood samples

PBMC (peripheral blood mononuclear cells) were isolated in analogy to the protocol described in example 13, above, with adaptations of the used volumes.

Staining of PBMC with fluorescence-labeled antibodies against cell surface molecules

Monoclonal antibodies reactive with cynomolgus antigens were obtained from Becton Dickinson ([1]Cat. No. 345784, [2]Cat. No. 556647, [3]Cat. No. 552851, [6]Cat. No. 557710), Beckman Coulter ([4]Cat. No. IM2470) and Miltenyi ([5]Cat. No. 130-091-732) and used according to the manufacturers' recommendations. $5x10^5$ – $1x10^6$ cells were stained with the following antibody combinations: anti-CD14[1] (FITC) x anti-CD56[2] (PE) x anti-CD3[3] (PerCP) x anti-CD19[4] (APC) and anti-CD14[1] (FITC) x anti-CD33[5] (PE) x anti-CD16[6] (Alexa Fluor 647™). Additional steps were performed as described in example 13, above.

Flowcytometric detection of stained lymphocytes by FACS

Data collection was performed with a 4 color BD FACSCalibur™ (Becton Dickinson). For each measurement $1x10^4$ cells of defined lymphocyte subpopulations were acquired. Statistical analysis was performed with the program CellQuest Pro™ (Becton Dickinson) to obtain lymphocyte subpopulation percentages and to classify cell surface molecule expression intensity. Subsequently, percentages of single lymphocyte subsets related to total lymphocytes (i.e. B plus T plus NK cells excluding myeloid cells via CD14-staining) as determined by FACS were correlated with the lymphocyte count from the differential blood analysis to calculate absolute cell numbers of T cells ($CD3^+$, $CD56^-$, $CD14^-$). Absolute numbers of CD33-positive monocytes were calculated by multiplying the monocyte counts from the differential blood analysis with the corresponding ratios of CD33-positive monocytes ($CD33^+$, $CD14^+$) to all monocytes ($CD14^+$) as determined by FACS.

The percentage compared to baseline (i.e. 100%) of absolute circulating CD33-positive monocyte counts at the end of treatment with CD33-AF5 VH-VL x I2C VH-VL

in 4 cohorts of 2 cynomolgus monkeys with inter-cohort dose escalation from 30 over 60 and 240 to 1000 µg/m^2/24h are shown in FIG 26 A.

As shown in FIG 26 A, continuous intravenous infusion of CD33-AF5 VH-VL x I2C VH-VL induces depletion of circulating CD33-positive monocytes in a dose-dependent manner. While there was still no detectable depletion of circulating CD33-positive monocytes at 30 µg/m^2/24h, a first trend towards a reduction of CD33-positive monocyte counts became visible at 60 µg/m^2/24h after 7 days of treatment. At 240 µg/m^2/24h circulating CD33-positive monocytes were almost completely depleted from the peripheral blood after 3 days of treatment. This was reached even faster at 1000 µg/m^2/24h, where depletion of the circulating CD33-positive monocytes from the peripheral blood was completed already after 1 day of treatment. This finding was confirmed by the results shown in Figure 26 B demonstrating depletion of circulating CD33-positive monocytes by two thirds and 50% compared to the respective baseline in two cynomolgus monkeys treated by continuous infusion with CD33-AF5 VH-VL x I2C VH-VL at 120 µg/m^2/24h for 14 days.

This outcome is a clear signal clinical efficacy of the CD3 binding molecules of the invention in general and of bispecific CD33-directed CD3 binding molecules of the invention for the treatment of CD33-positive malignomas like AML in particularly. Moreover, the T cell redistribution during the starting phase of treatment with CD33-AF5 VH-VL x I2C VH-VL in the presence of circulating target cells (i.e. CD33-positive monocytes) seems to be less pronounced than T cell redistribution during the starting phase of treatment with conventional CD19xCD3 constructs, as described in WO99/54440 in B-NHL patients with a significant number of circulating target cells (i.e. CD19-positive B cells) as shown in Fig 22. While T cells disappear completely from the circulation upon start of CD19xCD3 infusion and do not reappear until the circulating CD19-positive target B cells are depleted from the peripheral blood (FIG 22), initial disappearance of circulating T cells is incomplete upon infusion start with CD33-AF5 VH-VL x I2C VH-VL and T cell counts recover still during the presence of circulating CD33-positive target cells (FIG 26 B). This confirms that CD3 binding molecules of the invention (directed against and generated against an epitope of human and non-chimpanzee primates CD3ε (epsilon) chain and being a part or fragment or the full length of the amino acid sequence as provided in SEQ ID Nos. 2, 4, 6, or 8) by recognizing a context-independent CD3 epitope show a more favorable

T cell redistribution profile than conventional CD3 binding molecules recognizing a context-dependent CD3 epitope, like the binding molecules provided in WO99/54440.

15. CD3 binding molecules of the invention directed at essentially context independent CD3 epitopes by inducing less redistribution of circulating T cells in the absence of circulating target cells reduce the risk of adverse events related to the initiation of treatment

Reduced T cell redistribution in cynomolgus monkeys following initiation of treatment with a representative cross-species specific CD3 binding molecule of the invention

MCSP-G4 VH-VL x I2C VH-VL (amino acid sequence: SEQ ID NO. 193) was produced by expression in CHO cells using the coding nucleotide sequence SEQ ID NO. 194. The coding sequences of (i) an N-terminal immunoglobulin heavy chain leader comprising a start codon embedded within a Kozak consensus sequence and (ii) a C-terminal His6-tag followed by a stop codon were both attached in frame to the nucleotide sequence SEQ ID NO. 194 prior to insertion of the resulting DNA-fragment as obtained by gene synthesis into the multiple cloning site of the expression vector pEF-DHFR (Raum et al. Cancer Immunol Immunother 50 (2001) 141-150). Stable transfection of DHFR-deficient CHO cells, selection for DHFR-positive transfectants secreting the CD3 binding molecule MCSP-G4 VH-VL x I2C VH-VL into the culture supernatant and gene amplification with methotrexat for increasing expression levels were carried out as described (Mack et al. Proc. Natl. Acad. Sci. USA 92 (1995) 7021-7025). Test material for treatment of cynomolgus monkeys was produced in a 200-liter fermenter. Protein purification from the harvest was based on IMAC affinity chromatography targeting the C-terminal His6-tag of MCSP-G4 VH-VL x I2C VH-VL followed by preparative size exclusion chromatography (SEC). The total yield of final endotoxin-free test material was 40 mg. The test material consisted of 70 % monomer, 30% dimer and a small contamination of higher multimer. The potency of the test material was measured in a cytotoxicity assay as described in example 11 using CHO cells transfected with cynomolgus MCSP as target cells and the macaque T cell line 4119LnPx as source of effector cells (FIG 27). The concentration of MCSP-G4 VH-VL x I2C VH-VL required for half-maximal target cell lysis by the effector T cells (EC50) was determined to be 1.9 ng/ml.

Young (approx. 3 years old) adult cynomolgus monkeys (Macaca fascicularis) were treated by continuous intravenous infusion of CD3 binding molecule MCSP-G4 VH-VL x I2C VH-VL at different flow-rates (i.e. dose levels) to study redistribution of circulating T cells following initiation of treatment in the absence of circulating target cells. Although the CD3 binding molecule MCSP-G4 VH-VL x I2C VH-VL can recognize both cynomolgus MCSP and cynomolgus CD3, there are no circulating blood cells expressing MCSP. Therefore, the only interaction possible in the circulating blood is binding of the CD3-specific arm of MCSP-G4 VH-VL x I2C VH-VL to CD3 on T cells. This situation is equivalent to the treatment with the conventional CD3 binding molecule (CD19xCD3 binding molecule specific for CD19 on B cells and CD3 on T cells) of those B-NHL patients, who have no circulating CD19-positive target B cells as described in example 13.

Continuous infusion was carried out according to the Swivel method as follows: The monkeys are catheterized via the vena femoralis into the vena cava caudalis using a vein catheter. The catheter is tunneled subcutaneously to the dorsal shoulder region and exteriorized at the caudal scapula. Then a tube is passed through a jacket and a protection spring. The jacket is fastened around the animal and the catheter, via the tube, is connected to an infusion pump.

Administration solution (1.25 M lysine, 0.1% tween 80, pH 7) without test material was infused continuously at 48 ml/24h for 7 days prior to treatment start to allow acclimatization of the animals to the infusion conditions. Treatment was started by adding MCSP-G4 VH-VL x I2C VH-VL test material to the administration solution at the amount required for each individual dose level to be tested (i.e. flow rate of MCSP-G4 VH-VL x I2C VH-VL). The infusion reservoir was changed every day throughout the whole acclimatization and treatment phase. Treatment duration was 7 days.

Time courses of absolute T-cell counts in peripheral blood were determined by four color FACS analysis as follows:

Collection of blood samples and routine analysis

Blood samples (1 ml) were obtained before and 0.75, 2, 6, 12, 24, 30, 48, 72 hours after start of continuous infusion with MCSP-G4 VH-VL x I2C VH-VL as well as after 7 days of treatment using EDTA-containing Vacutainer™ tubes (Becton Dickinson) which were shipped for analysis at 4°C. In some cases slight variations of these time points occurred for operational reasons. FACS analysis of lymphocyte

subpopulations was performed within 24 – 48 h after blood sample collection. Absolute numbers of leukocyte subpopulations in the blood samples were determined through differential blood analysis in a routine veterinary lab.

Isolation of PBMC from blood samples

PBMC were isolated in analogy to the protocol described in example 13, above, with adaptations of the used volumes.

Staining of PBMC with fluorescence-labeled antibodies against cell surface molecules

Monoclonal antibodies reactive with cynomolgus antigens were obtained from Becton Dickinson ([1]Cat. No. 345784, [2]Cat. No. 556647, [3]Cat. No. 552851) and Beckman Coulter ([4]Cat. No. IM2470) used according to the manufacturers' recommendations. $5x10^5$ – $1x10^6$ cells were stained with the following antibody combination: anti-CD14[1] (FITC) x anti-CD56[2] (PE) x anti-CD3[3] (PerCP) x anti-CD19[4] (APC). Additional steps were performed as described in example 13, above.

Flowcytometric detection of stained lymphocytes by FACS

Data collection was performed with a 4 color BD FACSCalibur™ (Becton Dickinson). For each measurement $1x10^4$ cells of defined lymphocyte subpopulations were acquired. Statistical analysis was performed with the program CellQuest Pro™ (Becton Dickinson) to obtain lymphocyte subpopulation percentages and to classify cell surface molecule expression intensity. Subsequently, percentages of single lymphocyte subsets related to total lymphocytes (i.e. B plus T plus NK cells excluding myeloid cells via CD14-staining) as determined by FACS were correlated with the lymphocyte count from the differential blood analysis to calculate absolute cell numbers of T cells ($CD3^+$, $CD56^-$, $CD14^-$).

T cell redistribution during the starting phase of treatment with MCSP-G4 VH-VL x I2C VH-VL in cynomolgus monkeys at dose levels of 60, 240 and 1000 µg/m^2/24h is shown in Fig 28. These animals showed no signs at all of any T cell redistribution during the starting phase of treatment, i.e. T cell counts rather increased than decreased upon treatment initiation. Given that T cell redistribution is consistently observed in 100% of all patients without circulating target cells, upon treatment initiation with the conventional CD3 binding molecule (e.g. CD19xCD3 construct as described in WO 99/54440) against a context dependent CD3 epitope, it was demonstrated that substantially less T cell redistribution in the absence of circulating target cells upon treatment initiation can be observed with a CD3 binding molecule of

the invention directed and generated against an epitope of human an non-chimpanzee primate CD3 epsilon chain as defined by the amino acid sequence of anyone of SEQ ID NOs: 2, 4, 6, or 8 or a fragment thereof. This is in clear contrast to CD3-binding molecules directed against a context-dependent CD3 epitope, like the constructs described in WO 99/54440, The binding molecules against context-independent CD3 epitopes, as (inter alia) provided in any one of SEQ ID NOs: 2, 4, 6, or 8 (or fragments of these sequences) provide for this substantially less (detrimental and non-desired) T cell redistribution. Because T cell redistribution during the starting phase of treatment with CD3 binding molecules is a major risk factor for CNS adverse events, the CD3 binding molecules provided herein and capable of recognizing a context independent CD3 epitope have a substantial advantage over the CD3 binding molecules known in the art and directed against context-dependent CD3 epitopes. Indeed none of the cynomolgus monkeys treated with MCSP-G4 VH-VL x I2C VH-VL showed any signs of CNS symptoms.

The context-independence of the CD3 epitope is provided in this invention and corresponds to the first 27 N-terminal amino acids of CD3 epsilon) or fragments of this 27 amino acid stretch. This context-independent epitope is taken out of its native environment within the CD3 complex and fused to heterologous amino acid sequences without loss of its structural integrity. Anti-CD3 binding molecules as provided herein and generated (and directed) against a context-independent CD3 epitope provide for a surprising clinical improvement with regard to T cell redistribution and, thus, a more favorable safety profile. Without being bound by theory, since their CD3 epitope is context-independent, forming an autonomous selfsufficient subdomain without much influence on the rest of the CD3 complex, the CD3 binding molecules provided herein induce less allosteric changes in CD3 conformation than the conventional CD3 binding molecules (like molecules provided in WO 99/54440), which recognize context-dependent CD3 epitopes like molecules provided in WO 99/54440. As a consequence (again without being bound by theory), the induction of intracellular NcK2 recruitment by the CD3 binding molecules provided herein is also reduced resulting in less isoform switch of T cell integrins and less adhesion of T cells to endothelial cells. It is preferred that preparations of CD3 binding molecules of the invention (directed against and generated against a context-independent epitope as defined herein) essentially consists of monomeric molecules. These monomeric molecules are even more efficient (than dimeric or multimeric

molecules) in avoiding T cell redistribution and thus the risk of CNS adverse events during the starting phase of treatment.

16. Generation and characterization of CD33 and CD3 cross-species specific bispecific single chain molecules

16.1. Generation of CHO cells expressing human CD33

The coding sequence of human CD33 as published in GenBank (Accession number NM_001772) was obtained by gene synthesis according to standard protocols. The gene synthesis fragment was designed as to contain first a Kozak site for eukaryotic expression of the construct, followed by a 19 amino acid immunoglobulin leader peptide, followed in frame by the coding sequence of the mature human CD33 protein, followed in frame by the coding sequence of serine glycine dipeptide, a histidine$_6$-tag and a stop codon (the cDNA and amino acid sequence of the construct is listed under SEQ ID Nos 305 and 306). The gene synthesis fragment was also designed as to introduce restriction sites at the beginning and at the end of the fragment. The introduced restriction sites, EcoRI at the 5' end and SalI at the 3' end, were utilised in the following cloning procedures. The gene synthesis fragment was cloned via EcoRI and SalI into a plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) following standard protocols. The aforementioned procedures were carried out according to standard protocols (Sambrook, Molecular Cloning; A Laboratory Manual, 3rd edition, Cold Spring Harbour Laboratory Press, Cold Spring Harbour, New York (2001)). A clone with sequence-verified nucleotide sequence was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells (ATCC No. CRL 9096) was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct was induced by increasing concentrations of methothrexate (MTX) to a final concentration of up to 20 nM MTX.

16.2. Generation of CHO cells expressing the extracellular domain of macaque CD33

The cDNA sequence of macaque CD33 was obtained by a set of 3 PCRs on cDNA from macaque monkey bone marrow prepared according to standard protocols. The following reaction conditions: 1 cycle at 94°C for 3 minutes followed by 35 cycles with

94°C for 1 minute, 53°C for 1 minute and 72°C for 2 minutes followed by a terminal cycle of 72°C for 3 minutes and the following primers were used:

1. forward primer:
   5'-gaggaattcaccatgccgctgctgctactgctgcccctgctgtgggcaggggccctggctatgg-3' (SEQ ID No. 369)
   reverse primer: 5'-gatttgtaactgtatttggtacttcc-3' (SEQ ID No. 370)
2. forward primer: 5'-attccgcctccttggggatcc-3' (SEQ ID No. 371)
   reverse primer: 5'-gcataggagacattgagctggatgg-3' (SEQ ID No. 372)
3. forward primer: 5'-gcaccaacctgacctgtcagg-3' (SEQ ID No. 373)
   reverse primer: 5'-agtgggtcgactcactgggtcctgacctctgagtattcg-3' (SEQ ID No. 374)

Those PCRs generate three overlapping fragments, which were isolated and sequenced according to standard protocols using the PCR primers, and thereby provided a portion of the cDNA sequence of macaque CD33 from the second nucleotide of codon +2 to the third nucleotide of codon +340 of the mature protein. To generate a construct for expression of macaque CD33 a cDNA fragment was obtained by gene synthesis according to standard protocols (the cDNA and amino acid sequence of the construct is listed under SEQ ID Nos 307 and 308). In this construct the coding sequence of macaque CD33 from amino acid +3 to +340 of the mature CD33 protein was fused into the coding sequence of human CD33 replacing the human coding sequence of the amino acids +3 to +340. The gene synthesis fragment was also designed as to contain a Kozak site for eukaryotic expression of the construct and restriction sites at the beginning and the end of the fragment containing the cDNA coding for essentially the whole extracellular domain of macaque CD33, the macaque CD33 transmembrane domain and a macaque-human chimeric intracellular CD33 domain. The introduced restriction sites XbaI at the 5' end and SalI at the 3' end, were utilised in the following cloning procedures. The gene synthesis fragment was then cloned via XbaI and SalI into a plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150). A sequence verified clone of this plasmid was used to transfect CHO/dhfr- cells as described above.

16.3. Generation of CD33 and CD3 cross-species specific bispecific antibody molecules

Cloning of cross-species specific binding molecules

Generally, bispecific antibody molecules, each comprising a domain with a binding specificity cross-species specific for human and non-chimpanzee primate CD3 epsilon as well as a domain with a binding specificity cross-species specific for human and non-chimpanzee primate CD33, were designed as set out in the following Table 5:

Table 5: Formats of anti-CD3 and anti-CD33 cross-species specific bispecific molecules

SEQ ID (nucl/prot)	Formats of protein constructs (N → C)
276/275	AH11HLxH2CHL
258/257	AH3HLxH2CHL
270/269	AC8HLxH2CHL
264/263	AF5HLxH2CHL
288/287	F2HLxH2CHL
300/299	E11HLxH2CHL
282/281	B3HLxH2CHL
294/293	B10HLxH2CHL
278/277	AH11HLxF12QHL
260/259	AH3HLxF12QHL
272/271	AC8HLxF12QHL
266/265	AF5HLxF12QHL
290/289	F2HLxF12QHL
302/301	E11HLxF12QHL
284/283	B3HLxF12QHL
296/295	B10HLxF12QHL
280/279	AH11HLxI2CHL
262/261	AH3HLxI2CHL
274/273	AC8HLxI2CHL
268/267	AF5HLxI2CHL
292/291	F2HLxI2CHL
304/303	E11HLxI2CHL
286/285	B3HLxI2CHL
298/297	B10HLxI2CHL

The aforementioned constructs containing the variable light-chain (L) and variable heavy-chain (H) domains cross-species specific for human and macaque CD33 and the CD3 specific VH and VL combinations cross-species specific for human and macaque CD3 were obtained by gene synthesis. The gene synthesis fragments were

designed and eukaryotic protein expression was performed similar as described in example 9 for the MCSP and CD3 cross-species specific single chain molecules.
The same holds true for the expression and purification of the CD33 and CD3 cross-species specific single chain molecules.
In the Western Blot a single band was detected at 52 kD corresponding to the purified bispecific antibody.

16.4. Flow cytometric binding analysis of the CD33 and CD3 cross-species specific bispecific antibodies

In order to test the functionality of the cross-species specific bispecific antibody constructs regarding the capability to bind to human and macaque CD33 and CD3, respectively, a FACS analysis was performed similar to the analysis described for the analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 10 using CHO cells expressing the human or macaque CD33 extracellular domains (see example 16.1 and 16.2).
The specific binding of human and non-chimpanzee primate CD3 of the CD3 binding molecules of the invention was clearly detectable as shown in Figure 29. In the FACS analysis all constructs show binding to CD3 and CD33 as compared to the respective negative controls. Cross-species specificity of the bispecific antibodies to human and macaque CD3 and CD33 antigens is demonstrated.

16.5. Bioactivity of CD33 and CD3 cross-species specific bispecific antibodies

Bioactivity of the generated bispecific antibodies was analyzed by chromium 51 (^{51}Cr) release in vitro cytotoxicity assays using the CD33 positive cell lines described in Examples 16.1 and 16.2. As effector cells stimulated human CD4/CD56 depleted PBMC or the macaque T cell line 4119LnPx were used as specified in the respective figures. The cytotoxicity assays were performed similar to the setting described for the bioactivity analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 11 using CHO cells expressing the human or macaque CD33 extracellular domains (see example 16.1 and 16.2) as target cells.
As shown in Figure 30, all of the generated cross-species specific bispecific constructs demonstrate cytotoxic activity against human CD33 positive target cells elicited by stimulated human CD4/CD56 depleted PBMC and against macaque CD33 positive target cells elicited by the macaque T cell line 4119LnPx.

17. Purification of cross-species specific bispecific single chain molecules by an affinity procedure based on the context independent CD3 epsilon epitope corresponding to the N-terminal amino acids 1-27

17.1 Generation of an affinity column displaying the isolated context independent human CD3 epsilon epitope corresponding to the N-terminal amino acids 1-27

The plasmid for expression of the construct 1-27 CD3-Fc consisting of the 1-27 N-terminal amino acids of the human CD3 epsilon chain fused to the hinge and Fc gamma region of human immunoglobulin IgG1 described above (Example 3; cDNA sequence and amino acid sequence of the recombinant fusion protein are listed under SEQ ID NOs 230 and 229) was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct was induced by increasing concentrations of methotrexate (MTX) to a final concentration of up to 20 nM MTX. After two passages of stationary culture the cells were grown in roller bottles with nucleoside-free HyQ PF CHO liquid soy medium (with 4.0 mM L-Glutamine with 0.1% Pluronic F – 68; HyClone) for 7 days before harvest. The cells were removed by centrifugation and the supernatant containing the expressed protein was stored at -20°C. For the isolation of the fusion protein a goat anti-human fc affinity column was prepared according to standard protocols using a commercially available affinity purified goat anti-human IgG fc fragment specific antibody with minimal cross-reaction to bovine, horse, and mouse serum proteins (Jackson ImmunoResearch Europe Ltd.). Using this affinity column the fusion protein was isolated out of cell culture supernatant on an Äkta Explorer System (GE Amersham) and eluted by citric acid. The eluate was neutralized and concentrated. After dialysis against amine free coupling buffer the purified fusion protein was coupled to an N-Hydroxy-Succinimide NHS activated 1 ml HiTrap column (GE Amersham).

After coupling remaining NHS groups were blocked and the column was washed and stored at 5°C in storage buffer containing 0.1% sodium azide.

17.2 Purification of cross-species specific bispecific single chain molecules using a human CD3 peptide affinity column

200 ml cell culture supernatant of cells expressing cross-species specific bispecific single chain molecules were 0.2 µm sterile filtered and applied to the CD3 peptide affinity column using an Äkta Explorer system (GE Amersham).

The column was then washed with phosphate buffered saline PBS pH 7.4 to wash out unbound sample. Elution was done with an acidic buffer pH 3.0 containing 20 mM Citric acid and 1 M sodium chloride. Eluted protein was neutralized immediately by 1 M Trishydroxymethylamine TRIS pH 8.3 contained in the collection tubes of the fraction collector.

Protein analysis was done by SDS PAGE and Western Blot.

For SDS PAGE BisTris Gels 4-12% are used (Invitrogen). The running buffer was 1 x MES-SDS-Puffer (Invitrogen). As protein standard 15 µl prestained Sharp Protein Standard (Invitrogen) was applied. Electrophoresis was performed for 60 minutes at 200 volts 120 mA max. Gels were washed in demineralised water and stained with Coomassie for one hour. Gels are destained in demineralised water for 3 hours. Pictures are taken with a Syngene Gel documentation system.

For Western Blot a double of the SDS PAGE gel was generated and proteins were electroblotted onto a nitrocellulose membrane. The membrane was blocked with 2% bovine serum albumin in PBS and incubated with a biotinylated murine Penta His antibody (Qiagen). As secondary reagent a streptavidin alkaline phosphatase conjugate (DAKO) was used. Blots were developed with BCIP/NBT substrate solution (Pierce).

As demonstrated in Figures 31, 32 and 33 the use of a human CD3 peptide affinity column as described above allows the highly efficient purification of the bispecific single chain molecules from cell culture supernatant. The cross-species specific anti-CD3 single chain antibodies contained in the bispecific single chain molecules therefore enable via their specific binding properties an efficient generic one-step method of purification for the cross-species specific bispecific single chain molecules, without the need of any tags solely attached for purification purposes.

18. Generic pharmacokinetic assay for cross-species specific bispecific single chain molecules

18.1 Production of 1-27 CD3-Fc for use in the pharmacokinetic assay

The coding sequence of the 1-27 N-terminal amino acids of the human CD3 epsilon chain fused to the hinge and Fc gamma region of human immunoglobulin IgG1 was obtained by gene synthesis according to standard protocols (cDNA sequence and amino acid sequence of the recombinant fusion protein are listed under SEQ ID NOs 309 and 310). The gene synthesis fragment was designed as to contain first a Kozak site for eukaryotic expression of the construct, followed by a 19 amino acid immunoglobulin leader peptide, followed in frame by the coding sequence of the first 27 amino acids of the extracellular portion of the mature human CD3 epsilon chain, followed in frame by the coding sequence of the hinge region and Fc gamma portion of human IgG1 and a stop codon. The gene synthesis fragment was also designed and cloned as described in example 3.1, supra. A clone with sequence-verified nucleotide sequence was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described in example 9, supra. For the isolation of the fusion protein a goat anti-human fc affinity column was prepared according to standard protocols using a commercially available affinity purified goat anti-human IgG fc fragment specific antibody with minimal cross-reaction to bovine, horse, and mouse serum proteins (Jackson ImmunoResearch Europe Ltd.). Using this affinity column the fusion protein was isolated out of cell culture supernatant on an Äkta Explorer System (GE Amersham) and eluted by citric acid. The eluate was neutralized and concentrated.

18.2 Pharmacokinetic assay for cross-species specific bispecific single chain molecules

The assay is based on the ECL-ELISA technology using ruthenium labelled detection on carbon plates measured on a Sektor Imager device (MSD). In a first step, carbon plates (MSD High Bind Plate 96 well Cat: L15xB-3) were coated with 5 µl/well at 50 ng/ml of the purified 1-27 CD3-Fc described in Example 18.1. The plate was then dried overnight at 25°C. Subsequently plates were blocked with 5% BSA (Paesel&Lorei #100568) in PBS at 150 µl/well for 1h at 25°C in an incubator while shaking (700 rpm). In the next step plates were washed three times with 0.05% Tween in PBS. A standard curve in 50% macaque serum in PBS was generated by

serial 1:4 dilution starting at 100 ng/ml of the respective cross-species specific bispecific single chain molecule to be detected in the assay. Quality control (QC) samples were prepared in 50% macaque serum in PBS ranging from 1 ng/ml to 50 ng/ml of the respective cross-species specific bispecific single chain molecule dependent on the expected sample serum concentrations. Standard, QC or unknown samples were transferred to the carbon plates at 10 µl/well and incubated for 90 min at 25°C in the incubator while shaking (700 rpm). Subsequently plates were washed three times with 0.05% Tween in PBS. For detection 25 µl/well of penta-His-Biotin antibody (Qiagen, 200 µg/ml in 0.05% Tween in PBS) was added and incubated for 1 h at 25°C in an incubator while shaking (700 rpm). In a second detection step 25 µl/well Streptavidin-SulfoTag solution (MSD; Cat: R32AD-1; Lot: W0010903) was added and incubated for 1 h at 25°C in an incubator while shaking (700 rpm). Subsequently plates were washed three times with 0.05% Tween in PBS. Finally 150 µl/well MSD Reading Buffer (MSD, Cat: R9ZC-1) was added and plates were read in the Sektor Imager device.

Figures 34 and 35 demonstrate the feasibility of detection of cross-species specific bispecific single chain molecules in serum samples of macaque monkeys for cross-species specific bispecific single chain molecules. The cross-species specific anti-CD3 single chain antibodies contained in the bispecific single chain molecules enable therefore via their specific binding properties a highly sensitive generic assay for detection of the cross-species specific bispecific single chain molecules. The assay set out above can be used in the context of formal toxicological studies that are needed for drug development and can be easily adapted for measurement of patient samples in connection with the clinical application of cross-species specific bispecific single chain molecules.

19. Generation of recombinant transmembrane fusion proteins of the N-terminal amino acids 1-27 of CD3 epsilon from different non-chimpanzee primates fused to EpCAM from cynomolgus monkey (1-27 CD3-EpCAM).

19.1 Cloning and expression of 1-27 CD3-EpCAM

CD3 epsilon was isolated from different non-chimpanzee primates (marmoset, tamarin, squirrel monkey) and swine. The coding sequences of the 1-27 N-terminal amino acids of CD3 epsilon chain of the mature human, common marmoset (*Callithrix jacchus*), cottontop tamarin (*Saguinus oedipus),* common squirrel monkey

(*Saimiri sciureus*) and domestic swine (*Sus scrofa*; used as negative control) fused to the N-terminus of Flag tagged cynomolgus EpCAM were obtained by gene synthesis according to standard protocols (cDNA sequence and amino acid sequence of the recombinant fusion proteins are listed under SEQ ID NOs 231 to 240). The gene synthesis fragments were designed as to contain first a BsrGI site to allow for fusion in correct reading frame with the coding sequence of a 19 amino acid immunoglobulin leader peptide already present in the target expression vector, which was followed in frame by the coding sequence of the N-terminal 1-27 amino acids of the extracellular portion of the mature CD3 epsilon chains, which was followed in frame by the coding sequence of a Flag tag and followed in frame by the coding sequence of the mature cynomolgus EpCAM transmembrane protein. The gene synthesis fragments were also designed to introduce a restriction site at the end of the cDNA coding for the fusion protein. The introduced restriction sites BsrGI at the 5' end and SalI at the 3' end, were utilized in the following cloning procedures. The gene synthesis fragments were then cloned via BsrGI and SalI into a derivative of the plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150), which already contains the coding sequence of the 19 amino acid immunoglobulin leader peptide following standard protocols. Sequence verified plasmids were used to transfect DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct was induced by increasing concentrations of methotrexate (MTX) to a final concentration of up to 20 nM MTX.

Transfectants were tested for cell surface expression of the recombinant transmembrane protein via an FACS assay according to standard protocols. For that purpose a number of $2.5x10^5$ cells were incubated with 50 µl of the anti-Flag M2 antibody (Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany) at 5 µg/ml in PBS with 2% FCS. Bound antibody was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Flow cytometry was performed on a FACS-Calibur apparatus, the CellQuest software was used to acquire and analyze the data (Becton Dickinson biosciences, Heidelberg). FACS staining and measuring of the fluorescence intensity

were performed as described in Current Protocols in Immunology (Coligan, Kruisbeek, Margulies, Shevach and Strober, Wiley-Interscience, 2002).
Expression of the Flag tagged recombinant transmembrane fusion proteins consisting of cynomolgus EpCAM and the 1-27 N-terminal amino acids of the human, marmoset, tamarin, squirrel monkey and swine CD3 epsilon chain respectively on transfected cells is clearly detectable (Figure 36).

19.2 Cloning and expression of the cross-species specific anti-CD3 single chain antibody I2C HL in form of an IgG1 antibody

In order to provide improved means of detection of binding of the cross-species specific single chain anti-CD3 antibody the I2C VHVL specificity is converted into an IgG1 antibody with murine IgG1 and murine kappa constant regions. cDNA sequences coding for the heavy chain of the IgG antibody were obtained by gene synthesis according to standard protocols. The gene synthesis fragments were designed as to contain first a Kozak site to allow for eukaryotic expression of the construct, which is followed by an 19 amino acid immunoglobulin leader peptide, which is followed in frame by the coding sequence of the heavy chain variable region or light chain variable region, followed in frame by the coding sequence of the heavy chain constant region of murine IgG1 as published in GenBank (Accession number AB097849) or the coding sequence of the murine kappa light chain constant region as published in GenBank (Accession number D14630), respectively.
Restriction sites were introduced at the beginning and the end of the cDNA coding for the fusion protein. Restriction sites EcoRI at the 5' end and SalI at the 3' end were used for the following cloning procedures. The gene synthesis fragments were cloned via EcoRI and SalI into a plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) for the heavy chain construct and pEFADA (pEFADA is described in Raum et al. loc cit.) for the light chain construct according to standard protocols. Sequence verified plasmids were used for co-transfection of respective light and heavy chain constructs into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the constructs was induced by increasing concentrations of methotrexate (MTX) to a final concentration of up to 20 nM MTX and deoxycoformycin (dCF) to a final

concentration of up to 300 nM dCF. After two passages of stationary culture cell culture supernatant was collected and used in the subsequent experiment.

19.3 Binding of the cross-species specific anti-CD3 single chain antibody I2C HL in form of an IgG1 antibody to 1-27 CD3-EpCAM

Binding of the generated I2C IgG1 construct to the 1-27 N-terminal amino acids of the human, marmoset, tamarin and squirrel monkey CD3 epsilon chains respectively fused to cynomolgus Ep-CAM as described in Example 19.1 was tested in a FACS assay according to standard protocols. For that purpose a number of $2.5x10^5$ cells were incubated with 50 µl of cell culture supernatant containing the I2C IgG1 construct as described in Example 19.2. The binding of the antibody was detected with an R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Flow cytometry was performed on a FACS-Calibur apparatus, the CellQuest software was used to acquire and analyze the data (Becton Dickinson biosciences, Heidelberg). FACS staining and measuring of the fluorescence intensity were performed as described in Current Protocols in Immunology (Coligan, Kruisbeek, Margulies, Shevach and Strober, Wiley-Interscience, 2002).

As shown in Figure 37 binding of the I2C IgG1 construct to the transfectants expressing the recombinant transmembrane fusion proteins consisting of the 1-27 N-terminal amino acids of CD3 epsilon of human, marmoset, tamarin or squirrel monkey fused to cynomolgus EpCAM as compared to the negative control consisting of the 1-27 N-terminal amino acids of CD3 epsilon of swine fused to cynomolgus EpCAM was observed. Thus multi-primate cross-species specificity of I2C was demonstrated. Signals obtained with the anti Flag M2 antibody and the I2C IgG1 construct were comparable, indicating a strong binding activity of the cross-species specific specificity I2C to the N-terminal amino acids 1-27 of CD3 epsilon.

20. Binding of the cross-species specific anti-CD3 binding molecule I2C to the human CD3 epsilon chain with and without N-terminal His6 tag

A chimeric IgG1 antibody with the binding specificity I2C as described in Example 19.2 specific for CD3 epsilon was tested for binding to human CD3 epsilon with and without N-terminal His6 tag. Binding of the antibody to the EL4 cell lines transfected with His6-human CD3 epsilon as described in Example 6.1 and wild-type human CD3 epsilon as described in Example 5.1 respectively was tested by a FACS assay

according to standard protocols. $2.5x10^5$ cells of the transfectants were incubated with 50 µl of cell culture supernatant containing the I2C IgG1 construct or 50 µl of the respective control antibodies at 5µg/ml in PBS with 2% FCS. As negative control an appropriate isotype control and as positive control for expression of the constructs the CD3 specific antibody UCHT-1 were used respectively. Detection of the His6 tag was performed with the penta His antibody (Qiagen). The binding of the antibodies was detected with a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG, Fc-gamma fragment specific, diluted 1:100 in PBS with 2% FCS (Jackson ImmunoResearch Europe Ltd., Newmarket, Suffolk, UK). Flow cytometry was performed on a FACS-Calibur apparatus, the CellQuest software was used to acquire and analyze the data (Becton Dickinson biosciences, Heidelberg). FACS staining and measuring of the fluorescence intensity were performed as described in Current Protocols in Immunology (Coligan, Kruisbeek, Margulies, Shevach and Strober, Wiley-Interscience, 2002).

Comparable binding of the anti-human CD3 antibody UCHT-1 to both transfectants demonstrates approximately equal levels of expression of the constructs. The binding of the penta His antibody confirmed the presence of the His6 tag on the His6-human CD3 construct but not on the wild-type construct.

Compared to the EL4 cell line transfected with wild-type human CD3 epsilon a clear loss of binding of the I2C IgG1 construct to human-CD3 epsilon with an N-terminal His6 tag was detected. These results show that a free N-terminus of CD3 epsilon is essential for binding of the cross-species specific anti-CD3 binding specificity I2C to the human CD3 epsilon chain (Figure 28).

21. Generation of CD33 and CD3 cross-species specific bispecific single chain molecules

21.1 Generation of CD33 and CD3 cross-species specific bispecific single chain molecules

Generally, bispecific single chain antibody molecules, each comprising a domain with a binding specificity cross-species specific for human and macaque CD3epsilon as well as a domain with a binding specificity cross-species specific for human and macaque CD33, were designed as set out in the following Table 6:

Table 6: Formats of anti-CD3 and anti-CD33 cross-species specific bispecific single chain antibody molecules

SEQ ID (nucl/prot)	Formats of protein constructs (N → C)
316/315	I2CHLxAF5HL
314/313	F12QHLxAF5HL
312/311	H2CHLxAF5HL

The aforementioned constructs containing the variable light-chain (L) and variable heavy-chain (H) domains cross-species specific for human and macaque CD33 and the CD3 specific VH and VL combinations cross-species specific for human and macaque CD3 were obtained by gene synthesis. The gene synthesis fragments were designed in analogy to the procedure described in example 9 for the MCSP and CD3 cross-species specific single chain molecules. A clone with sequence-verified nucleotide sequence was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as also described in example 9 for the MCSP and CD3 cross-species specific single chain molecules and used in the subsequent experiments.

21.2 Flow cytometric binding analysis of the CD33 and CD3 cross-species specific bispecific antibodies

In order to test the functionality of the cross-species specific bispecific antibody constructs regarding the capability to bind to human and macaque CD33 and CD3, respectively, a FACS analysis is performed similar to the analysis described for the analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 10 using CHO cells expressing the human or macyque CD33 extracellular domains (see examples 16.1 and 16.2).

The bispecific binding of the single chain molecules listed above, which were cross-species specific for CD33 and cross-species specific for human and non-chimpanzee primate CD3 was clearly detectable as shown in Figure 41. In the FACS analysis all constructs showed binding to CD3 and CD33 as compared to the respective negative controls. Cross-species specificity of the bispecific antibodies to human and macaque CD3 and CD33 antigens was demonstrated.

21.3. Bioactivity of CD33 and CD3 cross-species specific bispecific single chain antibodies

Bioactivity of the generated bispecific single chain antibodies was analyzed by

chromium 51 (^{51}Cr) release in vitro cytotoxicity assays using the CD33 positive cell lines described in Examples 16.1 and 16.2. As effector cells stimulated human CD4/CD56 depleted PBMC or the macaque T cell line 4119LnPx were used as specified in the respective figures. The cytotoxicity assays were performed similar to the procedure described for the bioactivity analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 11 using CHO cells expressing the human or macaque CD33 extracellular domains (see example 16.1 and 16.2) as target cells.

As shown in Figure 42, all of the generated cross-species specific bispecific single chain antibody constructs demonstrate cytotoxic activity against human CD33 positive target cells elicited by stimulated human CD4/CD56 depleted PBMC and against macaque CD33 positive target cells elicited by the macaque T cell line 4119LnPx.

22. Redistribution of circulating chimpanzee T cells upon exposure to a conventional bispecific CD3 binding molecule directed at a target molecule which is absent from circulating blood cells

A single male chimpanzee was subjected to dose escalation with intravenous single-chain EpCAM/CD3-bispecific antibody construct (Schlereth (2005) Cancer Res 65: 2882). Like in the conventional single-chain CD19/CD3-bispecific antibody construct (Loffler (2000, Blood, Volume 95, Number 6) or WO 99/54440), the CD3 arm of said EpCAM/CD3-construct is also directed against a conventional context dependent epitope of human and chimpanzee CD3. At day 0, the animal received 50ml PBS/5% HSA without test material, followed by 50ml PBS/5% HSA plus single-chain EpCAM/CD3-bispecific antibody construct at 1.6, 2.0, 3.0 and 4.5 µg/kg on days 7, 14, 21 and 28, respectively. The infusion period was 2 hours per administration. For each weekly infusion the chimpanzee was sedated with 2-3 mg/kg Telazol intramuscularly, intubated and placed on isoflurane/O_2 anesthesia with stable mean blood pressures. A second intravenous catheter was placed in an opposite limb to collect (heparinized) whole blood samples at the time points indicated in Figure 43 for FACS analysis of circulating blood cells. After standard erythrocyte lysis, T cells were stained with a FITC-labeled antibody reacting with chimpanzee CD2 (Becton Dickinson) and the percentage of T cells per total lymphocytes determined by flowcytometry. As shown in Figure 43, every administration of single-chain

EpCAM/CD3-bispecific antibody construct induced a rapid drop of circulating T cells as observed with single-chain CD19/CD3-bispecific antibody construct in B-NHL patients, who had essentially no circulating target B (lymphoma) cells. As there are no EpCAM-positive target cells in the circulating blood of humans and chimpanzees, the drop of circulating T cells upon exposure to the single-chain EpCAM/CD3-bispecific antibody construct can be attributed solely to a signal, which the T cells receive through pure interaction of the CD3 arm of the construct with a conventional context dependent CD3 epitope in the absence of any target cell mediated crosslinking. Like the redistribution of T cells induced through their exposure to single-chain CD19/CD3-bispecific antibody construct in B-NHL patients, who had essentially no circulating target B (lymphoma) cells, the T cell redistribution in the chimpanzee upon exposure to the single-chain EpCAM/CD3-bispecific antibody construct can be explained by a conformational change of CD3 following the binding event to a context dependent CD3 epitope further resulting in the transient increase of T cell adhesiveness to blood vessel endothelium (see Example 13). This finding confirms, that conventional CD3 binding molecules directed to context dependent CD3 epitopes – solely through this interaction – can lead to a redistribution pattern of peripheral blood T cells, which is associated with the risk of CNS adverse events in humans as describe in Example 13.

23. Specific binding of scFv clones to the N-terminus of human CD3 epsilon

23.1 Bacterial expression of scFv constructs in E. coli XL1 Blue

As previously mentioned, *E. coli* XL1 Blue transformed with pComb3H5Bhis/Flag containing a VL- and VH-segment produce soluble scFv in sufficient amounts after excision of the gene III fragment and induction with 1 mM IPTG. The scFv-chain is exported into the periplasma where it folds into a functional conformation.

The following scFv clones were chosen for this experiment:

i) ScFvs 4-10, 3-106, 3-114, 3-148, 4-48, 3-190 and 3-271 as described in WO 2004/106380.

ii) ScFvs from the human anti-CD3epsilon binding clones H2C, F12Q and I2C as described herein.

For periplasmic preparations, bacterial cells transformed with the respective scFv containing plasmids allowing for periplasmic expression were grown in SB-medium supplemented with 20 mM $MgCl_2$ and carbenicillin 50 µg/ml and redissolved in PBS

after harvesting. By four rounds of freezing at -70°C and thawing at 37°C, the outer membrane of the bacteria was destroyed by osmotic shock and the soluble periplasmic proteins including the scFvs were released into the supernatant. After elimination of intact cells and cell-debris by centrifugation, the supernatant containing the human anti-human CD3-scFvs was collected and used for further examination. These crude supernatants containing scFv will be further termed periplasmic preparations (PPP).

23.2 Binding of scFvs to human CD3 epsilon (aa 1-27)-Fc fusion protein

ELISA experiments were carried out by coating the human CD3 epsilon (aa 1-27)- Fc fusion protein to the wells of 96 well plastic plates (Nunc, maxisorb) typically at 4° C over night. The antigen coating solution was then removed, wells washed once with PBS/0.05 % Tween 20 and subsequently blocked with PBS/3 % BSA for at least one hour. After removal of the blocking solution, PPPs and control solutions were added to the wells and incubated for typically one hour at room temperature. The wells were then washed three times with PBS/0.05 % Tween 20. Detection of scFvs bound to immobilized antigen was carried out using a Biotin-labeled anti FLAG-tag antibody (M2 anti Flag-Bio, Sigma, typically at a final concentration of 1µg/ml PBS) and detected with a peroxidase-labeled Streptavidine (Dianova, 1µg/ml PBS). The signal was developed by adding ABTS substrate solution and measured at a wavelength of 405 nm. Unspecific binding of the test-samples to the blocking agent and/or the human IgG1 portion of the human CD3 epsilon (aa 1-27)- Fc fusion protein was examined by carrying out the identical assay with the identical reagents and identical timing on ELISA plates which were coated with human IgG1 (Sigma). PBS was used as a negative control.

As shown in Figure 44, scFvs H2C, F12Q and I2C show strong binding signals on human CD3 epsilon (aa 1-27)- Fc fusion protein. The human scFvs 3-106, 3-114, 3-148, 3-190, 3-271, 4-10 and 4-48 (as described in WO 2004/106380) do not show any significant binding above negative control level.

To exclude the possibility that the positive binding of scFvs H2C, F12Q and I2C to wells coated with human CD3 epsilon (aa 1-27)- Fc fusion protein might be due to binding to BSA (used as a blocking agent) and/or the human IgG1 Fc-gamma-portion of the human CD3 epsilon (aa 1-27)- Fc fusion protein, a second ELISA experiment was performed in parallel. In this second ELISA experiment, all parameters were identical to those in the first ELISA experiment, except that in the second ELISA

experiment human IgG1 (Sigma) was coated instead of human CD3 epsilon (aa 1-27)- Fc fusion protein. As shown in Figure 45, none of the scFvs tested showed any significant binding to BSA and/or human IgG1 above background level.

Taken together, these results allow the conclusion that conventional CD3 binding molecules recognizing a context-dependent epitope of CD3 epsilon (e.g. as disclosed in WO 2004/106380) do not bind specifically to the human CD3 epsilon (aa 1-27)-region, whereas the scFvs H2C, F12Q and I2C binding a context-independent epitope of CD3 epsilon clearly show specific binding to the N-terminal 27 amino acids of human CD3 epsilon.

24. Generation and characterization of PSMA and CD3 cross-species specific bispecific single chain antibody molecules

24.1 Cloning and expression of human PSMA antigen on CHO cells

The sequence of the human PSMA antigen ('AY101595', Homo sapiens prostate-specific membrane antigen mRNA, complete cds, National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov/entrez) was used to obtain a synthetic molecule by gene synthesis according to standard protocols. The gene synthesis fragment was also designed as to contain a Kozak site for eukaryotic expression of the construct and restriction sites at the beginning and the end of the DNA. The introduced restriction sites XbaI at the 5' end and SalI at the 3' end were utilised during the cloning step into the expression plasmid designated pEFDHFR as described in Mack et al. (Mack M et al., Proc Natl Acad Sci U S A 1995;92:7021-5. and Raum et al. Cancer Immunol Immunother (2001) 50(3)). After sequence verification the plasmid was used to transfect CHO/dhfr- cells as follows. A sequence verified plasmid was used to transfect CHO/dhfr- cells (ATCC No. CRL 9096; cultivated in RPMI 1640 with stabilized glutamine obtained from Biochrom AG Berlin, Germany, supplemented with 10% FCS, 1% penicillin/streptomycin all obtained from Biochrom AG Berlin, Germany and nucleosides from a stock solution of cell culture grade reagents obtained from Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany, to a final concentration of 10 µg/ml Adenosine, 10 µg/ml Deoxyadenosine and 10 µg/ml Thymidine, in an incubator at 37 °C, 95% humidity and 7% CO_2). Transfection was performed using the PolyFect Transfection Reagent (Qiagen GmbH, Hilden, Germany) and 5 µg of plasmid DNA according to the manufacturer's protocol. After a cultivation of 24 hours cells were washed once with PBS and again cultivated in the

aforementioned cell culture medium except that the medium was not supplemented with nucleosides and dialysed FCS (obtained from Biochrom AG Berlin, Germany) was used. Thus the cell culture medium did not contain nucleosides and thereby selection was applied on the transfected cells. Approximately 14 days after transfection the outgrowth of resistant cells was observed. After an additional 7 to 14 days the transfectants were tested positive for expression of the construct via FACS. Eukaryotic protein expression in DHFR deficient CHO cells is performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct is induced by increasing concentrations of methothrexate (MTX) to a final concentration of up to 20 nM MTX

24.2 Cloning and expression of macaque PSMA antigen on CHO cells

The cDNA sequence of macaque PSMA (cynomolgus) was obtained by a set of five PCRs on cDNA from macaque monkey prostate prepared according to standard protocols. The following reaction conditions: 1 cycle at 94°C for 2 minutes followed by 40 cycles with 94°C for 1 minute, 52°C for 1 minute and 72°C for 1.5 minutes followed by a terminal cycle of 72°C for 3 minutes and the following primers were used:

4. forward primer: 5'-cactgtggcccaggttcgagg-3' (SEQ ID NO. 375)
   reverse primer: 5'-gacataccacacaaattcaatacgg-3' (SEQ ID NO. 376)
5. forward primer: 5'-gctctgctcgcgccgagatgtgg-3' (SEQ ID NO. 377)
   reverse primer: 5'-acgctggacaccacctccagg-3' (SEQ ID NO. 378)
6. forward primer: 5'-ggttctactgagtgggcagagg-3' (SEQ ID NO. 379)
   reverse primer: 5'-acttgttgtggctgcttggagc-3' (SEQ ID NO. 380)
7. forward primer: 5'-gggtgaagtcctatccagatgg-3' (SEQ ID NO. 381)
   reverse primer: 5'-gtgctctgcctgaagcaattcc-3' (SEQ ID NO. 382)
8. forward primer: 5'-ctcggcttcctcttcgggtgg-3' (SEQ ID NO. 383)
   reverse primer: 5'-gcatattcatttgctgggtaacctgg-3' (SEQ ID NO. 384)

These PCRs generated five overlapping fragments, which were isolated and sequenced according to standard protocols using the PCR primers, and thereby provided a portion of the cDNA sequence coding macaque PSMA from codon 3 to the last codon of the mature protein. To generate a construct for expression of macaque PSMA a cDNA fragment was obtained by gene synthesis according to standard protocols (the cDNA and amino acid sequence of the construct is listed

under SEQ ID 385 and 386). In this construct the coding sequence of macaque PSMA from amino acid 3 to the last amino acid of the mature PSMA protein followed by a stop codon was fused in frame to the coding sequence of the first two amino acids of the human PSMA protein. The gene synthesis fragment was also designed as to contain a Kozak site for eukaryotic expression of the construct and restriction sites at the beginning and the end of the fragment containing the cDNA. The introduced restriction sites, XbaI at the 5' end and SalI at the 3' end, were utilised in the following cloning procedures. The gene synthesis fragment was cloned via XbaI and SalI into a plasmid designated pEF-DHFR following standard protocols. The aforementioned procedures were carried out according to standard protocols (Sambrook, Molecular Cloning; A Laboratory Manual, 3rd edition, Cold Spring Harbour Laboratory Press, Cold Spring Harbour, New York (2001)). A clone with sequence-verified nucleotide sequence was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct was induced by increasing concentrations of methotrexate (MTX) to a final concentration of up to 20 nM MTX.

24.3 Generation of PSMA and CD3 cross-species specific bispecific single chain molecules

Generally, bispecific single chain antibody molecules, each comprising a domain with a binding specificity for the human and the macaque CD3 antigen as well as a domain with a binding specificity for the human and the macaque PSMA antigen, were designed as set out in the following Table 7:

Table 7: Formats of anti-CD3 and anti-PSMA cross-species specific bispecific single chain antibody molecules

SEQ ID NO. (nucl/prot)	Formats of protein constructs (N → C)
400/399	PSMA-3 HL x I2C HL
414/413	PSMA-4 HL x I2C HL
428/427	PSMA-6 LH x I2C HL
442/441	PSMA-7 LH x I2C HL
456/455	PSMA-8 LH x I2C HL
470/469	PSMA-9 LH x I2C HL
484/483	PSMA-10 LH x I2C HL

498/497	PSMA-A LH x I2C HL
512/511	PSMA-B LH x I2C HL
526/525	PSMA-C LH x I2C HL
540/539	PSMA-D LH x I2C HL
554/553	PSMA-E LH x I2C HL
568/567	PSMA-F LH x I2C HL
582/581	PSMA-J LH x I2C HL
596/595	PSMA-L LH x I2C HL

The aforementioned constructs containing the variable light-chain (L) and variable heavy-chain (H) domains cross-species specific for human and macaque PSMA and the CD3 specific VH and VL combinations cross-species specific for human and macaque CD3 were obtained by gene synthesis. The gene synthesis fragments were designed and eukaryotic protein expression was performed in analogy to the procedure described in example 9 for the MCSP and CD3 cross-species specific single chain molecules. Alternatively the constructs can be transfected into DHFR-deficient CHO-cells in a transient manner according to standard protocols.

24.4 Flow cytometric binding analysis of the PSMA and CD3 cross-species specific bispecific antibodies

In order to test the functionality of the cross-species specific bispecific antibody constructs with regard to binding capability to human and macaque PSMA and to human and macaque CD3, a FACS analysis was performed. For this purpose the CHO cells transfected with human PSMA as described in Example 24.1 and human CD3 positive T cell leukemia cell line HPB-ALL (DSMZ, Braunschweig, ACC483) were used to check the binding to human antigens. The binding reactivity to macaque antigens was tested by using the generated macaque PSMA transfectant described in Example 24.2 and a macaque T cell line 4119LnPx (kindly provided by Prof Fickenscher, Hygiene Institute, Virology, Erlangen-Nuernberg; published in Knappe A, et al., and Fickenscher H., Blood 2000, 95, 3256-61). The flow cytrometric analysis was performed in analogy to the procedure described in example 10.

The binding ability of all PSMA based bispecific single chain molecules were clearly detectable as shown in Figure 46. In the FACS analysis, all constructs showed binding to CD3 and PSMA compared to the negative control using culture medium and 1. and 2. detection antibody. In summary, the cross-species specificity of the bispecific antibody to human and macaque CD3 and to human and macaque PSMA could clearly be demonstrated.

24.5 Bioactivity of PSMA and CD3 cross-species specific bispecific single chain antibodies

Bioactivity of the generated bispecific single chain antibodies was analyzed by chromium 51 release in vitro cytotoxicity assays using the PSMA positive cell lines described in example 24.1 and 24.2. As effector cells stimulated human CD8 positive T cells or the macaque T cell line 4119LnPx were used. The cytotoxicity assays were performed similar to the procedure described for the bioactivity analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 11.

As shown in Figures 47 and 48, all of the depicted cross-species specific bispecific single chain antibody constructs revealed cytotoxic activity against human PSMA positive target cells elicited by human CD8+ cells and against macaque PSMA positive target cells elicited by the macaque T cell line 4119LnPx. As a negative control, an irrelevant bispecific single chain antibody was used.

24.6 Generation of PSMA and CD3 cross-species specific bispecific single chain molecules

Bispecific single chain antibody molecules, each comprising a domain binding to the human and to the macaque CD3 antigen as well as a domain binding to the human PSMA antigen, were designed as set out in the following Table 8:

Table 8: Formats of anti-CD3 and anti-PSMA cross-species specific bispecific single chain antibody molecules

SEQ ID NO. (nucl/prot)	Formats of protein constructs (N → C)
610/609	PM99-A8 HL x I2C HL
624/623	PM86-A10 HL x I2C HL
638/637	PM86-B4-2 HL x I2C HL
652/651	PM98-B4 HL x I2C HL
666/665	PM86-C3 HL x I2C HL
680/679	PM86-E12 HL x I2C HL
694/693	PMF1-A10 HL x I2C HL
708/707	PM99-F1 HL x I2C HL
736/721	PM99-F5 HL x I2C HL
735/734	PM86-F6 HL x I2C HL
800/799	PM76-A9 HLx I2C HL
818/817	PM76-B10 HL x I2C HL
864/863	PM29-G1 HL x I2C HL
850/849	PM49-B9 HL x I2C HL
836/835	PM34-C7 HL x I2C HL
786/785	PM84-D7 HL x I2C HL
882/881	PM08-B6 HL x I2C HL
900/899	PM08-E11 HL x I2C HL
936/935	PM95-A8 HL x I2C HL
1018/1017	PM26-C9 HL x I2C HL
1032/1031	PM26-H4 HL x I2C HL
918/917	PM95-H6 HL x I2C HL
1004/1003	PM07-D3 HL x I2C HL
954/953	PM07-A12 HL x I2C HL
972/971	PM07-F8 HL x I2C HL
990/989	PM07-E5 HL x I2C HL

The aforementioned constructs each comprising a combination of a variable light-chain (L) and a variable heavy-chain (H) domain binding to the human and to the macaque CD3 antigen as well as a combination of a variable light-chain (L) and a variable heavy-chain (H) domains binding to the human PSMA antigen were obtained by gene synthesis. Each combination of a variable light-chain (L) and a variable heavy-chain (H) domains binding to the human PSMA antigen was obtained via phage display from a scFv-library by panning on the PSMA-positive human prostate cancer cell line LNCaP (ATCC No. CRL-1740) followed by FACS-based screening for positive clones using the same cell line. The gene synthesis fragments of the above listed bispecific single chain antibody molecules were designed and eukaryotic protein expression was performed in analogy to the procedure described in example 24.3, supra, respectively for the MCSP and CD3 cross-species specific single chain molecules in example 9. The same holds true for the expression and purification of the PSMA and CD3 bispecific single chain antibody molecules.

24.7 Flow cytometric binding analysis of PSMA and CD3 cross-species specific bispecific antibodies

In order to test the functionality of cross-species specific bispecific antibody constructs regarding the capability to bind to PSMA and CD3 a FACS analysis was performed. For this purpose PSMA-positive cells were used to test the binding to human antigens. The binding reactivity to macaque CD3 was tested by using the macaque T cell line 4119LnPx (kindly provided by Prof Fickenscher, Hygiene Institute, Virology, Erlangen-Nuernberg; published in Knappe A, et al., and Fickenscher H., Blood 2000, 95, 3256-61). The flow cytrometric analysis was performed in analogy to the procedure described in example 10.

The bispecific binding of the generated single chain molecules shown in Figure 49 and Figure 51, to human PSMA and to human and non-chimpanzee primate CD3 was clearly detectable. In the FACS analysis all shown constructs demonstrated binding to CD3 and PSMA compared to the negative control.

24.8 Bioactivity of PSMA and CD3 cross-species specific bispecific single chain antibodies

Bioactivity of generated bispecific single chain antibodies was analyzed by chromium 51 (^{51}Cr) release in vitro cytotoxicity assays using PSMA positive cell lines. As effector cells stimulated human CD4/CD56 depleted PBMC or the macaque T cell line 4119LnPx were used. The cytotoxicity assays were performed similar to the procedure described for the bioactivity analysis of the MCSP and CD3 cross-species specific bispecific antibodies in example 11.

The generated cross-species specific bispecific single chain antibody constructs shown in Figure 50 and 52 demonstrated cytotoxic activity against PSMA positive target cells.

24.9. Generation of additional PSMA and CD3 cross-species specific bispecific single chain molecules

The human antibody germline VH sequence VH3 3-11 (http://vbase.mrc-cpe.cam.ac.uk/) is chosen as framework context for CDRH1 (SEQ ID NO. 394, CDRH2 (SEQ ID NO. 395) and CDRH3 (SEQ ID NO. 396). Likewise the human antibody germline VH sequence VH1 1-02 (http://vbase.mrc-cpe.cam.ac.uk/) is chosen as framework context for CDRH1 (SEQ ID NO. 408), CDRH2 (SEQ ID NO. 409) and CDRH3 (SEQ ID NO. 410) as well as the human antibody germline VH

sequence VH1 1-03 (http://vbase.mrc-cpe.cam.ac.uk/) as framework context for CDRH1 (SEQ ID NO. 445), CDRH2 (SEQ ID NO. 446) and CDRH3 (SEQ ID NO. 447). For each human VH several degenerated oligonucleotides have to be synthesized that overlap in a terminal stretch of approximately 15-20 nucleotides. To this end every second primer is an antisense primer. For VH3 3-11 the following set of oligonucleotides is used:

5'PM3-VH-A-XhoI
CCG GAT CTC GAG TCT GGC GGC GGA CTG GTG AAG CCT GGC GRG TCC CTG ARG CTG TCC TGT (SEQ ID NO. 737)
3'PM3-VH-B
CCA GTA CAT GTA GTA GTC GGA GAA GGT GAA GCC GGA GGC GRY ACA GGA CAG CYT CAG GGA (SEQ ID NO. 738)
5'PM3-VH-C
TAC TAC ATG TAC TGG RTC CGC CAG RCC CCT GRG AAG SGG CTG GAA TGG GTG KCC ATC ATC TCC GAC GGC (SEQ ID NO. 739)
3'PM3-VH-D
GGC GTT GTC CCG GGA GAT GGT GAA CCG GCC CTT GAT GAT GTC GGA GTA GTA GGT GTA GTA GCC GCC GTC GGA GAT GAT (SEQ ID NO. 740)
5'PM3-VH-E
TCC CGG GAC AAC GCC AAG AAC ARC CTG TAC CTG CAG ATG ARC TCC CTG ARG KCC GAG GAC ACC GCC RTG TAC TAC TGC RCC CGG GGC (SEQ ID NO. 741)
3'PM3-VH-F-BstEII
CGA TAC GGT GAC CAG GGT GCC CTG GCC CCA GTA ATC CAT GGC GCC GTG TCT CAG CAG AGG GAA GCC CCG GGY GCA GTA GTA (SEQ ID NO. 742)

For VH1 1-02 the oligonucleotides are as follows:

5'PM4-VH-A-XhoI
CTT GAT CTC GAG TCT GGC GCC GAA STG RWG RAG CCT GGC GCC TCC GTG AAG STG TCC TGC AAG GCC TCC GGC TAC (SEQ ID NO. 743)
3'PM4-VH-B
CCA TTC CAG GCC CTG CYC AGG CSY CTG CCG CAS CCA GTT GAT GTC GAA GTA GGT GAA GGT GTA GCC GGA GGC CTT (SEQ ID NO. 744)
5'PM4-VH-C
CAG GGC CTG GAA TGG ATS GGC GGC ATC TCC CCT GGC GAC GGC AAC ACC AAC TAC AAC GAG AAC TTC AAG (SEQ ID NO. 745)
3'PM4-VH-D
AT GTA GGC GGT GGA GMT GGA CKT GTC TMT GGT CAK TGT GRC CYT GCC CTT GAA GTT CTC GTT GTA (SEQ ID NO. 746)
5'PM4-VH-E
C TCC ACC GCC TAC ATS SAG CTG TCC CGG CTG ASA TCT GAS GAC ACC GCC GTG TAC TWC TGC GCC AGG GAC GGC (SEQ ID NO. 747)
3'PM4-VH-F-BstEII
AGA CAC GGT CAC CGT GGT GCC CTG GCC CCA AGA GTC CAT GGC GTA GTA AGG GAA GTT GCC GTC CCT GGC GCA (SEQ ID NO. 748)

For VH1 1-03 the following oligonucleotides are used:

5'PM8-VH-A-XhoI
CTT GAT CTC GAG TCC GGC SCT GAG STG RWG AAG CCT GGC GCC TCC GTG AAG RTG TCC TGC AAG GCC TCC GGC TAC (SEQ ID NO. 749)
3'PM8-VH-B
CCA TTC CAG CMS CTG GCC GGG TKY CTG TYT CAC CCA GTG CAT CAC GTA GCC GGT GAA GGT GTA GCC GGA GGC CTT GCA (SEQ ID NO. 750)
5'PM8-VH-C
CCC GGC CAG SKG CTG GAA TGG ATS GGC TAC ATC AAC CCT TAC AAC GAC GTG ACC CGG TAC AAC GGC AAG TTC AAG (SEQ ID NO. 751)
3'PM8-VH-D
TTC CAT GTA GGC GGT GGA GGM GKA CKT GTC KCT GGT AAK GGT GRC TYT GCC CTT GAA CTT GCC GTT GTA (SEQ ID NO. 752)
5'PM8-VH-E
TCC ACC GCC TAC ATG GAA CTG TCC RGC CTG ASG TCT GAG GAC ACC GCC GTG TAC TAC TGC GCC AGG GGC (SEQ ID NO. 753)
3'PM8-VH-F-BstEII
CGA TAC GGT GAC CAG AGT GCC TCT GCC CCA GGA GTC GAA GTA GTA CCA GTT CTC GCC CCT GGC GCA GTA GTA (SEQ ID NO. 754)

Each of these primer-sets spans over the whole corresponding VH sequence.
Within each set primers are mixed in equal amounts (e.g. 1 µl of each primer (primer stocks 20 to 100 µM) to a 20 µl PCR reaction) and added to a PCR mix consisting of PCR buffer, nucleotides and Taq polymerase. This mix is incubated at 94 °C for 3 minutes, 65 °C for 1 minute, 62°C for 1 minute, 59 °C for 1 minute, 56 °C for 1 minute, 52 °C for 1 minute, 50 °C for 1 minute and at 72°C for 10 minutes in a PCR cycler. Subsequently the product is run in an agarose gel electrophoresis and the product of a size from 200 to 400 isolated from the gel according to standard methods.
Each VH PCR product is then used as a template for a standard PCR reaction using primers that incorporate N-terminal and C-terminal suitable cloning restriction sites. The DNA fragment of the correct size (for a VH approximately 350 nucleotides) is isolated by agarose gel electrophoresis according to standard methods. In this way sufficient VH DNA fragment is amplified.
The human antibody germline VL sequence VkI L1 (http://vbase.mrc-cpe.cam.ac.uk/) is chosen as framework context for CDRL1 (SEQ ID NO. 389), CDRL2 (SEQ ID NO. 390) and CDRL3 (SEQ ID NO. 391). Likewise human antibody germline VL sequence VkII A17 (http://vbase.mrc-cpe.cam.ac.uk/) is chosen as framework context for CDRL1 (SEQ ID NO. 403), CDRL2 (SEQ ID NO. 404) and CDRL3 (SEQ ID NO. 405) as well as the human antibody germline VL sequence VkII A1 (http://vbase.mrc-cpe.cam.ac.uk/) as framework context for CDRL1 (SEQ ID NO.

450), CDRL2 (SEQ ID NO. 451) and CDRL3 (SEQ ID NO. 452). For each human VL several degenerated oligonucleotides have to be synthesized that overlap in a terminal stretch of approximately 15-20 nucleotides. To this end every second primer is an antisense primer. Restriction sites needed for later cloning within the oligonucleotides are deleted. For VkI L1 the following oligonucleotides are used:

5'PM3-VL-A-SacI
CTT GAT GAG CTC CAG ATG ACC CAG TCC CCC ARS TYC MTG TCC RCC TCC GTG GGC GAC AGA GTG ACC (SEQ ID NO. 755)
3'PM3-VL-B
GCC GGG CTT CTG CTG AWA CCA GGC CAC GTT GGT GTC CAC GTT CTG GGA GGC CTT GCA GGT GAY GGT CAC TCT GTC GCC (SEQ ID NO. 756)
5'PM3-VL-C
CAG CAG AAG CCC GGC MAG KCC CCT AAG KCC CTG ATC TAC TCC GCC TCC TAC CGG TAC TCT (SEQ ID NO. 757)
3'PM3-VL-D
CAG GGT GAA GTC GGT GCC GGA CYC GGA GCC GGA GAA CCG GKM AGG CAC GYC AGA GTA CCG GTA GGA (SEQ ID NO. 758)
5'PM3-VL-E
ACC GAC TTC ACC CTG ACC ATC TCC ARC STG CAG YCT GAG GAC YTC GCC RMG TAC TWC TGC CAG CAG TAC GAC (SEQ ID NO. 759)
3'PM3-VL-F-BsiWI/SpeI
CGA GTA ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT GTA AGG GTA GGA GTC GTA CTG CTG GCA (SEQ ID NO. 760)

For VkII A17 the oligonucleotides are as follows:

5'PM4-VL-A-SacI
CTT GAT GAG CTC GTG ATG ACC CAG TCC CCC CTG TCC CTG CCT GTG AYC CTG GGC SAM CMG GCC TCC ATC TCC TGC CGG (SEQ ID NO. 761)
3'PM4-VL-B
AAA CCA GTG CAG GTA GGT ATT GCC GTT GGA GTG CAC CAG GGA CTG GGA GGA CCG GCA GGA GAT GGA GGC (SEQ ID NO. 762)
5'PM4-VL-C
ACC TAC CTG CAC TGG TTT CWG CAG ARG CCT GGC CAG TCC CCT ARG CKG CTG ATC TAC ACC GTG TCC AAC CGG (SEQ ID NO. 763)
3'PM4-VL-D
CAG GGT GAA GTC GGT GCC GGA GCC GGA GCC AGA GAA CCT GTC AGG CAC GCC GGA GAA CCG GTT GGA CAC GGT (SEQ ID NO. 764)
5'PM4-VL-E
GGC ACC GAC TTC ACC CTG AAG ATC TCC CGG GTG GAG GCC GAA GAT STG GGC GTG TAC TWT TGC TCC CAG TCC ACC (SEQ ID NO. 765)
3'PM4-VL-F-BsiWI/SpeI
ACT CAG ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT AGG CAC GTG GGT GGA CTG GGA GCA (SEQ ID NO. 766)

For VkII A1 the following oligonucleotides are used:

5'PM8-VL-A-SacI
CTT GAT GAG CTC GTG ATG ACC CAG TCT CCA SYC TCC CTG SCT GTG ACT CTG GGC CAG CSG GCC TCC ATC TCT TGC CGG (SEQ ID NO. 767)

3'PM8-VL-B
CCA GTG CAT GAA GGT GTT GTC GTA GGA GTC GAT GGA CTC GGA GGC CCG GCA AGA GAT GGA GGC (SEQ ID NO. 768)
5'PM8-VL-C
ACC TTC ATG CAC TGG TWT CAG CAG ARG CCT GGC CAG YCT CCT MRC CKG CTG ATC TWC CGG GCC TCT ATC CTG GAA (SEQ ID NO. 769)
3'PM8-VL-D
CAG GGT GAA GTC GGT GCC GGA GCC AGA GCC GGA GAA CCG GKC AGG GAY GCC GGA TTC CAG GAT AGA GGC CCG (SEQ ID NO. 770)
5'PM8-VL-E
ACC GAC TTC ACC CTG AMA ATC TMC CST GTG GAG GCC GAS GAC GTG GSC RYC TAC TAC TGC CAC CAG (SEQ ID NO. 771)
3'PM8-VL-F-BsiWI/SpeI
ACT CAG ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT GTA AGG GTC CTC GAT GGA CTG GTG GCA GTA GTA (SEQ ID NO. 772)

Each of these primer-sets spans over the whole corresponding VL sequence.
Within each set primers are mixed in equal amounts (e.g. 1 µl of each primer (primer stocks 20 to 100 µM) to a 20 µl PCR reaction) and added to a PCR mix consisting of PCR buffer, nucleotides and Taq polymerase. This mix is incubated at 94 °C for 3 minutes, 65 °C for 1 minute, 62°C for 1 minute, 59 °C for 1 minute, 56 °C for 1 minute, 52 °C for 1 minute, 50 °C for 1 minute and at 72°C for 10 minutes in a PCR cycler. Subsequently the product is run in an agarose gel electrophoresis and the product of a size from 200 to 400 isolated from the gel according to standard methods.
Each VL PCR product is then used as a template for a standard PCR reaction using primers that incorporate N-terminal and C-terminal suitable cloning restriction sites. The DNA fragment of the correct size (for a VL approximately 330 nucleotides) is isolated by agarose gel electrophoresis according to standard methods. In this way sufficient VL DNA fragment is amplified.
The final VH3 3-11 -based VH PCR product (i.e. the repertoire of human/humanized VH) is then combined with the final VkI L1 -based VL PCR product (i.e. the repertoire of human/humanized VL), the final VH1 1-02 -based VH PCR product (i.e. the repertoire of human/humanized VH) is combined with the final VkII A17-based VL PCR product (i.e. the repertoire of human/humanized VL) and the final VH1 1-03 -based VH PCR product (i.e. the repertoire of human/humanized VH) is combined with the final VkII A1-based VL PCR product (i.e. the repertoire of human/humanized VL) in the phage display vector pComb3H5Bhis, respectively. These three VH-VL combinations form three different libraries of functional scFvs from which – after

display on filamentous phage - anti-PSMA binders are selected, screened, identified and confirmed as described in the following:

450 ng of the light chain fragments (SacI-SpeI digested) are ligated with 1400 ng of the phagemid pComb3H5Bhis (SacI-SpeI digested; large fragment). The resulting combinatorial antibody library is then transformed into 300 ul of electrocompetent Escherichia coli XL1 Blue cells by electroporation (2.5 kV, 0.2 cm gap cuvette, 25 uFD, 200 Ohm, Biorad gene-pulser) resulting in a library size of more than 10^7 independent clones. After one hour of phenotype expression, positive transformants are selected for carbenicilline resistance encoded by the pComb3H5BHis vector in 100 ml of liquid super broth (SB)-culture over night. Cells are then harvested by centrifugation and plasmid preparation is carried out using a commercially available plasmid preparation kit (Qiagen).

2800 ng of this plasmid-DNA containing the VL-library (XhoI-BstEII digested; large fragment) are ligated with 900 ng of the heavy chain V-fragments (XhoI-BstEII digested) and again transformed into two 300 ul aliquots of electrocompetent E. coli XL1 Blue cells by electroporation (2.5 kV, 0.2 cm gap cuvette, 25 uFD, 200 Ohm) resulting in a total VH-VL scFv (single chain variable fragment) library size of more than 10^7 independent clones.

After phenotype expression and slow adaptation to carbenicilline, the E. coli cells containing the antibody library are transferred into SB-carbenicilline (SB with 50 ug/mL carbenicilline) selection medium. The E. coli cells containing the antibody library is then infected with an infectious dose of 10^{12} particles of helper phage VCSM13 resulting in the production and secretion of filamentous M13 phage, wherein phage particle contains single stranded pComb3H5BHis-DNA encoding a scFv-fragment and displayed the corresponding scFv-protein as a translational fusion to phage coat protein III. This pool of phages displaying the antibody library is used for the selection of antigen binding entities.

For this purpose the phage library carrying the cloned scFv-repertoire is harvested from the respective culture supernatant by PEG8000/NaCl precipitation and centrifugation. Approximately $10^{11}$to 10^{12} scFv phage particles are resuspended in 0.4 ml of PBS/0.1% BSA and incubated with 10^5 to 10^7 PSMA-positive human prostate cancer cell line LNCaP (ATCC No. CRL-1740) for 1 hour on ice under slow agitation. These LNCaP cells are harvested beforehand by centrifugation, washed in PBS and resuspended in PBS/1 % FCS (containing 0.05% Na Azide). scFv phage

which do not specifically bind to LNCaP cells are eliminated by up to five washing steps with PBS/1 % FCS (containing 0.05% Na Azide). After washing, binding entities are eluted from the cells by resuspending the cells in HCl-glycine pH 2.2 (10 min incubation with subsequent vortexing) and after neutralization with 2 M Tris pH 12, the eluate is used for infection of a fresh uninfected E. coli XL1 Blue culture (OD600 > 0.5). The E. coli culture containing E. coli cells successfully transduced with a phagemid copy, encoding a human/humanized scFv-fragment, are again selected for carbenicilline resistance and subsequently infected with VCMS 13 helper phage to start the second round of antibody display and in vitro selection. A total of 4 to 5 rounds of selections are carried out, normally.

In order to screen for PSMA specific binders plasmid DNA corresponding to 4 and 5 rounds of panning is isolated from E. coli cultures after selection. For the production of soluble scFv-protein, VH-VL-DNA fragments are excised from the plasmids (XhoI-SpeI). These fragments are cloned via the same restriction sites into the plasmid pComb3H5BFlag/His differing from the original pComb3H5BHis in that the expression construct (e.g. scFv) includes a Flag-tag (DYKDDDDK) between the scFv and the His6-tag and the additional phage proteins are deleted. After ligation, each pool (different rounds of panning) of plasmid DNA is transformed into 100 µl heat shock competent E. coli TG1 or XLI blue and plated onto carbenicilline LB-agar. Single colonies are picked into 100 µl of LB carb (50 ug/ml carbenicilline).

E. coli transformed with pComb3H5BFlag/His containing a VL-and VH-segment produce soluble scFv in sufficient amounts after induction with 1 mM IPTG. Due to a suitable signal sequence, the scFv-chain is exported into the periplasma where it folds into a functional conformation.

Single E. coli TG1 bacterial colonies from the transformation plates are picked for periplasmic small scale preparations and grown in SB-medium (e.g. 10 ml) supplemented with 20 mM $MgCl_2$ and carbenicilline 50µg/ml (and re-dissolved in PBS (e.g. 1 ml) after harvesting. By four rounds of freezing at –70°C and thawing at 37°C, the outer membrane of the bacteria is destroyed by temperature shock and the soluble periplasmic proteins including the scFvs are released into the supernatant. After elimination of intact cells and cell-debris by centrifugation, the supernatant containing the anti-PSMA scFvs is collected and used for the identification of PSMA specific binders as follows:

Binding of scFvs to PSMA is tested by flow cytometry on the PSMA-positive human prostate cancer cell line LNCaP (ATCC No. CRL-1740). A periplasmic small scale preparation as described above without any grown bacteria is used as negative control.

For flow cytometry $2.5x10^5$ cells are incubated with 50 ul of scFv periplasmic preparation or with 5 µg/ml of purified scFv in 50 µl PBS with 2% FCS. The binding of scFv is detected with an anti-His antibody (Penta-His Antibody, BSA free, Qiagen GmbH, Hilden, FRG) at 2 µg/ml in 50 µl PBS with 2% FCS. As a second step reagent a R-Phycoerythrin-conjugated affinity purified F(ab')2 fragment, goat anti-mouse IgG (Fc-gamma fragment specific), diluted 1:100 in 50 µl PBS with 2% FCS (Dianova, Hamburg, FRG) is used. The samples are measured on a FACSscan (BD biosciences, Heidelberg, FRG).

Single clones are then analyzed for favourable properties and amino acid sequence. PSMA specific scFvs are converted into recombinant bispecific single chain antibodies by joining them via a Gly_4Ser_1-linker with the CD3 specific scFv I2C (SEQ ID 185) or any other CD3 specific scFv of the invention to result in constructs with the domain arrangement VH_{PSMA} - $(Gly_4Ser_1)_3$ –VL_{PSMA}- Gly_4Ser_1-VH_{CD3} - $(Gly_4Ser_1)_3$ - VL_{CD3} or VL_{PSMA} - $(Gly_4Ser_1)_3$ –VH_{PSMA}- Gly_4Ser_1-VH_{CD3} - $(Gly_4Ser_1)_3$ - VL_{CD3} or alternative domain arrangements. For expression in CHO cells the coding sequences of (i) an N-terminal immunoglobulin heavy chain leader comprising a start codon embedded within a Kozak consensus sequence and (ii) a C-terminal His_6-tag followed by a stop codon are both attached in frame to the nucleotide sequence encoding the bispecific single chain antibodies prior to insertion of the resulting DNA-fragment as obtained by gene synthesis into the multiple cloning site of the expression vector pEF-DHFR (Raum et al. Cancer Immunol Immunother 50 (2001) 141-150). Transfection of the generated expression plasmids, protein expression and purification of cross-species specific bispecific antibody constructs are performed as described in chapters 24.6 and 24.7 of this example. All other state of the art procedures are carried out according to standard protocols (Sambrook, Molecular Cloning; A Laboratory Manual, 3rd edition, Cold Spring Harbour Laboratory Press, Cold Spring Harbour, New York (2001)).

Identification of functional bispecific single-chain antibody constructs is carried out by flow cytometric binding analysis of culture supernatant from transfected cells expressing the cross-species specific bispecific antibody constructs. The

flowcytometric analysis is perfomed on the human PSMA positive prostate cancer cell line LNCaP (ATCC No. CRL-1740) as described in chapter 24.7 of this example. Only those constructs showing bispecific binding to human and macaque CD3 as well as to PSMA are selected for further use.

Cytotoxic activity of the generated cross-species specific bispecific single chain antibody constructs against PSMA positive target cells elicited by effector T cells is analyzed as described in chapter 24.8 of this example. The human PSMA positive prostate cancer cell line LNCaP (ATCC No. CRL-1740) is used as source of target cells. Only those constructs showing potent recruitment of cytotoxic activity of effector T cells against target cells positive for PSMA are selected for further use.

25. Epitope mapping of PSMA and CD3 cross-species specific bispecific single chain antibody molecules

25.1 Generation of CHO cells expressing human / rat PSMA chimeras

For mapping of the binding epitopes of PSMA cross-species specific bispecific single chain antibody molecules, chimeric PSMA proteins were generated with PSMA from two different species. This approach requires that only the PSMA protein from one species is recognized by the antibody. Here, PSMA of rattus norvegicus, which is not bound by the tested PSMA cross-species specific bispecific single chain antibody molecules, was used for making chimera with human PSMA. Therefore creating a chimera in the region containing the binding epitope of a PSMA cross-species specific bispecific single chain antibody leads to loss of binding of said single chain antibody to the respective PSMA construct.

The coding sequence of human PSMA as published in GenBank (Accession number NM_004476) and the coding sequence of rat PSMA (NM_057185, Rattus norvegicus folate hydrolase (Folh1), mRNA, National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov/entrez) were used for generation of the chimeric constructs.

A set of 7 chimeric cDNA constructs was designed and generated by gene synthesis according to standard protocols. In the constructs segments of the coding sequences for the amino acids 140 to 169, 191 to 258, 281 to 284, 300 to 344, 589 to 617, 683 to 690 and 716 to 750, respectively, were exchanged for the homologous sequences of rat PSMA.

Chimeric PSMA constructs were generated as described above and designated as set out in the following Table 9:

Table 9: Designation of chimeric PSMA constructs

SEQ ID (nucl/prot)	Designation
1033/1034	huPSMArat140-169
1035/1036	huPSMArat191-258
1037/1038	huPSMArat281-284
1039/1040	huPSMArat300-344
1041/1042	huPSMArat598-617
1043/1044	huPSMArat683-690
1045/1046	huPSMArat716-750

The gene synthesis fragments were designed as to contain first a Kozak site for eukaryotic expression of the construct followed by the coding sequence of the chimeric PSMA proteins, followed in frame by the coding sequence of a FLAG-tag and a stop codon. The gene synthesis fragments were also designed as to introduce restriction sites at the beginning and at the end of the fragments. The introduced restriction sites, EcoRI at the 5' end and SalI at the 3' end, were utilized in the following cloning procedures. Undesirable internal restriction sites were removed by silent mutation of the coding sequence in the gene synthesis fragments. The gene synthesis fragments were cloned via EcoRI and SalI into a plasmid designated pEF-DHFR (pEF-DHFR is described in Raum et al. Cancer Immunol Immunother 50 (2001) 141-150) following standard protocols. The aforementioned procedures were carried out according to standard protocols (Sambrook, Molecular Cloning; A Laboratory Manual, 3rd edition, Cold Spring Harbour Laboratory Press, Cold Spring Harbour, New York (2001)). A clone with sequence-verified nucleotide sequence was transfected into DHFR deficient CHO cells for eukaryotic expression of the construct. Eukaryotic protein expression in DHFR deficient CHO cells was performed as described by Kaufmann R.J. (1990) Methods Enzymol. 185, 537-566. Gene amplification of the construct was induced by increasing concentrations of methotrexate (MTX) to a final concentration of up to 20 nM MTX.

25.2 Flow cytometric binding analysis for epitope mapping of PSMA and CD3 cross-species specific bispecific single chain antibody molecules using chimeric PSMA proteins

In order to determine the binding epitope of PSMA cross-species specific bispecific single chain antibody constructs a FACS analysis was performed. For this purpose CHO cells transfected with human / rat chimeric PSMA molecules as described in Example 25.1 were used. FACS analysis with supernatant of CHO cells expressing bispecific single chain antibody constructs was performed as described herein. Detection of binding of PSMA cross-species specific bispecific single chain antibody constructs was performed using a murine Penta His antibody and as second step reagent an Fc gamma-specific antibody conjugated to phycoerythrin. Supernatant of untransfected cells was used as a negative control.

As shown in Figure 53 all PSMA cross-species specific bispecific single chain antibody constructs tested showed binding to the chimeric constructs huPSMArat140-169, huPSMArat191-258, huPSMArat281-284, huPSMArat683-690 and huPSMArat716-750. As furthermore shown in Figure 53 there is a lack of binding for the PSMA cross-species specific bispecific single chain antibody constructs PM84-D7 x I2C, PM29-G1 x I2C and PM49-B9 x I2C to the construct huPSMArat300-344, which demonstrates the presence of a major binding epitope for these constructs in the region of amino acids 300 to 344 of human PSMA. As also shown in Figure 53 there is a lack of binding for the PSMA cross-species specific bispecific single chain antibody construct PM34-C7 x I2C to the construct huPSMArat598-617, which demonstrates the presence of a major binding epitope for this construct in the region of amino acids 598 to 617 of human PSMA.

26 Epitope mapping using a peptide scanning approach

The two PSMA BiTE antibodies PM 76-B10 x I2C and PM 76-A9 x I2C were cross-reactive with rat PSMA, which excluded them from mapping by using human-rat PSMA chimeras. Likewise, binding signals of PSMA BiTE antibody PM F1-A10 x I2C on human-rat PSMA chimeras were too weak for reliable epitope mapping. These three PSMA BiTE antibodies were subjected to an alternative epitope mapping approach based on peptide scanning (Pepscan). Pepscan uses overlapping peptides of a given protein and analyses antibody binding to immobilized peptides by enzyme-linked immunosorbent assays (ELISAs). The epitope mapping experiments with PSMA BiTE antibodies were performed at the company Pepscan (Lelystad, The

Netherlands). A detailed description of the method is found elsewhere (Bernard et al. 2004, J. Biol. Chem., 279: 24313 -22; Teeling et al. 2006, J Immunol., 177: 362-71). In brief, 693 different 15-mer peptides were synthesized that span the entire extracellular amino acid sequence of human PSMA and overlap with each neighbouring 15-mer peptide by 14 amino acids. These peptides were coated to ELISA wells in a 384-well plate format. For this series of experiments, anti-PSMA scFvs of the respective BiTE antibody candidates (scFv MP 9076-A9 for BiTE antibody PM 76-A9 x I2C; scFv MP 9076-B10 for BiTE antibody PM 76-B10 x I2C; scFv F1-A10 for BiTE antibody PM F1-A10 x I2C) were produced in E. coli and used for ELISA as crude periplasmic extracts. To this end 7 ml of crude periplasmic extracts were shipped on dry ice to Pepscan (The Netherlands). Using scFv counterparts in this assay minimized the risk to pick up signals from the second non-PSMA binding specificity of the BiTE antibodies, which may lead to misinterpretation of the PSMA binding epitopes of the target binders. The scFvs were incubated with the peptides and specific binding detected using an anti-His antibody. Binding signals were measured in a 384-well ELISA reader. Results are shown in Figures 54, 55 and 56.

Of the three anti-PSMA scFv antibodies used to generate PSMA BiTE antibodies (scFv MP 9076-A9 for BiTE antibody PM 76-A9 x I2C; scFv MP 9076-B10 for BiTE antibody PM 76-B10 x I2C; scFv F1-A10 for BiTE antibody PM F1-A10 x I2C) apparently two (MP 9076-A9 and MP 9076-B10) bound to a similar dominant epitope of human PSMA. This finding is supported by the close homology of the two scFv antibodies and sequence identity in their six CDRs. The peptide binding signals point to a core epitope between Thr334 to Thr339. This sequence is located in an exposed loop of the apical domain of human PSMA as is shown in Figure 57. For scFv F1-A10, a dominant epitope could be detected within the sequence LFEPPPPGYENVS (amino acids 143-155 of human PSMA), which is also localized in the apical domain. The strong binding of the three antibody fragments MP 9076-A9. MP9076-B10 and F1-A10 to discrete peptides indicates recognition of a linear protein epitope rather than a carbohydrate moiety.

SEQ ID NO.	DESIGNATION	SOURCE	TYPE	SEQUENCE
1.	Human CD3ε extracellular domain	human	aa	QDGNEEMGGITQTPYKVSISGTTVILTCPQYPGSEILWQHNDKNIGGDEDDKNIGSDEDHLSLKE FSELEQSGYYVCYPRGSKPEDANFYLYLRARVCENCMEMD
2.	Human CD3ε 1-27	human	aa	QDGNEEMGGITQTPYKVSISGTTVILT
3.	*Callithrix jacchus* CD3ε extracellular domain	*Callithrix jacchus*	aa	QDGNEEMGDTTQNPYKVSISGTTVTLTCPRYDGHEIKWLVNSQNKEGHEDHLLLEDFSEMEQSGY YACLSKETPAEEASHYLYLKARVCENCVEVD
4.	*Callithrix jacchus* CD3ε 1-27	*Callithrix jacchus*	aa	QDGNEEMGDTTQNPYKVSISGTTVTLT
5.	*Saguinus oedipus* CD3ε extracellular domain	*Saguinus oedipus*	aa	QDGNEEMGDTTQNPYKVSISGTTVTLTCPRYDGHEIKWLVNSQNKEGHEDHLLLEDFSEMEQSGY YACLSKETPAEEASHYLYLKARVCENCVEVD
6.	*Saguinus oedipus* CD3ε 1-27	*Saguinus oedipus*	aa	QDGNEEMGDTTQNPYKVSISGTTVTLT
7.	*Saimiri sciureus* CD3ε extracellular domain	*Saimiri sciureus*	aa	QDGNEEIGDTTQNPYKVSISGTTVTLTCPRYDGQEIKWLVNDQNKEGHEDHLLLEDFSEMEQSGY YACLSKETPTEEASHYLYLKARVCENCVEVD
8.	*Saimiri sciureus* CD3ε 1-27	*Saimiri sciureus*	aa	QDGNEEIGDTTQNPYKVSISGTTVTLT
9.	CDR-L1 of F6A	artificial	aa	GSSTGAVTSGYYPN
10.	CDR-L2 of F6A	artificial	aa	GTKFLAP
11.	CDR-L3 of F6A	artificial	aa	ALWYSNRWV
12.	CDR-H1 of F6A	artificial	aa	IYAMN
13.	CDR-H2 of F6A	artificial	aa	RIRSKYNNYATYYADSVKS
14.	CDR-H3 of F6A	artificial	aa	HGNFGNSYVSFFAY
15.	VH of F6A	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNIYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSFFAYWGQGTLVTVSS
16.	VH of F6A	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATATCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TATCCTTCTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
17.	VL of F6A	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS

				GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
18.	VL of F6A	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCGTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
19.	VH-P of F6A	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNIYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSFFAYWGQGTLVTVSS
20.	VH-P of F6A	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATATCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TATCCTTCTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
21.	VL-P of F6A	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
22.	VL-P of F6A	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCGTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
23.	VH-VL of F6A	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNIYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSFFAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
24.	VH-VL of F6A	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATATCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TATCCTTCTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT

				CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
25.	VH-VL-P of F6A	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNIYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSFFAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
26.	VH-VL-P of F6A	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATATCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATGATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TATCCTTCTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
27.	CDR-L1 of H2C	artificial	aa	GSSTGAVTSGYYPN
28.	CDR-L2 of H2C	artificial	aa	GTKFLAP
29.	CDR-L3 of H2C	artificial	aa	ALWYSNRWV
30.	CDR-H1 of H2C	artificial	aa	KYAMN
31.	CDR-H2 of H2C	artificial	aa	RIRSKYNNYATYYADSVKD
32.	CDR-H3 of H2C	artificial	aa	HGNFGNSYISYWAY
33.	VH of H2C	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSS
34.	VH of H2C	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA

35.	VL of H2C	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
36.	VL of H2C	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
37.	VH-P of H2C	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSS
38.	VH-P of H2C	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
39.	VL-P of H2C	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
40.	VL-P of H2C	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
41.	VH-VL of H2C	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
42.	VH-VL of H2C	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC

				CTCGCCCCCGGTACTCCTGCCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
43.	VH-VL-P of H2C	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
44.	VH-VL-P of H2C	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
45.	CDR-L1 of H1E	artificial	aa	GSSTGAVTSGYYPN
46.	CDR-L2 of H1E	artificial	aa	GTKFLAP
47.	CDR-L3 of H1E	artificial	aa	ALWYSNRWV
48.	CDR-H1 of H1E	artificial	aa	SYAMN
49.	CDR-H2 of H1E	artificial	aa	RIRSKYNNYATYYADSVKG
50.	CDR-H3 of H1E	artificial	aa	HGNFGNSYLSFWAY
51.	VH of H1E	artificial	aa	EVQLVESGGGLEQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSFWAYWGQGTLVTVSS
52.	VH of H1E	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGAGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATTCGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACC TATCCTTCTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTC
53.	VL of H1E	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
54.	VL of H1E	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG

				TGGCTCCTCGACTGGGGCGTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
55.	VH-P of H1E	artificial	aa	EVQLLESGGGLEQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSFWAYWGQGTLVTVSS
56.	VH-P of H1E	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGAGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATTCGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACC TATCCTTCTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
57.	VL-P of H1E	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
58.	VL-P of H1E	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
59.	VH-VL of H1E	artificial	aa	EVQLVESGGGLEQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSFWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
60.	VH-VL of H1E	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGAGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATTCGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACC TATCCTTCTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTCACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA

61.	VH-VL-P of H1E	artificial	aa	EVQLLESGGGLEQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSFWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
62.	VH-VL-P of H1E	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGAGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATTCGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACC TATCCTTCTGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
63.	CDR-L1 of G4H	artificial	aa	GSSTGAVTSGYYPN
64.	CDR-L2 of G4H	artificial	aa	GTKFLAP
65.	CDR-L3 of G4H	artificial	aa	ALWYSNRWV
66.	CDR-H1 of G4H	artificial	aa	RYAMN
67.	CDR-H2 of G4H	artificial	aa	RIRSKYNNYATYYADSVKG
68.	CDR-H3 of G4H	artificial	aa	HGNFGNSYLSYFAY
69.	VH of G4H	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSS
70.	VH of G4H	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATCGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGCAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTACTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
71.	VL of G4H	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
72.	VL of G4H	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA

				ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
73.	VH-P of G4H	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSS
74.	VH-P of G4H	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATCGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGCAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTACTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
75.	VL-P of G4H	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
76.	VL-P of G4H	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
77.	VH-VL of G4H	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
78.	VH-VL of G4H	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATCGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTACTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTCTCTATGGTACAGCAACCGCCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
79.	VH-VL-P of G4H	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF

				LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
80.	VH-VL-P of G4H	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATCGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTACTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
81.	CDR-L1 of A2J	artificial	aa	RSSTGAVTSGYYPN
82.	CDR-L2 of A2J	artificial	aa	ATDMRPS
83.	CDR-L3 of A2J	artificial	aa	ALWYSNRWV
84.	CDR-H1 of A2J	artificial	aa	VYAMN
85.	CDR-H2 of A2J	artificial	aa	RIRSKYNNYATYYADSVKK
86.	CDR-H3 of A2J	artificial	aa	HGNFGNSYLSWWAY
87.	VH of A2J	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSWWAYWGQGTLVTVSS
88.	VH of A2J	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
89.	VL of A2J	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
90.	VL of A2J	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
91.	VH-P of A2J	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS

				VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSWWAYWGQGTLVTVSS
92.	VH-P of A2J	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
93.	VL-P of A2J	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
94.	VL-P of A2J	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
95.	VH-VL of A2J	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDM RPSGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
96.	VH-VL of A2J	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTCGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATG AGGCCCTCTGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
97.	VH-VL-P of A2J	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDM RPSGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
98.	VH-VL-P of A2J	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG

				GTTTGGAATGGGTTGCTCGCATAAGAGTAAATATAATTACAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACT TATCCTGGTGGGCTTACTGGGGCCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTCGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATG AGGCCCTCTGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
99.	CDR-L1 of E1L	artificial	aa	GSSTGAVTSGYYPN
100.	CDR-L2 of E1L	artificial	aa	GTKFLAP
101.	CDR-L3 of E1L	artificial	aa	ALWYSNRWV
102.	CDR-H1 of E1L	artificial	aa	KYAMN
103.	CDR-H2 of E1L	artificial	aa	RIRSKYNNYATYYADSVKS
104.	CDR-H3 of E1L	artificial	aa	HGNFGNSYTSYYAY
105.	VH of E1L	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYTSYYAYWGQGTLVTVSS
106.	VH of E1L	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAATCGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA CATCCTACTACGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
107.	VL of E1L	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
108.	VL of E1L	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
109.	VH-P of E1L	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYTSYYAYWGQGTLVTVSS
110.	VH-P of E1L	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG

				GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAATCGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA CATCCTACTACGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
111.	VL-P of E1L	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
112.	VL-P of E1L	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
113.	VH-VL of E1L	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYTSYYAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
114.	VH-VL of E1L	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAATCGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA CATCCTACTACGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
115.	VH-VL-P of E1L	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKSRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYTSYYAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
116.	VH-VL-P of E1L	artificial	nt	CAGGTGCAGCTGCTCGAGTCTGGAGGCAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAATCGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA

				CATCCTACTACGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
117.	CDR-L1 of E2M	artificial	aa	RSSTGAVTSGYYPN
118.	CDR-L2 of E2M	artificial	aa	ATDMRPS
119.	CDR-L3 of E2M	artificial	aa	ALWYSNRWV
120.	CDR-H1 of E2M	artificial	aa	GYAMN
121.	CDR-H2 of E2M	artificial	aa	RIRSKYNNYATYYADSVKE
122.	CDR-H3 of E2M	artificial	aa	HRNFGNSYILSWFAY
123.	VH of E2M	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNGYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKERFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHRNFGNSYILSWFAYWGQGTLVTVSS
124.	VH of E2M	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATAGGAACTTCGGTAATAGCTACT TATCCTGGTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
125.	VL of E2M	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
126.	VL of E2M	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
127.	VH-P of E2M	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNGYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKERFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHRNFGNSYILSWFAYWGQGTLVTVSS
128.	VH-P of E2M	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATAGGAACTTCGGTAATAGCTACT

				TATCCTGGTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
129.	VL-P of E2M	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
130.	VL-P of E2M	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
131.	VH-VL of E2M	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNGYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKERFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHRNFGNSYLSWFAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDM RPSGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
132.	VH-VL of E2M	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATAGGAACTTCGGTAATAGCTACT TATCCTGGTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTCGCTCCTCGACTGGGGCTGTTACAATAGGTGCCACATG ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATG AGGCCCTCTGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
133.	VH-VL-P of E2M	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNGYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKERFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHRNFGNSYLSWFAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDM RPSGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
134.	VH-VL-P of E2M	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATAGGAACTTCGGTAATAGCTACT TATCCTGGTTCGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTCGCTCCTCGACTGGGGCTGTTACATCTGGCTACT

				ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATG AGGCCCTCTGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
135.	CDR-L1 of F7O	artificial	aa	GSSTGAVTSGYYPN
136.	CDR-L2 of F7O	artificial	aa	GTKFLAP
137.	CDR-L3 of F7O	artificial	aa	ALWYSNRWV
138.	CDR-H1 of F7O	artificial	aa	VYAMN
139.	CDR-H2 of F7O	artificial	aa	RIRSKYNNYATYYADSVKK
140.	CDR-H3 of F7O	artificial	aa	HGNFGNSYISWWAY
141.	VH of F7O	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISWWAYWGQGTLVTVSS
142.	VH of F7O	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
143.	VL of F7O	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
144.	VL of F7O	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
145.	VH-P of F7O	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISWWAYWGQGTLVTVSS
146.	VH-P of F7O	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
147.	VL-P of F7O	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL

148.	VL-P of F7O	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
149.	VH-VL of F7O	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
150.	VH-VL of F7O	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTGGTGGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTGAGCTCGTGTTGACTCAGGAACCTTCACTCACCGT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
151.	VH-VL-P of F7O	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKKRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
152.	VH-VL-P of F7O	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATGTGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAAAGAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTGGTGGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTGAGCTCGTGTTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTCTATGGTACAGCAACCGCTGGG

				TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
153.	CDR-L1 of F12Q	artificial	aa	GSSTGAVTSGNYPN
154.	CDR-L2 of F12Q	artificial	aa	GTKFLAP
155.	CDR-L3 of F12Q	artificial	aa	VLWYSNRWV
156.	CDR-H1 of F12Q	artificial	aa	SYAMN
157.	CDR-H2 of F12Q	artificial	aa	RIRSKYNNYATYYADSVKG
158.	CDR-H3 of F12Q	artificial	aa	HGNFGNSYVSWWAY
159.	VH of F12Q	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSS
160.	VH of F12Q	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TTTCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
161.	VL of F12Q	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
162.	VL of F12Q	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
163.	VH-P of F12Q	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSS
164.	VH-P of F12Q	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TTTCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
165.	VL-P of F12Q	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
166.	VL-P of F12Q	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA

				GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
167.	VH-VL of F12Q	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
168.	VH-VL of F12Q	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TTTCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCCGACTGGGGCGTGTTACATCTGGCAACT ACCCAAACTGGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
169.	VH-VL-P of F12Q	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
170.	VH-VL-P of F12Q	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG TTTCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCCGACTGGGGCGTGTTACATCTGGCAACT ACCCAAACTGGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
171.	CDR-L1 of I2C	artificial	aa	GSSTGAVTSGNYPN
172.	CDR-L2 of I2C	artificial	aa	GTKFLAP

173.	CDR-L3 of I2C	artificial	aa	VLWYSNRWV
174.	CDR-H1 of I2C	artificial	aa	KYAMN
175.	CDR-H2 of I2C	artificial	aa	RIRSKYNNYATYYADSVKD
176.	CDR-H3 of I2C	artificial	aa	HGNFGNSYISYWAY
177.	VH of I2C	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSS
178.	VH of I2C	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
179.	VL of I2C	artificial	aa	QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
180.	VL of I2C	artificial	nt	CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
181.	VH-P of I2C	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSS
182.	VH-P of I2C	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCA
183.	VL-P of I2C	artificial	aa	ELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
184.	VL-P of I2C	artificial	nt	GAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA

185.	VH-VL of I2C	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
186.	VH-VL of I2C	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACT ACCCAAACTGGGTCCAACACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAAATATTTACTGTGTTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
187.	VH-VL-P of I2C	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS GGGGSGGGGSELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
188.	VH-VL-P of I2C	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTTCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACT ACCCAAACTGGGTCCAACACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAAATATTTACTGTGTTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTA
189.	MCSP-G4 VH-VL x H2C VH-VL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR

				DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
190.	MCSP-G4 VH-VL x H2C VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
191.	MCSP-G4 VH-VL x F12Q VH-VL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCARKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
192.	MCSP-G4 VH-VL x F12Q VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG

				GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG
				GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG
				ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG
				GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA
				GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCCTG
				GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA
				GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAG
				CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA
				GTAAATATAATAATTATATGCAACATATTATGCCGATTCAGTGAAAGGCAGGTTCACCATCTCCAGA
				GATGATTCAAAAAACACTGCCCTATCTACAAATGAACACAACTTGAAAACTGAGGACACTGCCGTGTA
				CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGGCTTACTGGGGCCAAG
				GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT
				TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACACGTCACACTCAC
				TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAAACCAG
				GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCGGTACTCCTGCCAGATTC
				TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC
				AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG
				TCCTA
193.	MCSP-G4 VH-VL x I2C VH-VL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ
				GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG
				GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG
				VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG
				GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR
				DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG
				SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF
				SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
194.	MCSP-G4 VH-VL x I2C VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG
				CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCCTGGACAAG
				GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG
				GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG
				ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGATCCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC

				CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACACAAAAACCAG GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
195.	MCSP-G4 VH-VL-P x F6A VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNIYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKSRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSFFAYWGQGTLVTVSSGGGGSGGGGSGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
196.	MCSP-G4 VH-VL-P x F6A VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCACAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA

				GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAT CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAAGCAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTATCCTTCTTCGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
197.	MCSP-G4 VH-VL-P x H2C VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
198.	MCSP-G4 VH-VL-P x H2C VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGGATGGGTTGGATCAACCCTAACAGTGGTGTCCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTTCTACTGGGGCCTTACTGGGGCCAAG

				GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
199.	MCSP-G4 VH-VL-P x H1E VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGSEVQLLESGG GLEQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSFWAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
200.	MCSP-G4 VH-VL-P x H1E VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGAGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATTC GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACCTATCCTTCTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC

				AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
201.	MCSP-G4 VH-VL-P x G4H VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
202.	MCSP-G4 VH-VL-P x G4H VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCTCCAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATCG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACTTATCCTACTTCGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
203.	MCSP-G4 VH-VL-P x A2J VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG

				VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKKRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSWWAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
204.	MCSP-G4 VH-VL-P x A2J VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCTCCAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATGT CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAAAGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACTTATCCTGGTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACACAGTCACACTCAC TTGTCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
205.	MCSP-G4 VH-VL-P x E1L VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSISTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKSRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYTSYYAYWGQGTLVTVSSGGGGSGGGGSGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL

206.	MCSP-G4 VH-VL-P x E1L VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCCACATATTATGCCGATTCAGTGAAATCGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGACTTCGGTAATAGCTACACATCCTACTACGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
			aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNGYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKERFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHRNFGNSYLSWFAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCRSSTGAVTSGYYPNWVQQKPGQAPRGLIGATDMRPSGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
207.	MCSP-G4 VH-VL-P x E2M VH-VL-P	artificial		
208.	MCSP-G4 VH-VL-P x E2M VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC

				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACACATTATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATGG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGAGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATAGGAACTTCGGTAATAGCTACTTATCCTGGTTCGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTCGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGCCACTGACATGAGGCCCTCTGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
209.	MCSP-G4 VH-VL-P x F7O VH-VL-P	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNVYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKKRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISWWAYWGQGTLVTVSSGGGGSGGGGSGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
210.	MCSP-G4 VH-VL-P x F7O VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA

				GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATGT GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAAAGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTGGTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
211.	MCSP-G4 VH-VL-P x F12Q VH-VL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGGSGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
212.	MCSP-G4 VH-VL-P x F12Q VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGGTTCACCATCTCCAGA

				GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
213.	MCSP-G4 VH-VL-P x I2C VH-VL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
214.	MCSP-G4 VH-VL-P x I2C VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACCCTCTAACAGTGGTGCCACACAGACTCTACATGGAGCTGAGCAGCCTGAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCCGGTGGTGGT GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG

				GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
215.	MCSP-D2 VH-VL x H2C VH-VL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTGYYMHWVRQAPGQGLEWMGWINPNSGGTSYAQKFQ GRVTMTRDTSTSTVYMELSNLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
216.	MCSP-D2 VH-VL x H2C VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG CAAGGCTTCTGGATACACCTTCACCGGCTACTATATGCACTGGGTGCGACAGGCCCCTGGACAAG GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACACAGCTACGCCAGAAGTTCCAG GGCAGAGTCACCATGACTAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAACCTGAG ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
217.	MCSP-D2 VH-VL x	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTGYYMHWVRQAPGQGLEWMGWINPNSGGTSYAQKFQ

	F12Q VH-VL			GRVTMTRDTSTSTVYMELSNLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGGSGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
218.	MCSP-D2 VH-VL x F12Q VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG CAAGGCTTCTGGATACACCTTCACCGGCTACTATATGCACTGGGTGCGACAGGCCCCTGGACAAG GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACAAGCTACGCACAGAAGTTCCAG GGCAGAGTCACCATGACTAGGGACACCGTCCACGAGCACAGTCTACATGGAGCTGAGCAACCTGAG ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
219.	MCSP-D2 VH-VL x I2C VH-VL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTGYYMEWVRQAPGQGLEWMGWINPNSGGTSYAQKFQ GRVTMTRDTSTSTVYMELSNLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG

				SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
220.	MCSP-D2 VH-VL x l2C VH-VL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG CAAGGCTTCTGGATACACCTTCACCGGCTACTATATGCACTGGGTGCGACAGGCCCCTGGACAAG GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACAAGCTACGCCACAGAAGTTCCAG GGCAGAGTCACCATGACTAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAACCTGAG ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTCTGGCGGCGGCTCCCGGTGGTGGT GGTTCTGATATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
221.	MCSP-D2 VH-VL-P x H2C VH-VL-P	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTGYYMHWVRQAPGQGLEWMGWINPNSGGTSYAQKFQ GRVTMTRDTSTSTVYMELSNLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLNSSNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
222.	MCSP-D2 VH-VL-P x H2C VH-VL-P	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG CAAGGCTTCTGGATACACCTTCACCGGCTACTATATGCACTGGGTGCGACAGGCCCCCTGGACAAG GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACAAGCTACGCCACAGAAGTTCCAG

				GGCAGAGTCACCATGACTAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAACCTGAG
				ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGAGCTCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGCCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCTCCAACACAATAGGAACTACTTAGCTTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG
				GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA
				GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG
				GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA
				GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA
				GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA
				GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA
				GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA
				CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCCTTACTGGGGCCAAG
				GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT
				TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC
				TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAACTGGGTCCAACAAAAACCAG
				GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC
				TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC
				AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG
				TCCTA
223.	MCSP-F9 VH-VL x H2C VH-VL	artificial	aa	QVQLQESGPGLVKPSETLSLTCVVSGGSISSSNWWSWVRQPPGKGLEWLGTIYYNGNTYYNPSLK
				SRVTISVDTSKNQFSLRLSSVTAADTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG
				GSDIVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG
				VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHYSVPFTFGPGTKVDIKGGGSEVQLVESGGG
				LVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRD
				DSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGS
				QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS
				GSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
224.	MCSP-F9 VH-VL x H2C VH-VL	artificial	nt	CAGGTGCAGCTGCAAGAGTCTGGCCCAGGACTGGTGAAGCCTTCGGAGACCCTGTCCCTCACCTG
				CGTTGTCTCTGGTGGCTCCATCAGCAGTAGTAACTGGTGGAGCTGGGTCCGCCAGCCCCCAGGGA
				AGGGACTGGAGTGGCTTGGGACTATCTATTATAATGGGAATACCTACTACAACCCGTCCCTCAAG
				AGTCGAGTCACCATCTCCGTAGACACGTCCAAGAACCAGTTCTCCCTGAGGCTGAGCTCTGTGAC
				CGCCGCAGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGATATCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT

				ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTGTTCCATTCACTTTCGGCCCTG GGACCAAAGTGGATATCAAAGGAGGTGGTGGCTCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGA TTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTA CGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTA AATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGAT GATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTA CTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGA CTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGCTCTATGGCTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
225.	MCSP-F9 VH-VL-P x H2C VH-VL-P	artificial	aa	EVQLQESGPGLVKPSETLSLTCVVSGGSISSSNWWSWVRQPPGKGLEWLGTIYYNGNTYYNPSLK SRVTISVDTSKNQFSLRLSSVTAADTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHYSVPFTFGPGTKVDIKSGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
226.	MCSP-F9 VH-VL-P x H2C VH-VL-P	artificial	nt	GAGGTGCAGCTGCAAGAGTCTGGCCCAGGACTGGTGAAGCCTTCGGAGACCCTGTCCCTCACCTG CGTTGTCTCTGGTGGCTCCATCAGCAGTAGTAACTGGTGGAGCTGGGTCCGCCAGCCCCCAGGGA AGGGACTGGAGTGGCTTGGGACTATCTATTATAATGGGAATACCTACTACAACCCGTCCCTCAAG AGTCGAGTCACCATCTCCGTAGACACGTCCAAGAACCAGTTCTCCCTGAGGCTGAGCTCTGTGAC CGCCGCAGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTGTTCCATTCACTTTCGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA

				GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGTGGCTTACTGGGCCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTCT TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
227.	MCSP-F9 VH-VL-P x G4H VH-VL-P	artificial	aa	EVQLQESGPGLVKPSETLSLTCVVSGGSISSSNWWSWVRQPPGKGLEWLGTIYYNGNTYYNPSLK SRVTISVDTSKNQFSLRLSSVTAADTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSELVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHYSVPFTFGPGTKVDIKSGGGGSEVQLLESGG GLVQPGGSLKLSCAASGFTFNRYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYLSYFAYWGQGTLVTVSSGGGGSGGGGSGGGG SELVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
228.	MCSP-F9 VH-VL-P x G4H VH-VL-P	artificial	nt	GAGGTGCAGCTGCAAGAGTCTGGCCCAGGACTGGTGAAGCCTTCGGAGACCCTGTCCCTCACCTG CGTTGTCTCTGGTGGCTCCATCAGCAGTAGTAACTGGTGGAGCTGGGTCCGCCAGCCCCCAGGGA AGGGACTGGAGTGGCTTGGGACTATCTATTATAATGGGAATACCTACTACAACCCGTCCCTCAAG AGTCGAGTCACCATCTCCGTAGACACGTCCAAGAACCAGTTCTCCCTGAGGCTGAGCTCTGTGAC CGCCGCAGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGAGCTCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACACAATAAGAACTACTTAAATTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTGTTCCATTCACTTTCGGCCCTG GGACCAAAGTGGATATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGCTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATCG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGGAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACTTACTTCCTACTATCCTACTTCGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTCT

				TCTGAGCTCGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
229.	1-27 CD3ε-Fc	artificial	aa	QDGNEEMGGITQTPYKVSISGTTVILTSGEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNG KEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEW ESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG KHHHHHH
230.	1-27 CD3ε-Fc	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAAGATGG TAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTCTCCATCTCTGGAACCACAGTAA TATTGACATCCGGAGAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCT GAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTC CCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAGACCCTGAGGTCAAGTTCA ACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAGTACAAC AGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTA CAAGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAG GGCAGCCCCGAGAACCACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAG GTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAA TGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACTCCGACGGCTCCTTCTTCC TCTATAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTCCGTG ATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCCCCGGGTAAACATCA TCACCATCATCAT
231.	human 1-27 CD3ε - EpCAM	artificial	aa	QDGNEEMGGITQTPYKVSISGTTVILTDYKDDDDKTASFAAAQKECVCENYKLAVNCFLNDNGQC QCTSIGAQNTVLCSKLAAKCLVMKAEMNGSKLGRRAKPEGALQNNDGLYDPDCDESGLFKAKQCN GTSTCWCVNTAGVRRTDKDTEITCSERVRTYWIIIELKHKAREKPYDVQSLRTALEEAIKTRYQL DPKFITNILYEDNVITIDLVQNSSQKTQNDVDIADVAYYFEKDVKGESLFHSKKMDLRVNGEQLD LDPGQTLIYYVDEKAPEFSMQGLKAGVIAVIVVVVIAIVAGIVVLVISRKKRMAKYEKAEIKEMG EMHRELNA
232.	human 1-27 CD3ε - EpCAM	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAAGATGG TAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTCTCCATCTCTGGAACCACAGTAA TATTGACAGATTACAAGGACGACGATGACAAGACTGCGAGTTTTGCCGCAGCTCAGAAAGAATGT GTCTGTGAAAACTACAAGCTGGCCGTAAACTGCTTTTTGAATGACAATGGTCAATGCCAGTGTAC TTCGATTGGTGCACAAAATACTGTCCTTTGCTCAAAGCTGGCTGCCAAATGTTTGGTGATGAAGG CAGAAATGAACGGCTCAAAACTTGGGAGAAGAGCGAAACCTGAAGGGGCTCTCCAGAACAATGAT

				GGCCTTTACGATCCTGACTGCGATGAGAGCGGGCTCTTTAAGGCCAAGCAGTGCAACGGCACCTC CACGTGCTGGTGTGTGAACACACTGCTGGGGTCAGAAGAACTGACAAGGACACTGAAATAACCTGCT CTGAGCGAGTGAGAACCTACTGGATCATCATTGAATTAAAACACAAAGCAAGAGAAAAACCTTAT GATGTTCAAAGTTTGCGGACTGCACTTGAGGAGGCGATCAAAAACGCCGTTATCAACTGGATCCAAA ATTTATCACAAATATATTTTGTATGAGGATAATGTTATCACTATTGATCTGGTTCAAAATTCTTCTC AGAAAACTCAGAATGATGTGGACATAGCTGATGTGGCTTATTATTTGAAAAAGATGTTAAAGGT GAATCCTTGTTTCATTCTAAGAAAAATGGACCTGAGAGTAAATGGGGAACAACTGGATCTGGATCC TGGTCAAACTTTAATTATTATGTCGATGAAAAAGCACCTGAATTCTCAATGCAGGGTCTAAAAG CTGGTGTTATTGCTGTTATTGTGGTTGTGATAGCAATTGTTGCTGGAATTGTTGTGCTGGTT ATTTCCAGAAAGAAGAGAAATGGCAAAGTATGAGAAGGCTGAGATAAAGGAGATGGGTGAGATGCA TAGGGAACTCAATGCA
233.	marmoset 1-27 CD3ε -EpCAM	artificial	aa	QDGNEEMGDTTQNPYKVSISGTTVTLTDYKDDDDKTASFAAAQKECVCENYKLAVNCFLNDNGQC QCTSIGAQNTVLCSKLAAKCLVMKAEMNGSKLGRRAKPEGALQNNDGLYDPDCDESGLFKAKQCN GTSTCWCVNTAGVRRTDKDTEITCSERVRTYWIIIELKHKAREKPYDVQSLRTALEEAIKTRYQL DPKFITNILYEDNVITIDLVQNSSQKTQNDVDIADVAYYFEKDVKGESLFHSKKMDLRVNGEQLD LDPGQTLIYYVDEKAPEFSMQGLKAGVIAVIVVVVIAIVAGIVVLVISRKKRMAKYEKAEIKEMG EMHRELNA
234.	marmoset 1-27 CD3ε -EpCAM	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAGGACGG TAATGAAGAAATGGGTGATACTACACAGAACCCATATAAAGTTTCCATCTCAGGAACCACAGTAA CACTGACAGATTACAAGGACGACGATGACAAGACTGCGAGTTTTGCCGCAGCTCAGAAAGAATGT GTCTGTGAAAACTACAAGCTGGCCGTAAACTGCTTTTTGAATGACAATGGTCAATGCCAGTGTAC TTCGATTGGTGCACAAAATACTGTCCTTTGCTCAAAGCTGGCTGCCAAATGTTTGGTGATGAAGG CAGAAATGAACGGCTCAAAACTTGGGAGAAGAGCGAAACCTGAAGGGGCTCTCCAGAACAATGAT GGCCTTTACGATCCTGACTGCGATGAGAGCGGGCTCTTTAAGGCCAAGCAGTGCAACGGCACCTC CACGTGCTGGTGTGTGAACACTGCTGGGGTCAGAAGAACTGACAAGGACACTGAAATAACCTGCT CTGAGCGAGTGAGAACCTACTGGATCATCATTGAATTAAAACACAAAGCAAGAGAAAAACCTTAT GATGTTCAAAGTTTGCGGACTGCACTTGAGGAGGCGATCAAAAACGCCGTTATCAACTGGATCCAAA ATTTATCACAAATATATTTTGTATGAGGATAATGTTATCACTATTGATCTGGTTCAAAATTCTTCTC AGAAAACTCAGAATGATGTGGACATAGCTGATGTGGCTTATTATTTGAAAAAGATGTTAAAGGT GAATCCTTGTTTCATTCTAAGAAAAATGGACCTGAGAGTAAATGGGGAACAACTGGATCTGGATCC TGGTCAAACTTTAATTATTATGTCGATGAAAAAGCACCTGAATTCTCAATGCAGGGTCTAAAAG CTGGTGTTATTGCTGTTATTGTGGTTGTGATAGCAATTGTTGCTGGAATTGTTGTGCTGGTT ATTTCCAGAAAGAAGAGAAATGGCAAAGTATGAGAAGGCTGAGATAAAGGAGATGGGTGAGATGCA TAGGGAACTCAATGCA
235.	tamarin 1-27 CD3ε - EpCAM	artificial	aa	QDGNEEMGDTTQNPYKVSISGTTVTLTDYKDDDDKTASFAAAQKECVCENYKLAVNCFLNDNGQC QCTSIGAQNTVLCSKLAAKCLVMKAEMNGSKLGRRAKPEGALQNNDGLYDPDCDESGLFKAKQCN GTSTCWCVNTAGVRRTDKDTEITCSERVRTYWIIIELKHKAREKPYDVQSLRTALEEAIKTRYQL

				DPKFITNILYEDNVITIDLVQNSSQKTQNDVDIADVAYYFEKDVKGESLFHSKKMDLRVNGEQLD LDPGQTLIYYVDEKAPEFSMQGLKAGVIAVIVVVVIAIVAGIVVLVISRKKRMAKYEKAEIKEMG EMHRELNA
236.	tamarin 1-27 CD3ε - EpCAM	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAGGACGG TAATGAAGAAATGGGTGATACTACACACAGAACCCATATAAAGTTTCCATCTCAGGAACCACAGTAA CACTGACAGATTACAAGGACGACGATGACAAGACTGCGAGTTTGCCGCAGCTCAGAAAGAATGT GTCTGTGAAAACTACAAGCTGGCCGTAACTGCTTTTTGAATGACAATGGTCAATGCCAGTGTAC TTCGATTGGTGCACAAAATACTGTCCTTTGCTCAAAGCTGGCTGCCAAATGTTTGGTGATGAAGG CAGAAATGAACGGCTCAAAACTTGGGAGAAGAGCGAAACCTGAAGGGGCTCTCCAGAACAATGAT GGCCTTTACGATCCTGACTGCGATGAGAGCGGGCTCTCTTTAAGGCCAAGCAGTGCAACGGCACCTC CACGTGCTGGTGTGTGAACACTGCTGGGTCAGAAGAACTGACACAAGGACACTGAAATAACCTGCT CTGAGCGAGTGAGAACCTACTGGATCATCATTGAATTAAAACACAAAGCAAGAGAAAAACCTTAT GATGTTCAAAGTTTGCGGACTGCACTTGAGGAGGCGATCAAAACGCCGTTATCAACTGGATCCAAA ATTTATCACAAATATTTTGTATGAGGATAATGTTATCACTATTGATCTGGTTCAAAATTCTTCTC AGAAAACTCAGAATGATGTGGACATAGCTGATGTGGCTTATTATTTTGAAAAAGATGTTTAAAGGT GAATCCTTGTTTCATTCTAAGAAAATGGACCTGAGAGTAAATGGGGAACAACTGGATCTGGATCC TGGTCAAACTTTAATTTATTATGTCGATGAAAAGCACCTGAATTCTCAATGCAGGGTCTAAAAG CTGGTGTTATTGCTGTTATTGTGGTTGTGATAGCAATTGTTGCTGGAATTGTTGTGCTGGTT ATTTCCAGAAAGAAGAGAATGGCAAAGTATGAGAAGGCTGAGATAAAGGAGATGGGTGAGATGCA TAGGGAACTCAATGCA
237.	squirrel monkey 1-27 CD3ε -EpCAM	artificial	aa	QDGNEEIGDTTQNPYKVSISGTTVTLTDYKDDDDKTASFAAAQKECVCENYKLAVNCFLNDNGQC QCTSIGAQNTVLCSKLAAKCLVMKAEMNGSKLGRRAKPEGALQNNDGLYDPDCDESGLFKAKQCN GTSTCWCVNTAGVRRTDKDTEITCSERVRTYWIIIELKHKAREKPYDVQSLRTALEEAIKTRYQL DPKFITNILYEDNVITIDLVQNSSQKTQNDVDIADVAYYFEKDVKGESLFHSKKMDLRVNGEQLD LDPGQTLIYYVDEKAPEFSMQGLKAGVIAVIVVVVIAIVAGIVVLVISRKKRMAKYEKAEIKEMG EMHRELNA
238.	squirrel monkey 1-27 CD3ε -EpCAM	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAGGACGG TAATGAAGAGATTGGTGATACTACCCAGAACCCATATAAAGTTTCCATCTCAGGAACCACAGTAA CACTGACAGATTACAAGGACGACGATGACAAGACTGCGAGTTTGCCGCAGCTCAGAAAGAATGT GTCTGTGAAAACTACAAGCTGGCCGTAAACTGCTTTTTGAATGACAATGGTCAATGCCAGTGTAC TTCGATTGGTGCACAAAATACTGTCCTTTGCTCAAAGCTGGCTGCCAAATGTTTGGTGATGAAGG CAGAAATGAACGGCTCAAAACTTGGGAGAAGAGCGAAACCTGAAGGGGCTCTCCAGAACAATGAT GGCCTTTACGATCCTGACTGCGATGAGAGCGGGCTCTCTTTAAGGCCAAGCAGTGCAACGGCACCTC CACGTGCTGGTGTGTGAACACTGCTGGGTCAGAAGAACTGACACAAGGACACTGAAATAACCTGCT CTGAGCGAGTGAGAACCTACTGGATCATCATTGAATTAAAACACAAAGCAAGAGAAAAACCTTAT GATGTTCAAAGTTTGCGGACTGCACTTGAGGAGGCGATCAAAACGCCGTTATCAACTGGATCCAAA ATTTATCACAAATATTTTGTATGAGGATAATGTTATCACTATTGATCTGGTTCAAAATTCTTCTC

				AGAAAACTCAGAATGATGTGGACATAGCTGATGGCTTATTTATTTGAAAAAGATGTTAAAGGT GAATCCTTGTTTCATTCTAAGAAAATGGACCTGAGAGTAAATGGGGAACAACTGGATCTGGATCC TGGTCAAACTTTAATTTATTATGTCGATGAAAAAGCACCTGAATTCTCAATGCAGGGTCTAAAAG CTGGTGTTATTGCTGTTATTTGTGGTTGTAGATAGCAATTGTTGCTGGAATTGTTGTGCTGGTT ATTTCCAGAAAGAAGAGAATGGCAAAGTATGAGAAGGCTGAGATAAAGGAGATGGGTGAGATGCA TAGGGAACTCAATGCA
239.	swine 1-27 CD3ε - EpCAM	artificial	aa	QEDIERPDEDTQKTFKVSISGDKVELTDYKDDDDKTASFAAAQKECVCENYKLAVNCFLNDNGQC QCTSIGAQNTVLCSKLAAKCLVMKAEMNGSKLGRRAKPEGALQNNDGLYDPDCDESGLFKAKQCN GTSTCWCVNTAGVRRTDKDTEITCSERVRTYWIIIELKHKAREKPYDVQSLRTALEEAIKTRYQL DPKFITNILYEDNVITIDLVQNSSQKTQNDVDIADVAYYFEKDVKGESLFHSKKMDLRVNGEQLD LDPGQTLIYYVDEKAPEFSMQGLKAGVIAVIVVVVIAIVAGIVVLVISRKKRMAKYEKAEIKEMG EMHRELNA
240.	swine 1-27 CD3ε - EpCAM	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAAGAAGA CATTGAAAGACCAGATGAAGATACACACAGAAAACATTTAAAGTCTCCATCTCTGGAGACAAAGTAG AGCTGACAGATTACAAGGACGACGATGACAAGACTGCGAGTTTGCCGCAGCTCAGAAAGAATGT GTCTGTGAAAACTACAAGCTGGCCGTAACTGCTTTTTGAATGACAATGGTCCAATGCCAGTGTAC TTCGATTGGTGCACAAAATACTGTCCTTGCTCAAAGCTGGCTGCCAAATGTTTGGTGATGAAGG CAGAAATGAACGGCTCAAAACTTGGGAGAAGAGCGAAACCTGAAGGGGCTCTCCAGAACAATGAT GGCCTTTACGATCCTGACTGCGATGAGAGCGGGCTCTTTAAGGCCAAGCAGTGCAACGGCACCTC CACGTGCTGGTGTGTGAACACTGCTGGGGTCAGAAGAACTGACACAAGGACACTGAAATAACCTGCT CTGAGCGAGTGAGAACCTACTGGATCATCATTGAATTAAAACACAAAGCAAGAGAAAAACCTTAT GATGTTCAAAGTTTGCGGACTGCACTTGAGGAGGCGATCAAAAACGCCGTTATCAACTGGATCCAAA ATTTATCACAAATATTTTGTATGAGGATAATGTTATCACTATTGATCTGGTTCAAAATTCTTCTC AGAAAACTCAGAATGATGTGGACATAGCTGATGGCTTATTTATTTGAAAAAGATGTTAAAGGT GAATCCTTGTTTCATTCTAAGAAAATGGACCTGAGAGTAAATGGGGAACAACTGGATCTGGATCC TGGTCAAACTTTAATTTATTATGTCGATGAAAAAGCACCTGAATTCTCAATGCAGGGTCTAAAAG CTGGTGTTATTGCTGTTATTTGTGGTTGTGATAGCAATTGTTGCTGGAATTGTTGTGCTGGTT ATTTCCAGAAAGAAGAGAATGGCAAAGTATGAGAAGGCTGAGATAAAGGAGATGGGTGAGATGCA TAGGGAACTCAATGCA
241.	human CD3 epsilon chain	human	aa	QDGNEEMGGITQTPYKVSISGTTVILTCPQYPGSEILWQHNDKNIGGDEDDKNIGSDEDHLSLKE FSELEQSGYYVCYPRGSKPEDANFYLYLRARVCENCMEMDVMSVATIVIVDICITGGLLLLVYYW SKNRKAKAKPVTRGAGAGGRQRGQNKERPPPVPNPDYEPIRKGQRDLYSGLNQRRI
242.	human CD3 epsilon chain	human	nt	ATGCAGTCGGGCACTCACTGGAGAGTTCTGGGCCTCTGCCTCTTATCAGTTGGCGTTTGGGGGCA AGATGGTAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTCTCCATCTCTGGAACCA CAGTAATATTGACATGCCCTCAGTATCCTGGATCTGAAATACTATGGCAACACAATGATAAAAAC ATAGGCGGTGATGAGGATGATAAAAACATAGGCAGTGATGAGGATCACCTGTCACTGAAGGAATT TTCAGAATTGGAGCAAAGTGGTTATTATGTCTGCTACCCCAGAGGAAGCAAACCAGAAGATGCGA

				ACTTTTATCTCTACCTGAGGGCACGCGTGTGTGAGAACTGCATGGAGATGGATGTGATCGGTG GCCACAATTGTCATAGTGGACATCTGCATCACTGGGGGCTTGCTGCTGGTTACTACTGGAG CAAGAATAGAAAGGCCAAGGCCTGTGACACGAGGAGCGGGTGCTGGCGGCAGGCAAAGGG GACAAAACAAGGAGAGGCCACCACCTGTTCCCAACCCAGACTATGAGCCCATCCGGAAAGGCCAG CGGGACCTGTATTCTGGCCTGAATCAGAGACGCATC
243.	19 amino acid immunoglobulin leader peptide	artificial	aa	MGWSCIILFLVATATGVHS
244.	19 amino acid immunoglobulin leader peptide	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCC
245.	murine IgG1 heavy chain constant region	murine	aa	AKTTPPSVYPLAPGSAAQTNSMVTLGCLVKGYFPEPVTVTWNSGSLSSGVHTFPAVLQSDLYTLS SSVTVPSSTWPSETVTCNVAHPASSTKVDKKIVPRDCGCKPCICTVPEVSSVFIFPPKPKDVLTI TLTPKVTCVVVDISKDDPEVQFSWFVDDVEVHTAQTQPREEQFNSTFRSVSELPIMHQDWLNGKE FKCRVNSAAFPAPIEKTISKTKGRPKAPQVYTIPPPKEQMAKDKVSLTCMITDFFPEDITVEWQW NGQPAENYKNTQPIMDTDGSYFVYSKLNVQKSNWEAGNTFTCSVLHEGLHNHHTEKSLSHSPGK
246.	murine IgG1 heavy chain constant region	murine	nt	GCCAAAACGACACCCCCATCTGTCTATCCACTGGCCCCTGGATCTGCTGCCCAAACTAACTCCAT GGTGACCCTGGGATGCCTGGTCAAGGGCTATTTCCCTGAGCCAGTGACAGTGACCTGGAACTCTG GATCCCTGTCCAGCGGTGTGCACACCTTCCCAGCTGTCCTGCAGTCTGACCTCTACACTCTGAGC AGCTCAGTGACTGTCCCCTCCAGCACCTGGCCCAGCGACCGTCACCTGCAACGTTGCCCACCC GGCCAGCAGCACCAAGGTGGACAAGAAAATTGTGCCCAGGGATTGTGGTTGTAAGCCTTGCATAT GTACAGTCCCAGAAGTATCATCTGTCTTCATCTTCCCCCCAAAGCCCAAGGATGTGCTCACCATT ACTCTGACTCCTAAGGTCACGTGTGTTGTGGTAGACATCAGCAAGGATGATCCCGAGGTCCAGTT CAGCTGGTTTGTAGATGATGTGGAGGTGCACACAGCTCAGACGCAACCCCGGGAGGAGCAGTTCA ACAGCACTTTCCGCTCAGTCAGTGAACTTCCCATCATGCACCAGGACTGGCTCAATGGCAAGGAG TTCAAATGCAGGGTCAACAGTGCAGCTTTCCCTGCCCCCATCGAGAAAACCATCTCCAAAACCAA AGGCAGACCGAAGGCTCCACAGGTGTACACCATTCCACCTCCCAAGGAGCAGATGGCCAAGGATA AAGTCAGTCTGACCTGCATGATAACAGACTTCTTCCCTGAAGACATTACTGTGGAGTGGCAGTGG AATGGGCAGCCAGCGGAGAACTACAAGAACACTCAGCCCATCATGGACACAGATGGCTCTTACTT CGTCTACAGCAAGCTCAATGTGCAGAAGAGCAACTGGGAGGCAGGAAATACTTTCACCTGCTCTG TGTTACATGAGGGCCTGCACAACCACCACATACTGAGAAGAGCCTCTCCCACTCTCCTGGTAAA
247.	human lambda light chain constant region	human	aa	GQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVETTTPSKQSNNK YAASSYLSLTPEQWKSHKSYSCQVTHEGSTVEKTVAPTECS
248.	human lambda light chain constant region	human	nt	GGTCAGCCCAAGGCTGCCCCCTCGGTCACTCTGTTCCCACCCTCCTCTGAGGAGCTTCAAGCCAA CAAGGCCACACTGGTGTGTCTCATAAGTGACTTCTACCCGGGAGCCGTGACAGTGGCCTGGAAGG CAGATAGCAGCCCCGTCAAGGCGGGAGTGGAGACCACACCCTCCAAACAAAGCAACAACAAG

				TACGCGGCCAGCAGCTACCTGAGCCTGACGCCTGAGCAGTGGAAGTCCCACAAAGCTACAGCTG CCAGGTCACGCATGAAGGGAGCACCGTGGAGAAGACAGTGGCCCCTACAGAATGTTCA
249.	c-terminal domain construct of human MCSP	human	aa	DYKDDDDKSRTRSGSQLDGGLVLFSHRGTLDGGFRFRLSDGEHTSPGHFFRVTAQKQVLLSLKGS QTLTVCPGSVQPLSSQTLRASSSAGTDPQLLLYRVVRGPQLGRLFHAQQDSTGEALVNFTQAEVY AGNILYEHEMPPEPFWEAHDTLELQLSSPPARDVAATLAVAVSFEAACPQRPSHLWKNKGLWVPE GQRARITVAALDASNLLASVPSPQRSEHDVLFQVTQFPSRGQLLVSEEPLHAGQPHFLQSQLAAG QLVYAHGGGTQQDGFHFRAHLQGPAGASVAGPQTSEAFAITVRDVNERPPQPQASVPLRLTRGS RAPISRAQLSVVDPDSAPGEIEYEVQRAPHNGFLSLVGGGLGPVTRFTQADVDSGRLAFVANGSS VAGIFQLSMSDGASPPLPMSLAVDILPSAIEVQLRAPLEVFQALGRSSLSQQQLRVVSDREEPEA AYRLIQGPQYGHLLVGGRFTSAFSQFQIDQGEVVFAFTNSSSSHDHFRVLALARGVNASAVVNVT VRALLHVWAGGPWPQGATLRLDPTVLDAGELANRTDSVPRFRLLEGPRHGRVVRVPRARTEPGGS QLVEQFTQQDLEDGRLGLEVGRPEGRAPGPAGDSLTLELWAQGVPPAVASLDFATEPYNAARPYS VALLSVPEAARTEAGKPESSTPTGEPGPMASSPEPAVAKGGFLSFLEANMFSVIIPMCLVLLLLA LILPLLFYLRKRNKTGKHDVQVLTAKPRNGLAGDTETFRKVEPGQAIPLTAVPGQGPPPGGQPDP ELLQFCRTPNPALKNGQYWV
250.	c-terminal domain construct of human MCSP	human	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCGACTACAA AGACGATGACGACAAGTCCCGTACGAGATCTGGATCCCAATTGGACGGCGGGCTCGTGCTGTTCT CACACAGAGGAACCCTGGATGGAGGCTTCCGCTTCCGCCTCTCTGACGGCGAGCACACTTCCCCC GGACACTTCTTCCGAGTGACGGCCCAGAAGCAAGTGCTCCTCTCGCTGAAGAGGCAGCCAGACACT GACTGTCTGCCCAGGGTCCGTCCAGCCACTCAGCAGTCAGACCCTCAGGGCCAGCTCCAGCGCAG GCACTGACCCCCAGCTCCTGCTCTACCGTGTGGTGCGGGGCCCCCAGCTAGGCCGGCTGTTCCAC GCCCAGCAGGACAGCACAGGGGAGGCCCTGGTGAACTTCACTCAGGCAGAGGTCTACGCTGGAA TATTCTGTATGAGCATGAGATGCCCCCCGAGGCCCTTTGGGAGGCCCATGATACCCTAGAGCTCC AGCTGTCCTCGCCGCCTGCCCGGGACGTGGCCGCCACCCTTGCTGTGGCTGTGTCTTTGAGGCT GCCTGTCCCCAGCGCCCCAGCCACCTCTGGAAGAACAAAGGTCTCTGGGTCCCCGAGGGCCCAGCG GGCCAGGATCACCGTGGCTGCTCTGGATGCCTCCAATCTCTTGGCCAGCGTTCCATCACCCCAGC GCTCAGAGCATGATGTGCTCTTCCAGGTCACACAGTTCCCCAGCCGCGGCCAGCTGTTGGTGTCC GAGGAGCCCCCTCCATGCTGGGCAGCCCCCACTTCCTGCAGTCCCAGCTGGCTGCAGGGCAGCTAGT GTATGCCCCACGGCGGTGGGGGCACCCAGCAGGATGGCTTCCACTTTCGTGCCCACCTCCAGGGGC CAGCAGGGGCCTCCGTGGCTGGACCCCAAACCTCAGAGGCCTTTGCCATCACGGTGAGGGATGTA AATGAGCGGCCCCCCTCAGCCACAGGCCTCTGTCCCACTCCGGCTCACCCGAGGCTCTCGTGCCCC CATCTCCCCGGGCCCAGCTGAGTGTGGTGGACCCCAGACTCAGCTCCTGGGGAGATTGAGTACGAGG TCCAGCGGGCACCCCCACAACGGCTTCCTCAGCCTGGTGGGTGGTGGCCTGGGGCCCGTGACCCGC TTCACGCAAGCCGATGTGGATTCAGGGCGGCTGGCCTTCGTGGCCAACGGGAGCAGCGTGGCAGG CATCTTCCAGCTGAGCATGTCTGATGGGGCCAGCCCACCCCTGCCCATGTCCCTGGCTGTGGACA TCCTACCATCCGCCATCGAGGTGCAGCTGCGGGCACCCCCTGGAGGTGCCCCAAGCTTTGGGGCGC TCCTCACTGAGCCAGCAGCAGCTCCGGGTGGTTTCAGATCGGGAGGAGCCAGAGGCAGCATACCG

				GTTGATCCAGGGACCCCAGTATGGGCATCTCCTGGTGGGCGGGCGGCCCACCTCGGCCTTCAGCC AATTCCAGATAGACCAGGGCGAGGTGGTCTTTGCCTTCACCAACTCCTCCTCCTCTCATGACCAC TTCAGAGTCCTGGCACTGGCTAGGGGTGTCAATGCATCAGCCGTAGTGAACGTCACTGTGAGGGC TCTGCTGCATGTGTGGGCAGGTGGGCCATGGCCCCAGGGTGCCACCCTGCGCCTGGACCCCACCG TCCTAGATGCTGGCGAGCTGGCCAACCGCACAGACAGTGTGCCGCGCTTCCGCCTCCTGGAGGGA CCCCGGCATGGCCGCGTGGTCCGCGTGCCCCGAGCCAGGACGGAGCCCGGGGGCAGCCAGCTGGT GGAGCAGTTCACTCAGCAGGACCTTGAGGACGGGAGGCTGGGGCTGGAGGTGGGCAGGCCAGAGG GGAGGGCCCCCGGCCCCGCAGGTGACAGTCTCACTCTGGAGCTGTGGCACAGGGCGTCCCGCCT GCTGTGGCCTCCCCTGGACTTTGCCACTGAGCCTTACAATGCTGCCCGGCCCTACAGCGTGGCCCT GCTCAGTGTCCCCGAGGCCGCCCGGACGGAAGCAGGGAAGCCAGAGAGCAGCACCCCCACAGGCG AGCCAGGCCCCATGGCATCCAGCCCTGAGCCCGCTGTGGCCAAGGGAGGCTTCCTGAGCTTTCTA GAGGCCAACATGTTCAGCGTCATCATCCCCATGTGCCTGGTACTTCTGCTCCTGGCGCTCATCCT GCCCCTGCTCTTCTACCTCCGAAAACGCAACAAGACGGGCAAGCATGACGTCCAGGTCCTGACTG CCAAGCCCCCGCAACGGCCTGGCTGGTGACACCGAGACCTTTCGCAAGGTGGAGCCAGGCCAGGCC ATCCCGCTCACAGCTGTGCCTGGCCAGGGGCCCCCTCCAGGAGGCCAGCCTGACCCAGAGCTGCT GCAGTTCTGCCGGACACCCAACCCTGCCCTTAAGAATGGCCAGTACTGGGTG
251.	partial sequence of cynomolgus MCSP	cynomolgus	aa	PSNGRVVLRAAPGTEVRSFTQAQLDGGLVLFSHRGTLDGGFRFGLSDGEHTSSGHFFRVTAQKQV LLSLEGSRTLTVCPGSVQPLSSQTLRASSSAGTDPQLLLYRVVRGPQLGRLFHAQQDSTGEALVN FTQAEVYAGNILYEHEMPTEPTWEAHDTLELQLSSPPARDVAATLAVAVSFEAACPQRPSHLWKN KGLWVPEGQRAKITMAALDASNLLASVPSSQRLEHDVLFQVTQFPSRGQLLVSEEPLHAGQPHFL QSQLAAGQLVYAHGGGTQQDGFHFRAHLQGPAGATVAGPQTSEAFAITVRDVNERPPQPQASVP LRITRGSRAPISRAQLSVVDPDSAPGEIEYEVQRAPHNGFLSLVGGGPGPVNRFTQADVDSGRLA FVANGSSVAGVFQLSMSDGASPPLPMSLAVDILPSAIEVQLQAPLEVPQALGRSSLSQQQLRVVS DREEPEAAYRLIQGPKYGHLLVGGQPASAFSQLQIDQGEVVFAFTNFSSSHDHFRVLALARGVNA SAVVNITVRALLHVWAGGPWPQGATLRLDPTILDAGELANRTGSVPRFRLLEGPRHGRVVRVPRA RMEPGGSQLVEQFTQQDLEDGRLGLEVGRPEGRAPSPTGDSILTLELWAQGVPPAVASLDFATEPY NAARPYSVALLSVPEATRTEAGKPESSTPTGEPGPMASSPVPAVAKGGFLGFLEANMFSVIIPXC LVLLLLALILPLLFYLRKRNKTGKHDVQVLTAKPRNGLAGDTETFRKVEPGQAIPLTAVPGQGPP PGGQPDPELLQFCRTPNPALKNGQYWV
252.	partial sequence of cynomolgus MCSP	cynomolgus	nt	CCCAGCAACGGACGGGTAGTGCTGCGGGCGGCCGGGCACCGAGGTGCGCAGCTTCACGCCAGGC CCAGCTGGATGGCGGACTCGTGCTGTTCTCACACAGAGGAACCCTGGATGGAGGCTTCCGCTTCG GCCTCTCCGATGGCGAGCACACTCCTCTGGACACTTCTTCCGAGTGACGGCCCAGAAGCAAGTG CTCCTCTCGCTGGAGGGCAGCCGGACACTGACTGTCTGCCCAGGGTCCGTGCAGCCACTCAGCAG TCAGACCCTCAGAGCCAGCTCCAGCGGCAGGCACCGACCCCCAGCTCCTGCTCTACCGTGTGGTGC GGGGCCCCCAGCTAGGCCGGCTGTTCCATGCCCAGCAGGACAGGCACACAGGGGAGGCCCTGGTGAAC TTCACTCAGGCAGAGGTCTATGCTGGGAATATTCTGTATGAGCATGAGATGCCCACCGAGCCCTT CTGGGAGGCCCATGATACCCTAGAGCTCCAGCTGTCCTCACCACCTGCCCGGGACGTGGCTGCCA

				CCCTTGCTGTGGCTGTCTTTTTGAGGCTGCCTGTCCCCAGCGCCCCAGCCACCTCTGGAAGAAC AAAGGTCTCTGGGTCCCCGAGGGCCAGCGGGCCAAGATCACCATGGCTGCCCTGGATGCCTCCAA CCTCTTGGCCAGCGTTCCATCATCCCAGCGCCTAGAGCATGATGTGCTCTTCCAGGTCACGCAGT TCCCCAGCCGGGGCCAGCTATTGGTGTCTGAGGAGCCCCTCCACGCTGGGCAGCCCCACTTCCTG CAGTCCCAGCTGGCTGCAGGGCAGCTAGTGTATGCCCACGGCGGTGGGGGTACCCAACAGGATGG CTTCCACTTTCGTGCCCACCTCCAGGGGCCAGCAGGGGCCACCGTGGCTGGACCCCAAACCTCAG AGGCTTTTGCCATCACGGTGCGGGATGTAAATGAGCGGCCCCCTCAGCCACAGGCCTCTGTCCCA CTCCGGATCACCCGAGGCTCTCGAGCCCCCATCTCCCGGGCCCAGCTGAGTGTCGTGGACCCAGA CTCAGCTCCTGGGGAGATTGAGTATGAGGTCCAGCGGGCACCCCACAACGGCTTCCTCAGCCTGG TGGGTGGTGGCCCGGGGCCCGTGAACCGCTTCACGCAAGCCGATGTGGATTCGGGGCGGCTGGCC TTCGTGGCCAACGGGAGCAGCGTAGCAGGCGTCTTCCAGCTGAGCATGTCTGATGGGGCCAGCCC ACCGCTGCCCATGTCCCTGGCCGTGGACATCCTACCATCCGCCATCGAGGTGCAGCTGCAGGCAC CCCTGGAGGTGCCCCAAGCTTTGGGGCGCTCCTCACTGAGCCAGCAGCAGCTCCGGGTGGTTTCA GATAGGGAGGAGCCAGAGGCAGCATACCGCCTCATCCAGGGACCAAAGTACGGGCATCTCCTGGT GGGTGGGCAGCCCGCCTCGGCCTTCAGCCAACTCCAGATAGACCAGGGCGAGGTGGTCTTTGCCT TCACCAACTTCTCCTCCTCTCATGACCACTTCAGAGTCCTGGCACTGGCTAGGGGTGTCAACGCA TCAGCCGTAGTGAACATCACTGTGAGGGCTCTGCTGCACGTGTGGGCAGGTGGGCCATGGCCCCA GGGTGCTACCCTGCGCCTGGACCCAACCATCCTAGATGCTGGCGAGCTGGCCAACCGCACAGGCA GTGTGCCCCCGCTTCCGCCTCCTGGAGGGACCCCGGCATGGCCCGCGTGGTCCGTGTGCCCCGAGCC AGGATGGAGCCTGGGGGCAGCCAGCTGGTGGAGCAGTTCACTCAGCAGGACCTTGAGGATGGGAG GCTGGGGCTGGAGGTGGGCAGGCCAGAGGGAAGGGCCCCCCAGCCCCACAGGCGACAGTCTCACTC TGGAGCTGTGGGCACAGGGCGTCCCACCTGCTGTGGCCTCCCCTGGACTTTGCCACTGAGCCTTAC AATGCTGCCCCGGCCCTACAGCGTGGCCCTGCTCAGTGTCCCCGAGGCCACCCGGACGGAAGCAGG GAAGCCAGAGAGCAGCACCCCCCACAGGCGAGCCCAGGCCCCCATGGCATCTAGCCCTGTGCCTGCTG TGGCCAAGGGAGGCTTCCTGGGCTTCCTTGAGGCCAACATGTTCAGTGTCATCATCCCCRTGTGC CTGGTCCTTCTGCTCCTGGCGCTCATCTTGCCCCTGCTCTTCTACCTCCGAAAACGCAACACAAGAC GGGCAAGCATGACGTCCAGGTCCTGACTGCCAAGCCCCGCAATGGTCTGGCTGGTGACACTGAGA CCTTTCGCAAGGTGGAGCCAGGCCAGGCCATCCCGCTCACAGCTGTGCCTGGCCAGGGGCCCCCT CCGGGAGGCCAGCCTGACCCAGAGCTGCTGCAGTTCTGCCGGACACCCAACCCTGCCCTTAAGAA TGGCCAGTACTGGGTG
253.	PCR primer for CD3ε chain - forward primer	artificial	nt	AGAGTTCTGGGCCTCTGC
254.	PCR primer for CD3ε chain - reverse primer	artificial	nt	CGGATGGGCTCATAGTCTG
255.	His6-human CD3ε	artificial	aa	HHHHHHQDGNEEMGGITQTPYKVSISGTTVILTCPQYPGSEILWQHNDKNIGGDEDDKNIGSDED

				HLSLKEFSELEQSGYYVCYPRGSKPEDANFYLYLRARVCENCMEMDVMSVATIVIVDICITGGLL LLVYYWSKNRKAKAKPVTRGAGAGGRQRGQNKERPPPVPNPDYEPIRKGQRDLYSGLNQRRI
256.	His6-human CD3ε	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCATCATCA CCATCATCATCAAGATGGTAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTCTCCA TCTCTGGAACCACAGTAATATTGACATGCCCTCAGTATCCTGGATCTGAAATACTATGGCAACAC AATGATAAAAACATAGGCGGTGATGAGGATGATAAAAACATAGGCAGTGATGAGGATCACCTGTC ACTGAAGGAATTTTCAGAATTGGAGCAAAGTGGTTATTATGTCTGCTACCCCAGAGGAAGCAAAC CAGAAGATGCGAACTTTTATCTCTACCTGAGGGCACGCGTGTGTGAGAACTGCATGGAGATGGAT GTGATGTCGGTGGCCACAATTGTCATAGTGGACATCTGCATCACTGGGGGCTTGCTGCTGCTGGT TTACTACTGGAGCAAGAATAGAAAGGCCAAGGCCAAGCCTGTGACACGAGGAGCGGGTGCTGGCG GCAGGCAAAGGGGACAAAACAAGGAGAGGCCACCACCTGTTCCCAACCCAGACTATGAGCCCATC CGGAAAGGCCAGCGGGACCTGTATTCTGGCCTGAATCAGAGACGCATC
257.	CD33 AH3 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVRQAPGQGLEWMGWINTYTGEPTYADDFK GRVTMSSDTSTSTAYLEINSLRSDDTAIYYCARWSWSDGYYVYFDYWGQGTTVTVSSggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
258.	CD33 AH3 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAAAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAGGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGTCTTCGGATACCTCTACCAGCACTGCCTATTTGGAAATCAACAGCCTCAG AAGTGATGACACGGCTATATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG

				CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
259.	CD33 AH3 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVRQAPGQGLEWMGWINTYTGEPTYADDFK GRVTMSSDTSTSTAYLEINSLRSDDTAIYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggggg ggggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
260.	CD33 AH3 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAAAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAGGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGTCTTCGGATACCTCTACCAGCACTGCCTATTTGGAAATCAACAGCCTCAG AAGTGATGACACGGCTATATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACCGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA

				GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
261.	CD33 AH3 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVRQAPGQGLEWMGWINTYTGEPTYADDFK GRVTMSSDTSTSTAYLEINSLRSDDTAIYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
262.	CD33 AH3 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAAAAGCCTGGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAGGCAGGCTCCAGGACAGG GTTTAGAGTGGGATGGGCTGGATAAACACCCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGTCTTCGGATACCTCTACCAGCACTGCCTATTTGGAAATCAACAGCCTCAG AAGTGATGACACGGCTATATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
263.	CD33 AF5 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS

				TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
264.	CD33 AF5 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACCGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACACTCACTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
265.	CD33 AF5 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL

266.	CD33 AF5 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACCGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
267.	CD33 AF5 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
268.	CD33 AF5 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT

				TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
269.	CD33 AC8 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTTDTSTSTAYMEIRNLRNDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggsggg gsgggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
270.	CD33 AC8 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAATGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC

				TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
271.	CD33 AC8 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTTDTSTSTAYMEIRNLRNDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
272.	CD33 AC8 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAATGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCCACATATTATGCCGATTCAGTGAAAGGCAGG

				TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
273.	CD33 AC8 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTTDTSTSTAYMEIRNLRNDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
274.	CD33 AC8 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAATGATGACACGGCTGTATATTACTGTGCCGCGGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG

				TCCAACACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
275.	CD33 AH11 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTSDTSTSTAYMEISSLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
276.	CD33 AH11 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATATGGAAATCAGCAGCCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGGCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
277.	CD33 AH11 HL x	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK

	F12Q HL			GRVTMTSDTSTSTAYMEISSLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg ggsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
278.	CD33 AH11 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATATGGAAATCAGCAGCCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
279.	CD33 AH11 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFK GRVTMTSDTSTSTAYMEISSLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg ggsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG

				SGGGGSQTVVTQEPSLLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
280.	CD33 AH11 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAAAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAG GGACGGGTTACCATGACTTCGGATACCTCTACCAGCACTGCCTATATGGAAATCAGCAGCCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
281.	CD33 B3 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggsggg gsggggsDIVMTQSPDSMTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLDIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
282.	CD33 B3 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGACAAACTATGCTGATAAGTTCCAG

				GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA
				AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT
				TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC
				GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCATGACTGTGTCTCT
				GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA
				ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT
				ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC
				TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA
				TCACCTTTGGCCAAGGGACACGACTGGACATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG
				GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG
				ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG
				TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG
				TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA
				GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG
				CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC
				TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG
				AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG
				TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT
				ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA
				GCCAGAGGATGAGGCAGAATATTACTGTGTCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG
				GAACCAAACTGACTGTCCTA
283.	CD33 B3 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ
				GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggggg
				gsggggsDIVMTQSPDSMTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKFGQPPKLLLSWAS
				TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLDIKSGGGGSEVQL
				VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR
				FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG
				SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG
				TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
284.	CD33 B3 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG
				CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG
				GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGACAAACTATGCTGATAAGTTCCAG
				GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA
				AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT
				TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC
				GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCATGACTGTGTCTCT
				GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA

				ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGACATTAAATCCGGAGGTGGTGGCCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
285.	CD33 B3 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsgggggsDIVMTQSPDSMTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLDIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
286.	CD33 B3 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCCAGGACAGG GTTTAGAGTGGGATGGGCTGGATAAACACCTACACTGGAGAGACAAACTATGCTGATAAGTTCCAG GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCCGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCATGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGACATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG

				ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
287.	CD33 F2 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggsggg gsggggsDIVMTQSPDSLSVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
288.	CD33 F2 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGGATGGGCTGGATAAACACCTACACTGGAGAGACAAACTATGCTGATAAGTTCCAG GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGTCTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC

				TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
289.	CD33 F2 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLSVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGSGGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
290.	CD33 F2 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACACTGGAGAGACAAACTATGCTGATAAGTTCCAG GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA AAGTGATGACACGGCTGTATATTACTGTGCGGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCCAGACTCCCTGTCTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG

				GAACCAAACTGACTGTCCTA
291.	CD33 F2 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGETNYADKFQ GRVTFTSDTSTSTAYMELRNLKSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLSVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
292.	CD33 F2 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGACAAACTATGCTGATAAGTTCCAG GGACGCGTTACCTTCACTTCGGATACCTCTACCAGCACTGCCTATATGGAACTCCGCAACCTCAA AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGTCTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTAGACAGCTCCACGAATAAGA AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCCACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
293.	CD33 B10 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSNNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDGLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL

				VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
294.	CD33 B10 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGTGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAACAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGTTCTGGGACAGATTTCACTCTCAC TATTGACGGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
295.	CD33 B10 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSNNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDGLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
296.	CD33 B10 HL x	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGTGAGTCAGTCAAGGTCTCCTG

	F12Q HL			CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAACAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGTTCTGGGACAGATTTCACTCTCAC TATTGACGGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACCGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCCACATATTATGCCGATTCAGTGAAAGGCAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
297.	CD33 B10 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSgggggggg gsgggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSNNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDGLQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
298.	CD33 B10 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGGTCAGTCAAGGTCTCCTGC AAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCAG AAGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC

				GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTAGACAGCTCCAACAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGTTCTGGGACAGATTTCACTCTCAC TATTGACGGCCTGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCCACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
299.	CD33 E11 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLGGDDTAVYYCARWSWSDGYYVYFDYWGQGTSVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLLSWAS TRESGIPDRFSGSGSGTDFTLTIDSPQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
300.	CD33 E11 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCGG AGGTGATGACACGGCGTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTTCGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCCGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA

				TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
301.	CD33 E11 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLGGDDTAVYYCARWSWSDGYYVYFDYWGQGTSVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSPQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
302.	CD33 E11 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCGG AGGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTTCGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCCGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTCCAGCCACTTCCCGA TCACCTTTGGCCAAGGGACACGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA

				GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
303.	CD33 E11 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGESVKVSCKASGYTFTNYGMNWVKQAPGQGLEWMGWINTYTGEPTYADKFQ GRVTMTTDTSTSTAYMEIRNLGGDDTAVYYCARWSWSDGYYVYFDYWGQGTSVTVSSgggggsggg gsggggsDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSTNKNSLAWYQQKPGQPPKLLISWAS TRESGIPDRFSGSGSGTDFTLTIDSPQPEDSATYYCQQSAHFPITFGQGTRLEIKSGGGSEVQL VESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDR FTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGG SGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPG TPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
304.	CD33 E11 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTGCAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGAGTCAGTCAAGGTCTCCTG CAAGGCTAGCGGGTATACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGG GTTTAGAGTGGATGGGCTGGATAAACACCTACACTGGAGAGCCAACCTATGCTGATAAGTTCCAG GGACGCGTTACCATGACTACGGATACCTCTACCAGCACTGCCTATATGGAAATCCGCAACCTCGG AGGTGATGACACGGCTGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACT TTGACTACTGGGGCCAAGGCACTTCGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCT GGGCGAGAGGACCACCATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAACGAATAAGA ACTCCTTAGCTTGGTACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCT ACGCGGGAATCCGGGATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCAC TATTGACAGCCCGCAGCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGA TCACCTTTGGCCAAGGGACACCGACTGGAGATTAAATCCGGAGGTGGTGGCTCCGAGGTGCAGCTG GTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGG ATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGG TTGCTCGCATAAGAAGTAAATATAATTATGCCACAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGA GGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGG CTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGC TCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGG AACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGT

				ACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACA GCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAG GAACCAAACTGACTGTCCTA
305.	CD33	human	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCGATCCAAA TTTCTGGCTGCAAGTGCAGGAGTCAGTGACGGTACAGGAGGGTTTGTGCGTCCTCGTGCCCTGCA CTTTCTTCCATCCCATACCCTACTACGACAAGAACTCCCCAGTTCATGGTTACTGGTTCCGGGAA GGAGCCATTATATCCGGGGACTCTCCAGTGGCCACAAACAAGCTAGATCAAGAAGTACAGGAGGA GACTCAGGGCAGATTCCGCCTCCTTGGGATCCCAGTAGGAACAACTGCTCCCTGAGCATCGTAG ACGCCAGGAGGAGGGATAATGGTTCATACTTCTTTCGGATGGAGAGGAGGAAGTACCAAATACAGT TACAAATCTCCCCAGCTCTCTGTGCATGTGACAGACTTGACCCACACAGGCCCAAAATCCTCATCCC TGGCACTCTAGAACCCGGCCACTCCCAAAAACCTGACCTGCTCTGTGTCCTGGGCCTGTGAGCAGG GAACACCCCCGATCTTCTCCTGGTTGTCAGCTGCCCCCACCTCCCTGGGCCCCAGGACTACTCAC TCCTCGGTGCTCATAATCACCCCCACGGCCCCAGGACCACGGCACCAACCTGACCTGTCAGGTGAA GTTCGCTGGAGCTGGTGTGACTACGGAGAGAACCATCCAGCTCAACGTCACCTATGTTCCACAGA ACCCAACAACTGGTATCTTTCCAGGAGATGGCTCAGGGAAACAAGAGACCAGAGCAGGAGTGGTT CATGGGGCCATTGGAGAGGCTGGTGTTACAGCCCTGCTCGCTCTTTGTCTCTGCCTCATCTTCTT CATAGTGAAGACCCACAGGAGGAAGCAGCCAGGACAGCAGTGGGCAGGAATGACACCCACCCTA CCACAGGGTCAGCCTCCCCGAAACACCAGAAGAAGTCCAAGTTACATGGCCCCACTGAAACCTCA AGCTGTTCAGGTGCCGCCCCTACTGTGGAGATGGATGAGGAGCTGCATTATGCTTCCCTCAACTT TCATGGGATGAATCCTTCCAAGGACACCTCCACCGAATACTCAGAGGTCAGGACCCAGTCCGGGC ATCATCACCATCATCATTGA
306.	CD33	human	aa	MGWSCIILFLVATATGVHSDPNFWLQVQESVTVQEGLCVLVPCTFFHPIPYYDKNSPVHGYWFRE GAIISGDSPVATNKLDQEVQEETQGRFRLLGDPSRNNCSLSIVDARRRDNGSYFFRMERGSTKYS YKSPQLSVHVTDLTHRPKILIPGTLEPGHSKNLTCSVSWACEQGTPPIFSWLSAAPTSLGPRTTH SSVLIITPRPQDHGTNLTCQVKFAGAGVTTERTIQLNVTYVPQNPTTGIFPGDGSGKQETRAGVV HGAIGGAGVTALLALCLCLIFFIVKTHRRKAARTAVGRNDTHPTTGSASPKHQKKSKLHGPTETS SCSGAAPTVEMDEELHYASLNFHGMNPSKDTSTEYSEVRTQSGHHHHHH
307.	CD33	macaque	nt	ATGCCGCTGCTGCTACTGCTGCCCCTGGTGGGCAGGGGCCCTGGCTATGGATCCAAGAGTCAG GCTGGAAGTGCAGGAGTCAGTGACAGTACAGGAGGGTTTGTGCGTCCTTGTGCCCTGCACTTTCT TCCATCCCGTACCCTACCACACCAGGAATTCCCCAGTTCATGGTTACTGGTTCCGGGAAGGAGCCC ATTGTATCCTTGGACTCTCCAGTGGCCACAAACACAAGCTAGATCAGGAGGAGACCCA GGGCCGATTCCGCCTCCTTGGGGATCCCAGTAGGAACAACTGCTCCCTGAGCATCGTAGATGCCA GGAGGAGGGATAACGGTTCATACTTCTTTCGGATGGAGAAAGGAAGTACCAAATACAGTTACAAA TCTACCCAGCTCTCTGTGCATGTGACAGACTTGACCCACAGGCCCCAAATCCTCATCCCTGGAGC CCTAGACCCTGACCACTCCAAAAACCTGACCTGCTCTGTGCCCTGGGCCTGTGAGCAGGGAACAC CTCCAATCTTCTCCTGGATGTCAGCTGCCCCCACCTCCCTGGGCCTCAGGACCACTCACTCCTCG GTGCTCATAATCACCCCCACGGCCCCAGGACCACGGCACCAACCTCACCTGTCAGGTGAAGTTCCC

				TGGAGCTGGCGTGACCACGGAGAGAACCATCCAGCTCAATGTCTCCTATGCTTCACAGAACCCAA GAACTGATATCTTCTAGGAGACGGCTCAGGGAAACAAGGAGTGGTTCAGGGAGCCATCGGGGA GCTGGTGTCACAGTCCTGCTCGCTCTTTGTCTCTGCCTCATCTTCTTCACAGTGAAGACTCACAG GAGGAAAGCAGCCAGGACAGCAGTGGGCAGGATCGACACCCACCCCGCCACAGGGCCAACATCCT CGAAACACCAGAAGAAGTCCAAGTTACATGGCGCCACTGAAACCTCAGGCTGTTCAGGTACCACC CTTACTGTGGAGATGGATGAGGAGCTGCACTACGCTTCCCTCAACTTTCATGGGATGAATCCTTC TGAGGACACCTCCACCGAATACTCAGAGGTCAGGACCCAGTGA
308.	CD33	macaque	aa	MPLLLLLPLLWAGALAMDPRVRLEVQESVTVQEGLCVLVPCTFFHPVPYYHTRNSPVHGYWFREGA IVSLDSPVATNKLDQEVQEETQGRFRLLGDPSRNNCSLSIVDARRRDNGSYFFRMEKGSTKYSYK STQLSVHVTDLTHRPQILIPGALDPDHSKNLTCSVPWACEQGTPPIFSWMSAAPTSLGLRTTHSS VLIITPRPQDHGTNLTCQVKFPGAGVTTERTIQLNVSYASQNPRTDIFLGDGSGKQGVVQGAIGG AGVTVLLALCLCLIFFTVKTHRRKAARTAVGRIDTHPATGPTSSKHQKKSKLHGATETSGCSGTT LTVEMDEELHYASLNFHGMNPSEDTSTEYSEVRTQ
309.	1-27 CD3-Fc + Leader	artificial	nt	ATGGGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACAGGTGTACACTCCCAAGATGG TAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTCTCCATCTCTGGAACCACAGTAA TATTGACATCCGGAGAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCT GAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTC CCGGACCCCTGAGGTCACATGCGTGGTGGACGTGAGCCACGAAGACCCTGAGGTCAAGTTCA ACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAGTACAAC AGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTA CAAGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAG GGCAGCCCCGAGAACCACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAG GTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAA TGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACTCCGACGGCTCCTTCTTCC TCTATAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTCCGTG ATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCCCCGGGTAAATAG
310.	1-27 CD3-Fc + Leader	artificial	aa	MGWSCIILFLVATATGVHSQDGNEEMGGITQTPYKVSISGTTVILTSGEPKSCDKTHTCPPCPAP ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYN STYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSREEMTKNQ VSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSV MHEALHNHYTQKSLSLSPGK
311.	CD33 UD H2C HL x AF5 HL	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVLSGGGGSQVQLV QSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFKGRVTM TSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSGGGGSGGGGSGGG

				GSDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWASTRESG IPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIK
312.	CD33 UD H2C HL x AF5 HL	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACT ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGG TGTTCGGTGGAGGAACCAAACTGACTGTCCTATCCGGAGGTGGTGGCTCCCAGGTGCAGCTGGTC CAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTGCAAGGCTAGCGGGTA TACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGGGTTTAAAGTGGATGG GCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAGGGACGGGTTACCATG ACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAGAAGTGATGACACGGC TGTATATTACTGTGCGCGCTGGAGTTGGAGTGATGGTTACTACGTTTACTTTGACTACTGGGGCC AAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGACCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGAACTCCTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCTACGCGGGAATCCGGG ATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACTATTGACAGCCTGCA GCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGATCACCTTTGGCCAAG GGACACGACTGGAGATTAAA
313.	CD33 UD F12Q HL x AF5 HL	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS VKGRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGS GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVLSGGGGSQVQLV QSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFKGRVTM TSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWASTRESG IPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIK
314.	CD33 UD F12Q HL x AF5 HL	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG TGCAGCCTCTGGATTCACCTTCAATAGCTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA

				GTGAAAGGCAGGTTCACCATCTCCAGAGATGATTCAAAAACACTGCCTATCTACAAATGAACAA
				CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACG
				TTTCCTGGTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT
				GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT
				ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACT
				ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTC
				CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT
				CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGG
				TGTTCGGTGGAGGAACCAAACTGACTGTCCTATCCGGAGGTGGTGGCTCCCAGGTGCAGCTGGTC
				CAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTGCAAGGCTAGCGGGTA
				TACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGGGTTTAAAGTGGATGG
				GCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAGGGACGGGTTACCATG
				ACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAGAAGTGATGACACGGC
				TGTATATTACTGTGCCGCCTGGAGTTCGATGGTTACTACGTTTACTTTGACTACTGGGGCC
				AAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGACCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGAACTCCTTAGCTTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCTACGCGGGAATCCGGG
				ATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACTATTGACAGCCTGCA
				GCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGATCACCTTTGGCCAAG
				GGACACGACTGGAGATTAAA
315.	CD33 UD I2C HL x AF5 HL	artificial	aa	EVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADS
				VKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGS
				GGGGSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKF
				LAPGTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVLSGGGGSQVQLV
				QSGAEVKKPGASVKVSCKASGYTFTNYGMNWVKQAPGQGLKWMGWINTYTGEPTYADDFKGRVTM
				TSDTSTSTAYLELHNLRSDDTAVYYCARWSWSDGYYVYFDYWGQGTTVTVSSGGGGSGGGGSGGG
				GSDIVMTQSPDSLTVSLGERTTINCKSSQSVLDSSKNKNSLAWYQQKPGQPPKLLLSWASTRESG
				IPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQSAHFPITFGQGTRLEIK
316.	CD33 UD I2C HL x AF5 HL	artificial	nt	GAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATG
				TGCAGCCTCTTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG
				GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA
				GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAA
				CTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACA
				TATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCT
				GGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGT
				ATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCCTGTTACATCTGGCAACT

				ACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTC
				CTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCT
				CTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGG
				TGTTCCGGTGGAGGAACCAAACTGACTGTCCTATCCGGAGGTGGTGGCTCCCAGGTGCAGCTGGTC
				CAGTCTGGAGCTGAGGTGAAGAAGCCTGGAGCGTCAGTCAAGGTCTCCTGCAAGGCTAGCGGGTA
				TACCTTCACAAACTATGGAATGAACTGGGTGAAGCAGGCTCCAGGACAGGGTTTAAAGTGGATGG
				GCTGGATAAACACCTACACTGGAGAGCCAACATATGCTGATGACTTCAAGGGACGGGTTACCATG
				ACTTCGGATACCTCTACCAGCACTGCCTATTTGGAACTCCACAACCTCAGAAGTGATGACACGGC
				TGTATATTACTGTGCGCGCTGGAGTTGGATGGTTACTACGTTTACTTTGACTACTGGGGCCC
				AAGGCACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGACCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTTTTAGACAGCTCCAAGAATAAGAACTCCTTAGCTTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAATTACTCCTTTCCTGGGCATCTACGCGGGAATCCGGG
				ATCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACTATTGACAGCCTGCA
				GCCTGAAGATTCTGCAACTTACTATTGTCAACAGTCTGCCCACTTCCCGATCACCTTTGGCCAAG
				GGACACGACTGGAGATTAAA
317.	MCSP-A9 HL x H2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYPFTGYYMHWVRQAPGQGLEWMGWINPNSGGTNYAQKFQ
				GRVTITADESTSTAYMELSRLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG
				GSDIVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG
				VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHFNTPFAFGQGTKLEIKSGGGGSEVQLVESGG
				GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR
				DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG
				SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGYYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF
				SGSLLGGKAALTLSGVQPEDEAEYYCALWYSNRWVFGGGTKLTVL
318.	MCSP-A9 HL x H2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG
				CAAGGCTTCTGGATACCCCTTCACCGGCTACTACATGCACTGGGTGCGACAGGCCCCTGGACAAG
				GGCTTGAGTGGGATGGGATGGATCAACCCTAACAGTGGTGGCACACAAACTATGCACAGAAGTTCAG
				GGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAGCCTACATGGAGCTGAGCAGGCTGAG
				ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG
				GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA
				GGCTGAAGATGTGGCGGTTTATTACTGTCAACAACATTTAATACTCCGTTCGCTTTTGGCCAGG
				GGACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA
				GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA

				GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCTACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGCTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
319.	MCSP-A9 HL x F12Q HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYPFTGYYMHWVRQAPGQGLEWMGWINPNSGGTNYAQKFQ GRVTITADESTSTAYMELSRLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHFNTPFAFGQGTKLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNSYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKGRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYVSWWAYWGQGTLVTVSSGGGGSGGGGSGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
320.	MCSP-A9 HL x F12Q HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG CAAGGCTTCTGGATACCCCTTCACCGGCTACTACATGCACTGGGTGCGACAGGCCCCTGGACAAG GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACAAACTATGCACAGAAGTTTCAG GGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAGCCTACATGGAGCTGAGCAGGCTGAG ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA GGCTGAAGATGTGGCGGTTTATTACTGTCAACAACATTTATACTCCGTTCGCTTTGGCCAGG GGACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAG CTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGGCAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACGTTTCCTGGTGGGCCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTGGT

				TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC
				TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG
				GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC
				TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCCAGAGGATGAGGC
				AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG
				TCCTA
321.	MCSP-A9 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKVSCKASGYPFTGYYMHWVRQAPGQGLEWMGWINPNSGGTNYAQKFQ
				GRVTITADESTSTAYMELSRLRSDDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG
				GSDIVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG
				VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHFNTPFAFGQGTKLEIKSGGGGSEVQLVESGG
				GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR
				DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG
				SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF
				SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
322.	MCSP-A9 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAAGCCTGGGGCCTCAGTGAAGGTCTCCTG
				CAAGGCTTCTGGATACCCCTTCACCGGCTACTACATGCACTGGGTGCGACAGGCCCCTGGACAAG
				GGCTTGAGTGGATGGGATGGATCAACCCTAACAGTGGTGGCACAAACTATGCACAGAAGTTTCAG
				GGCAGAGTCACGATTACCGCGGACGAATCCACGAGCACAGCCTACATGGAGCTGAGCAGGCTGAG
				ATCTGACGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC
				AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT
				GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC
				CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT
				ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG
				GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA
				GGCTGAAGATGTGGCGGTTTATTACTGTCAACAACATTTTAATACTCCGTTCGCTTTTGGCCAGG
				GGACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA
				GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA
				GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA
				GTAAATATAATAATTATATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA
				GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA
				CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG
				GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTT
				TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC
				TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG
				GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC
				TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC
				AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG

				TCCTA
323.	MCSP-C8 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISGLQAEDVAVYYCQQHYSTPFTFGPGTKVDIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
324.	MCSP-C8 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGGTCTCTGGCGGCGCTCCGGTGGTGGT GGCAGAGTCACCATGACCAGGGACACCGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCAAGAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGTGGCCTGCA GGCTGAAGATGTGGCAGTTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCCTG GGACCAAAGTGGATATCAAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCCACATATTATGCCGATTCAGTGAAGACAGGTTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
325.	MCSP-B8 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGSGGGGSGGG GSDIVMTQSPDSLTVSPGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQHYSTPFTFGQGTRLEIKSGGGGSGGGGSEVQLVESGG

				GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
326.	MCSP-B8 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGACTGTGTCTCCGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCAAGAACACTAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GCCTGAAGATAGTGCAACTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCAGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
327.	MCSP-B7 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCARKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLTVSLGERTTINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQPEDIATYYCQQHYSTPFTFGQGTRLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
328.	MCSP-B7 HL x I2C	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG

	HL			CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGACCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCAAGAACACTAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GCCTGAAGATATTGCAACTTATTACTGTCAGCAACATTATAGTACTCCCATTCACTTTTGGCCAGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
329.	MCSP-G8 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLTVSLGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQHYSTPFTFGQGTRLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
330.	MCSP-G8 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT

				GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCAAGAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GCCTGAAGATAGTGCAACTTATTACTGTCAGCAACATTATAGTACTCCCATTCACTTTTGGCCAGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCCACATATTATGCCGATTCAGTGAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
331.	MCSP-D5 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQAEDSATYYCQQHYSTPFTFGQGTRLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
332.	MCSP-D5 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCAAGAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GGCTGAAGATAGTGCAACTTATTACTGTCAGCAACATTATAGTACTCCCATTCACTTTTGGCCAGG

				GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
333.	MCSP-F7 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDVLQPEDIATYYCQQHYSTPFTFGQGTKLEIKSGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
334.	MCSP-F7 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGGTTGGATCAACCCTAACAGTGGTGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAAACAGCAAGAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATGTCCTGCA GCCTGAAGATATTGCAACTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTCGGCCAGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA

				CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
335.	MCSP-G5 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLAVSLGDRATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQPEDSATYYCQQHYSTPFTFGQGTRLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
336.	MCSP-G5 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACCGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGACAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCAAGAACACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GCCTGAGGATAGTGCAACTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCAGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC

				TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
337.	MCSP-F8 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGGSGGGGSGGG GSDIVMTQSPDSLTVSLGERATINCKSSQSVLNSKNNRNYLAWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTIDSLQAEDSAIYYCQQHYSTPFTFGQGTRLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
338.	MCSP-F8 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACCCAGTCTCCAGACTCCCTGACTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTTTTAACAGCAAGAACAATAGGAACTACTTAGCTTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGCTGCTCATTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCGATTCCCTGCA GGCTGAAGATAGTGCAATTTATTACTGTCAGCAACATTATAGTACTCCATTCACTTTTGGCCAGGG GGACCAGACTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
339.	MCSP-G10 HL x I2C HL	artificial	aa	QVQLVQSGAEVKRPGASMKVSCKASGYTFTNYYIHWVRQAPGQGLEWMGWINPNSGATNYAQKFQ GRVTMTRDTSTSTVYMELSSLRSEDTAVYYCAKSWVSWFASWGQGTLVTVSSGGGSGGGGSGGG

					GSDIVMTQSPDSLAVSLGERATINCKSSQSVLSSSNNKNYLNWYQQKPGQPPKLLIYWASTRESG VPDRFSGSGSGTDFTLTISSLQAEDVAVYYCQQHFNTPFAFGQGTKLEIKSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
340.	MCSP-G10 HL x I2C HL	artificial	nt		CAGGTGCAGCTGGTCCAGTCTGGGGCTGAGGTGAAGAGGCCTGGGGCCTCAATGAAGGTCTCCTG CAAGGCTTCTGGGTACACCTTCACCAACTACTATATACACTGGGTGCGACAGGCCCCTGGACAAG GTCTTGAGTGGATGGGTTGGATCAACCCTAACAGTGGTGCCACAAACTATGCACAGAAGTTCCAG GGCAGAGTCACCATGACCAGGGACACCGTCCACGAGCACAGTCTACATGGAGCTGAGCAGCCTGAG ATCTGAGGACACGGCCGTGTATTACTGTGCGAAATCCTGGGTCTCCTGGTTTGCTTCCTGGGGTC AAGGAACCTTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTGACATCGTGATGACACAGTCTCCAGACTCCCTGGCTGTGTCTCTGGGCGAGAGGGCCAC CATCAACTGCAAGTCCAGCCAGAGTGTCTTATCCAGCTCCAACAATAAGAACTACTTAAATTGGT ACCAGCAGAAACCAGGACAGCCTCCTAAGTTGCTCATTTACTGGGCATCTACCCGGGAATCCGGG GTCCCTGACCGATTCAGTGGCAGCGGGTCTGGGACAGATTTCACTCTCACCATCAGCAGCCTGCA GGCTGAAGATGTGGCGGTTTATTACTGTCAACAACATTTTAATACTCCGTTCGCTTTTGGCCAGG GGACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATATGCAACATATTATGCCGATTCAGTGAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
341.	Human CD3ε 1-8 (N-terminus)	human	aa		QDGNEEMG
342.	*Saimiri sciureus* CD3ε 1-8 (N-terminus)	*Saimiri sciureus*	aa		QDGNEEIG
343.	Thioate-modified CpG-Oligonucleotide	artificial	nt		TCCATGACGTTCCTGATGCT

344.	MVH1	artificial	nt	(GC)AGGTGCAGCTCGAGGAGTCAGGACCT
345.	MVH2	artificial	nt	GAGGTCCAGCTCGAGCAGTCTGGACCT
346.	MVH3	artificial	nt	CAGGTCCAACTCGAGCAGCCTGGGGCT
347.	MVH4	artificial	nt	GAGGTTCAGCTCGAGCAGTCTGGGGCA
348.	MVH5	artificial	nt	GA(AG)GTGAAGCTCGAGGAGTCTGGAGGA
349.	MVH6	artificial	nt	GAGGTGAAGCTTCTCGAGTCTGGAGGT
350.	MVH7	artificial	nt	GAAGTGAAGCTCGAGGAGTCTGGGGGA
351.	MVH8	artificial	nt	GAGGTTCAGCTCGAGCAGTCTGGAGCT
352.	MuVHBstEII	artificial	nt	TGAGGAGACGGTGACCGTGGTCCCTTGGCCCCAG
353.	MUVK1	artificial	nt	CCAGTTCCGAGCTCGTTGTGACTCAGGAATCT
354.	MUVK2	artificial	nt	CCAGTTCCGAGCTCGTGTTGACGCAGCCGCCC
355.	MUVK3	artificial	nt	CCAGTTCCGAGCTCGTGCTCACCCAGTCTCCA
356.	MUVK4	artificial	nt	CCAGTTCCGAGCTCCAGATGACCCAGTCTCCA
357.	MUVK5	artificial	nt	CCAGATGTGAGCTCGTGATGACCCAGACTCCA
358.	MUVK6	artificial	nt	CCAGATGTGAGCTCGTCATGACCCAGTCTCCA
359.	MUVK7	artificial	nt	CCAGTTCCGAGCTCGTGATGACACAGTCTCCA
360.	MuVkHindIII/BsiW1	artificial	nt	TGGTGCACTAGTCGTACGTTTGATCTCAAGCTTGGTCCC
361.	forward primer	artificial	nt	GATCTGGTCTACACCATCGAGC
362.	reverse primer	artificial	nt	GGAGCTGCTGCTGGCTCAGTGAGG
363.	forward primer	artificial	nt	TTCCAGCTGAGCATGTCTGATGG
364.	reverse primer	artificial	nt	CGATCAGCATCTGGGCCCAGG
365.	forward primer	artificial	nt	GTGGAGCAGTTCACTCAGCAGGACC
366.	reverse primer	artificial	nt	GCCTTCACACCCAGTACTGGCC
367.	forward primer	artificial	nt	TCCCGTACGAGATCTGGATCCCAATTGGATGGCGGACTCGTGCTGTTCTCACACAGAGG
368.	reverse primer	artificial	nt	AGTGGGTCGACTCACACCCAGTACTGGCCATTCTTAAGGGCAGGG
369.	forward primer	artificial	nt	GAGGAATTCACCATGCCGCTGCTGCTACTGCTGCCCCTGTGGGCAGGGGCCCTGGCTATGG
370.	reverse primer	artificial	nt	GATTTGTAACTGTATTTGGTACTTCC
371.	forward primer	artificial	nt	ATTCCGCCTCCTTGGGATCC
372.	reverse primer	artificial	nt	GCATAGGAGACATTGAGCTGGATGG
373.	forward primer	artificial	nt	GCACCAACCTGACCTGTCAGG
374.	reverse primer	artificial	nt	AGTGGGTCGACTCACTGGGTCCTGACCTCTGAGTATTCG
375.	forward primer	artificial	nt	CACTGTGGCCCAGGTTCGAGG
376.	reverse primer	artificial	nt	GACATACCACACAAATTCAATACGG
377.	forward primer	artificial	nt	GCTCTGCTCGCGCCGAGATGTGG
378.	reverse primer	artificial	nt	ACGCTGGACACCACCTCCAGG

379.	forward primer	artificial	nt	GGTTCTACTGAGTGGGCAGAGG
380.	reverse primer	artificial	nt	ACTTGTTGTGGCTGCTTGGAGC
381.	forward primer	artificial	nt	GGGTGAAGTCCTATCCAGATGG
382.	reverse primer	artificial	nt	GTGCTCTGCCTGAAGCAATTCC
383.	forward primer	artificial	nt	CTCGGCTTCCTCTTCGGGTGG
384.	reverse primer	artificial	nt	GCATATTCATTTGCTGGGTAACCTGG
385.	macaque PSMA (Cynomolgus)	artificial	nt	ATGTGGAATCTCCTGCACGAAACCGACTCGGCTGTGGCCACCGCGCCGCCCGCTGGCTGTG CGCTGGGGCACTGGTGCTGGCGGGTGGCTTCTTCTCCTCGGCTTCCTCTTCGGATGGTTTATAA AATCCTCCAGTGAAGCTACTAACATTACTCCAAAGCATAATATGAAAGCATTTTTGGATGAACTG AAAGCTGAGAACATCAAGAAGTTCTTACATAATTTTACACAGATACCACATTTAGCAGGAACAGA ACAAAACTTTCAACTTGCAAAGCAAATTCAATCCCAGTGGAAAGAATTTGGCCTGGATTCTGTTG AGCTAACTCATTATGATGTCCTGTTGTCCTACCCAAATAAGACTCATCCCAACTACATCTCAATA ATTAATGAAGATGGAAATGAGATTTTCAACACATCATTATTTGAACCACCTCCTGCAGGATATGA AAATGTTTCGGATATTGTACCACCTTTCAGTGCTTTCTCTCCTCAAGGAATGCCAGAGGCGATC TAGTGTATGTTAACTATGCACGAACTGAAGACTTCTTTAAATTGGAACGGGACATGAAAATCAAT TGCTCTGGGAAAATTGTAATTGCCAGATATGGGAAAGTTTTCAGAGGAAATAAGGTTAAAAATGC CCAGCTGGCAGGGGCCACAGGAGTCATTCTCTACTCAGACCCTGCTGACTACTTTGCTCCTGGGG TAAAGTCTTATCCAGATGGTTGGAATCTTCCTGGAGGTGGTGTCCAGCGTGGAAATATCCTAAAT CTGAATGGTGCAGGAGACCCTCTCACACCAGGTTACCCAGCAAATGAATATGCTTATAGGCGTGG AATGGCAGAGGCTGTTGGTCTTCCAAGTATTCCCGTTCATCCAATTGGGTACTATGATGCACAGA AGCTCCTAGAAAAAATGGGTGGCTCAGCATCACCAGATAGCAGCTGGAGAGGAAGTCTCAAAGTG CCCTACAATGTTGGACCTGGCTTTACTGGAAACTTTTCTACACAAAAAGTCAAGATGCACATCCA CTCTACCAGTGAAGTGACAAGAATTTACAATGTGATAGGTACTCTCAGAGGAGCAGTGGAACCAG ACAGATACGTCATTCTGGGAGGTCACCGGGACTCATGGGTGTTTGGTGATTGACCCTCAGAGT GGAGCAGCTGTTGTTCATGAAATTGTGAGGAGCTTTGGAACGCTGAAAAAGGAGGGTGGAGACC TAGAAGAACAATTTTGTTTGCAAGCTGGGATGCAGAAGAATTTGGTCTTCTTGGTTCTACTGAAT GGGCAGAGGAGAATTTCAAGACTCCTTCAAGAGCGTGGCGTTCTTATATTAATGCTGATTCGTCT ATAGAGGGAAACTACACTCTGAGAGTTGATTGTACACCACTGATGTACAGCTTGGTATACAACCT AACAAAAGAGCTGGAAAGCCCTGATGAAGGCTTTGAAGGCAAATCTCTTTATGAAAGTTGGACTA AAAAAAGTCCTTCCCCCGAGTTCAGTGGCATGCCCAGGATAAGCAAATTGGGATCTGGAAATGAT TTTGAGGTGTTCTTCCAACGACTTGGAATTGCCTCAGGCAGAGCACGGTATACTAAAAATTGGGA AACAAACAAATTCAGCAGCTATCCACTGTATCACAGTGTCTATGAGACATATGAGTTGGTGGAAA AGTTTTATGATCCAATGTTTAAATATCACCTCACTGTGGCCCAGGTTCGAGGAGGGATGGTGTTT GAACTAGCCAATTCCGTAGTGCTCCCTTTGATTGTCGAGATTATGCTGTAGTTTTAAGAAAGTA TGCTGACAAAAATCTACAATATTTCTATGAAACATCCACAGGAAATGAAGACATACAGTGTATCAT TTGATTCACTTTTTTTCTGCAGTAAAGAATTTTACAGAAATTGCTTCCAAGTTCAGCGAGAGACTC CGGGACTTTGACAAAAGCAACCCAATATTATTAAGAATGATGAATTGATCAACTCATGTTTCTTGGA

				AAGAGCATTTATTGATCCATTAGGGTTACCAGACAGACCTTTTATAGGCATGTCATCTATGCTC CAAGCAGCCACACAACAAGTATGCAGGGAGTCATTCCCAGGAATTTATGATGCTCTGTTTGATATC GAAAGCAAAGTGGACCCTTCCCAGGCCTGGGAGAAGTGAAGACAGATTTCTGTTGCAACCTT CACAGTGCAAGCAGCTGCAGAGACTTTGAGTGAAGTGGCCCTAA
386.	macaque PSMA (Cynomolgus)	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSSEATNITPKHNMKAFLDEL KAENIKKFLHNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELTHYDVLLSYPNKTHPNYISI INEDGNEIFNTSLFEPPPAGYENVSDIVPPFSAFSPQGMPEGDLVYVNYARTEDFFKLERDMKIN CSGKIVIARYGKVFRGNKVKNAQLAGATGVILYSDPADYFAPGVKSYPDGWNLPGGGVQRGNILN LNGAGDPLTPGYPANEYAYRRGMAEAVGLPSIPVHPIGYYDAQKLLEKMGGSAPPDSSWRGSLKV PYNVGPGFTGNFSTQKVKMHIHSTSEVTRIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQS GAAVVHEIVRSFGTLKKEGWRPRRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSS IEGNYTLRVDCTPLMYSLVYNLTKELESPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGND FEVFFQRLGIASGRARYTKNWETNKFSSYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVF ELANSVVLPFDCRDYAVVLRKYADKIYNISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSERL RDFDKSNPILLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGIYDALFDI ESKVDPSQAWGEVKRQISVATFTVQAAAETLSEVA
387.	PSMA-3 L	artificial	aa	DIQMTQSPKFMSTSVGDRVSVTCKASQNVDTNVAWYQQKPGQSPKALIYSASYRYSDVPDRFTGS ESGTDFTLTISNVQSEDLAEYFCQQYDSYPYTFGGGTKLEIK
388.	PSMA-3 L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAAGTTCATGTCCACCTCCGTGGGCGACAGAGTGTCCGTGAC CTGCAAGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGTCCC CTAAGGCCCTGATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCTGACCGGTTCACCGGCTCC GAGTCCGGCACCGACTTCACCCTGACCATCTCCAACGTGCAGTCTGAGGACCTGGCCGAGTACTT CTGCCAGCAGTACGACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
389.	PSMA-3 LCDR1	artificial	aa	KASQNVDTNVA
390.	PSMA-3 LCDR2	artificial	aa	SASYRYS
391.	PSMA-3 LCDR3	artificial	aa	QQYDSYPYT
392.	PSMA-3 H	artificial	aa	DVKLVESGGGLVKPGESLKLSCIASGFTFSDYYMYWVRQTPEKRLEWVAIISDGGYYTYYSDIIK GRFTISRDNAKNNLYLQMSSLKSEDTAMYYCTRGFPLLRHGAMDYWGLGTSVTVSS
393.	PSMA-3 H	artificial	nt	GACGTGAAACTGGTGGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGAGTCCCTGAAGCTGTCCTG TATCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGTGCGCCAGACCCCTGAGAAGC GGCTGGAATGGGTGGCCATCATCTCCGACGGCGGCTACTACACCTACTCCGACATCATCAAG GGCCGGTTCACCATCTCCCGGGACAACGCCAAGAACAACCTGTACCTGCAGATGTCCCTCCCTGAA GTCCGAGGACACCGCCATGTACTACTGCACCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGG ATTACTGGGGCCTGGGCACCTCTGTGACCGTGTCCTCT
394.	PSMA-3 HCDR1	artificial	aa	DYYMY
395.	PSMA-3 HCDR2	artificial	aa	IISDGGYYTYYSDIIKG

396.	PSMA-3 HCDR3	artificial	aa	GFPLLRHGAMDY
397.	PSMA-3 HL	artificial	aa	DVKLVESGGGLVKPGESLKLSCIASGFTFSDYYMYWVRQTPEKRLEWVAIISDGGYYTYYSDIIK GRFTISRDNAKNNLYLQMSSLKSEDTAMYYCTRGFPLLRHGAMDYWGLGTSVTVSSGGGGSGGGG SGGGGSDIQMTQSPKFMSTSVGDRVSVTCKASQNVDTNVAWYQQKPGQSPKALIYSASYRYSDVP DRFTGSESGTDFTLTISNVQSEDLAEYFCQQYDSYPYTFGGGTKLEIK
398.	PSMA-3 HL	artificial	nt	GACGTGAAACTGGTGGAGTCTGGGGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTGAAGCTGTCCTG TATCGCCTCCGGCTTCACCTTCTCCGACTACATGTACTGGGTGCGCCAGACCCCTGAGAAGC GGCTGGAATGGGTGGCCATCATCTCCGACGGCGGCTACTACACCTACTCCGACATCATCAAG GGCCGGTTCACCATCTCCCGGGACAACGCCAAGAACACCTGTACCTGCAGATGTCCTCCCTGAA GTCCGAGGACACCGCCATGTACTACTGCACCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGG ATTACTGGGGCCTGGGCACCTCTGTGACCGTGTCCTCTGGCGGAGGGGGCAGTGGAGGCGGAGGA AGTGGAGGGGGCGGATCCGACATCCAGATGACCCAGTCCCCCAAGTTCATGTCCACCTCCGTGGG CGACAGAGTGTCCGTGACCTGCAAGGCCTCCGAGAACGTGGACACCAACGTGGCCTGGTATCAGC AGAAGCCCGGCCAGTCCCCTAAGGCCCTGATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCT GACCGGTTCACCGGCTCCGAGTCCGGCACCGACTTCACCCTGACCATCTCCAACGTGCAGTCTGA GGACCTGGCCGAGTACTTCTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGGACCA AGCTGGAAATCAAG
399.	PSMA-3 HL x I2C HL	artificial	aa	DVKLVESGGGLVKPGESLKLSCIASGFTFSDYYMYWVRQTPEKRLEWVAIISDGGYYTYYSDIIK GRFTISRDNAKNNLYLQMSSLKSEDTAMYYCTRGFPLLRHGAMDYWGLGTSVTVSSGGGGSGGGG SGGGGSDIQMTQSPKFMSTSVGDRVSVTCKASQNVDTNVAWYQQKPGQSPKALIYSASYRYSDVP DRFTGSESGTDFTLTISNVQSEDLAEYFCQQYDSYPYTFGGGTKLEIKSGGGGSEVQLVESGGGL VQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDD SKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQ TVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSG SLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
400.	PSMA-3 HL x I2C HL	artificial	nt	GACGTGAAACTGGTGGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTGAAGCTGTCCTG TATCGCCTCCGGCTTCACCTTCTCCGACTACATGTACTGGGTGCGCCAGACCCCTGAGAAGC GGCTGGAATGGGTGGCCATCATCTCCGACGGCGGCTACTACACCTACTCCGACATCATCAAG GGCCGGTTCACCATCTCCCGGGACAACGCCAAGAACACCTGTACCTGCAGATGTCCTCCCTGAA GTCCGAGGACACCGCCATGTACTACTGCACCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGG ATTACTGGGGCCTGGGCACCTCTGTGACCGTGTCCTCTGGCGGAGGGGGCAGTGGAGGCGGAGGA AGTGGAGGGGGCGGATCCGACATCCAGATGACCCAGTCCCCCAAGTTCATGTCCACCTCCGTGGG CGACAGAGTGTCCGTGACCTGCAAGGCCTCCGAGAACGTGGACACCAACGTGGCCTGGTATCAGC AGAAGCCCGGCCAGTCCCCTAAGGCCCTGATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCT GACCGGTTCACCGGCTCCGAGTCCGGCACCGACTTCACCCTGACCATCTCCAACGTGCAGTCTGA GGACCTGGCCGAGTACTTCTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGGACCA AGCTGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTG

				GTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGC CATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAAT ATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGAT TCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTG TGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGCTTACTGGGCCAAGGGACTC TGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAG ACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGG CTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGG CACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGC TCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATA TTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
401.	PSMA-4 L	artificial	aa	DIELTQSPLSLPVILGDQASISCRSSQSLVHSNGNTYLHWFLQKPGQSPKLLIYTVSNRFSGVPD RFSGSGSGTDFTLKISRVEAEDLGVYFCSQSTHVPTFGGGTKLEIK
402.	PSMA-4 L	artificial	nt	GACATCGAGCTGACCCAGTCCCCCCCTGTCCCTGCCTGTGATCCTGGGCGACCAGGCCTCCATCTC CTGCCGGTCCTCCCAGTCCCTGGTGCACTCCCAACGGCAATACCTACCTGCACTGGTTCTCTGCAGA AGCCTGGCCAGTCCCCTAAGCTGCTGATCTACACCGGTGTCCAACCGGTTCTCCGGCGTGCCTGAC AGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCCGAAGA TCTGGGCGTGTACTTTTGCTCCCAGTCCCACCCACGTGCCTACCTTCGGCGGAGGGACCAAGCTGG AAATCAAG
403.	PSMA-4 LCDR1	artificial	aa	RSSQSLVHSNGNTYLH
404.	PSMA-4 LCDR2	artificial	aa	TVSNRFS
405.	PSMA-4 LCDR3	artificial	aa	SQSTHVPT
406.	PSMA-4 H	artificial	aa	QVQLQQSGAELVEPGASVKLSCKASGYTFTYFDINWLRQRPEQGLEWIGGISPGDGNTNYNENFK GKATLTIDKSSTTAYIQLSRLTSEDSAVYFCARDGNFPYYAMDSWGQGTSVTVSS
407.	PSMA-4 H	artificial	nt	CAGGTGCAGCTGCAGCAGTCTGGCGCCGAACTGGTGGAGCCTGGCGCCTCCGTGAAGCTGTCCTG CAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGCTGCGGCAGAGGCCTGAGCAGG GCCTGGAATGGATCGGCGGCATCTCCCCTGGCGACGGCAACACCAACTACAACGAGAAGTTCAAG GGCAAGGCCACCCTGACCATCGACAAGTCCTCCACCACCGCCTACATCCAGCTGTCCCGGCTGAC CTCTGAGGACTCCGCCGTGTACTTCTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACT CTTGGGGCCAGGGCACCTCCGTGACCGTGTCTAGT
408.	PSMA-4 HCDR1	artificial	aa	YFDIN
409.	PSMA-4 HCDR2	artificial	aa	GISPGDGNTNYNENFKG
410.	PSMA-4 HCDR3	artificial	aa	DGNFPYYAMDS
411.	PSMA-4 HL	artificial	aa	QVQLQQSGAELVEPGASVKLSCKASGYTFTYFDINWLRQRPEQGLEWIGGISPGDGNTNYNENFK GKATLTIDKSSTTAYIQLSRLTSEDSAVYFCARDGNFPYYAMDSWGQGTSVTVSSGGGSGGGGS GGGGSDIELTQSPLSLPVILGDQASISCRSSQSLVHSNGNTYLHWFLQKPGQSPKLLIYTVSNRF

				SGVPDRFSGSGSGTDFTLKISRVEAEDLGVYFCSQSTHVPTFGGGTKLEIK
412.	PSMA-4 HL	artificial	nt	CAGGTGCAGCTGCAGCAGTCTGGCGCCGAACTGGTGGAGCCTGGCGCCTCCGTGAAGCTGTCCTG CAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGCTGCGGCAGAGGCCTGAGCAGG GCCTGGAATGGATCGGCGGCATCTCCCCTGGCGACGGCAACACCAACTACAACGAGAACTTCAAG GGCAAGGCCACCCTGACCATCGACAAGTCCTCCACCACCGCCTACATCCAGCTGTCCCGGCTGAC CTCTGAGGACTCCGCCGTGTACTTCTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACT CTTGGGGCCAGGGCACCTCCGTGACCGTGTCTAGTGGCGGCGGAGGATCTGGCGGAGGGGATCT GGGGGCGGAGGAAGCGACATCGAGCTGACCCAGTCCCCCCTGTCCCTGTCCGTGGGCGA CCAGGCCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGCACTCCAACGGCAATACCTACCTGC ACTGGTTTCTGCAGAAGCCTGGCCAGTCCCCTAAGCTGCTGATCTACACCGTGTCCAACCGGTTC TCCGGCGTGCCTGACAGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCG GGTGGAGGCCGAAGATCTGGGCGTGTACTTTTGCTCCCAGTCCACCCACGTGCCTACCTTCGGCG GAGGGACCAAGCTGGAAATCAAG
413.	PSMA-4HL x I2C HL	artificial	aa	QVQLQQSGAELVEPGASVKLSCKASGYTFTYFDINWLRQRPEQGLEWIGGISPGDGNTNYNENFK GKATLTIDKSSTTAYIQLSRLTSEDSAVYFCARDGNFPYYAMDSWGQGTSVTVSSGGGGSGGGGS GGGGSDIELTQSPSLSLPVILGDQASISCRSSQSLVHSNGNTYLHWFLQKPGQSPKLLIYTVSNRF SGVPDRFSGSGSGTDFTLKISRVEAEDLGVYFCSQSTHVPTFGGGTKLEIKSGGGGSEVQLVESG GGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTIS RDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGG GSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPAR FSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
414.	PSMA-4HL x I2C HL	artificial	nt	CAGGTGCAGCTGCAGCAGTCTGGCGCCGAACTGGTGGAGCCTGGCGCCTCCGTGAAGCTGTCCTG CAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGCTGCGGCAGAGGCCTGAGCAGG GCCTGGAATGGATCGGCGGCATCTCCCCTGGCGACGGCAACACCAACTACAACGAGAACTTCAAG GGCAAGGCCACCCTGACCATCGACAAGTCCTCCACCACCGCCTACATCCAGCTGTCCCGGCTGAC CTCTGAGGACTCCGCCGTGTACTTCTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACT CTTGGGGCCAGGGCACCTCCGTGACCGTGTCTAGTGGCGGCGGAGGATCTGGCGGAGGGGATCT GGGGGCGGAGGAAGCGACATCGAGCTGACCCAGTCCCCCCTGTCCCTGTCCGTGGGCGA CCAGGCCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGCACTCCAACGGCAATACCTACCTGC ACTGGTTTCTGCAGAAGCCTGGCCAGTCCCCTAAGCTGCTGATCTACACCGTGTCCAACCGGTTC TCCGGCGTGCCTGACAGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCG GGTGGAGGCCGAAGATCTGGGCGTGTACTTTTGCTCCCAGTCCACCCACGTGCCTACCTTCGGCG GAGGGACCAAGCTGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGA GGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAA TAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAA GAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCC AGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGT

				GTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGCC AAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGT GGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACT CACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAAC CAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCCGGTACTCCTGCCAGA TTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGA GGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGA CTGTCCTA
415.	PSMA-6 L	artificial	aa	DIKMTQSPSSMYASLGERVTITCKASQDIYSYLIWFQQKPGKSPKTLIYRANRLVDGVPSRFSGS GSGQDYSLTISSLEYEDMGIYYCLQYDEFATFGSGTKLEMK
416.	PSMA-6 L	artificial	nt	GACATCAAGATGACCCAGTCCCCCTCCTCCATGTACGCCTCCCTGGGCGAGAGAGTGACCATCAC CTGCAAGGCCTCCCAGGACATCTACTCCTACCTGATCTGGTTCCAGCAGAAGCCTGGCAAGTCCC CTAAGACCCTGATCTACCGGGCCAACAGACTGGTGGACGGCGTGCCTTCCAGGTTCTCCGGCTCC GGCTCTGGCCAGGACTACTCCCTGACCATCTCCTCCCTGGAATACGAGGACATGGGCATCTACTA CTGCCTGCAGTACGACGAGTTCGGCCACCTTCGGCTCCGGCACCAAGCTGGAAATGAAG
417.	PSMA-6 LCDR1	artificial	aa	KASQDIYSYLI
418.	PSMA-6 LCDR2	artificial	aa	RANRLVD
419.	PSMA-6 LCDR3	artificial	aa	LQYDEFAT
420.	PSMA-6 H	artificial	aa	DVHLQESGPGLVKPSQSLSLTCTVTGYSITSDYAWNWIRQFPGNKLEWMGYISFSGSTSYNPSLK SRISVTRDTSKNQFFLQLNSVTTEDTATYYCARWNYYGSSHVWFAYWGQGTLVTVSS
421.	PSMA-6 H	artificial	nt	GACGTGCACCTGCAGGAATCTGGCCCTGGTGAAGCCTTCCCAGTCCCTGTCCCTGACCTG CACCGTGACCGGCTACTCCATCACCTCCGACTACGCCTGGAACTGGATCCGGCAGTTCCCTGGCA ATAAGCTGGAATGGATGGGCTACATCTCCTTCTCCGGCAGCACCTCCTACAACCCTTCCCTGAAG TCCCGGATCTCCGTGACCCGGGACACCTCCAAGAACCAGTTCTTCCTGCAGCTGAACTCCGTGAC CACCGAGGACACCGCCACCTACTACTGCGCCCGGTGGAACTACTACGGCTCCTCCCACGTGTGGT TCGCTTACTGGGGCCAGGGCACCCTGGTGACCGTGTCCTCC
422.	PSMA-6 HCDR1	artificial	aa	SDYAWN
423.	PSMA-6 HCDR2	artificial	aa	YISFSGSTSYNPSLKS
424.	PSMA-6 HCDR3	artificial	aa	WNYYGSSHVWFAY
425.	PSMA-6 LH	artificial	aa	DIKMTQSPSSMYASLGERVTITCKASQDIYSYLIWFQQKPGKSPKTLIYRANRLVDGVPSRFSGS GSGQDYSLTISSLEYEDMGIYYCLQYDEFATFGSGTKLEMKGGGGSGGGGSGGGGSDVHLQESGP GLVKPSQSLSLTCTVTGYSITSDYAWNWIRQFPGNKLEWMGYISFSGSTSYNPSLKSRISVTRDT SKNQFFLQLNSVTTEDTATYYCARWNYYGSSHVWFAYWGQGTLVTVSS
426.	PSMA-6 LH	artificial	nt	GACATCAAGATGACCCAGTCCCCCTCCTCCATGTACGCCTCCCTGGGCGAGAGAGTGACCATCAC CTGCAAGGCCTCCCAGGACATCTACTCCTACCTGATCTGGTTCCAGCAGAAGCCTGGCAAGTCCC CTAAGACCCTGATCTACCGGGCCAACAGACTGGTGGACGGCGTGCCTTCCAGGTTCTCCGGCTCC

				GGCTCTGGCCAGGACTACTCCCTGACCATCTCCTCCCTGGAATACGAGGACATGGGCATCTACTA CTGCCTGCAGTACGACGAGTTCGCCACCTTCGGCTCCGGCACCAAGCTGGAAATGAAGGGCGGAG GGGGATCTGGCGGCGGAGGAAGTGGCGGGGGAGGATCCGACGTGCACCTGCAGGAATCTGGCCCT GGCCTGGTGAAGCCTTCCCAGTCCCTGTCCCTGACCTGCACCGTGACCGGCTACTCCATCACCTC CGACTACGCCTGGAACTGGATCCGGCAGTTCCCTGGCAATAAGCTGGAATGGATGGGCTACATCT CCTTCTCCGGCAGCACCTCCTACAACCCTTCCCTGAAGTCCCGGATCTCCGTGACCCGGGACACC TCCAAGAACCAGTTCTTCCTGCAGCTGAACTCCGTGACCACCGAGGACACCGCCACCTACTACTG CGCCCGGTGGAACTACTACGGCTCCTCCCACGTGTGGTTCGCTTACTGGGGCCAGGGCACCCTGG TGACCGTGTCCTCC
427.	PSMA-6 LH x I2C HL	artificial	aa	DIKMTQSPSSMYASLGERVTITCKASQDIYSYLIWFQQKPGKSPKTLIYRANRLVDGVPSRFSGS GSGQDYSLTISSLEYEDMGIYYCLQYDEFATFGSGTKLEMKGGGGSGGGGSGGGGSDVHLQESGP GLVKPSQSLSLTCTVTGYSITSDYAWNWIRQFPGNKLEWMGYISFSGSTSYNPSLKSRISVTRDT SKNQFFLQLNSVTTEDTATYYCARWNYYGSSHVWFAYWGQGTLVTVSSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
428.	PSMA-6 LH x I2C HL	artificial	nt	GACATCAAGATGACCCAGTCCCCCTCCTCCATGTACGCCTCCCTGGGCGAGAGAGTGACCATCAC CTGCAAGGCCTCCCAGGACATCTACTCCTACCTGATCTGGTTCCAGCAGAAGCCTGGCAAGTCCC CTAAGACCCTGATCTACCGGGCCAACAGACTGGTGGACGGCGTGCCTTCCAGGTTCTCCGGCTCC GGCTCTGGCCAGGACTACTCCCTGACCATCTCCTCCCTGGAATACGAGGACATGGGCATCTACTA CTGCCTGCAGTACGACGAGTTCGGCCACCTTCGGCTCCGGCACCAAGCTGGAAATGAAGGGCGGAG GGGGATCTGGCGGCGGAGGAAGTGGCGGGGGAGGATCCGACGTGCACCTGCAGGAATCTGGCCCT GGCCTGGTGAAGCCTTCCCAGTCCCTGTCCCTGACCTGCACCGTGACCGGCTACTCCATCACCTC CGACTACGCCTGGAACTGGATCCGGCAGTTCCCTGGCAATAAGCTGGAATGGATGGGCTACATCT CCTTCTCCGGCAGCACCTCCTACAACCCTTCCCTGAAGTCCCGGATCTCCGTGACCCGGGACACC TCCAAGAACCAGTTCTTCCTGCAGCTGAACTCCGTGACCACCGAGGACACCGCCACCTACTACTG CGCCCGGTGGAACTACTACGGCTCCTCCCACGTGTGGTTCGCTTACTGGGGCCAGGGCACCCTGG TGACCGTGTCCTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC CTCGACTGGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAACCAGGTCAGGCAC

				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
429.	PSMA-7 L	artificial	aa	DIVMTQSHKFMSTSVGDRVSIICKASQDVGTAVDWYQQKPGQSPKLLIYWASTRHTGVPDRFTGS GSGTDFTLTITNVQSEDLADYFCQQYNSYPLTFGAGTMLDLK
430.	PSMA-7 L	artificial	nt	GACATCGTGATGACCCAGTCCCACACAAGTTCATGTCCACCTCCGTGGGCGACCGGGTGTCCATCAT CTGCAAGGCCTCCCAGGATGTGGGCACCGCCGTGGACTGGTATCAGCAGAAGCCTGGCCAGTCCC CTAAGCTGCTGATCTACTGGGCCTCCACCAGACACACCGGCGTGCCTGACAGATTCACCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCACCAACGTGCAGTCCGAGGACCTGGCCGACTACTT CTGCCAGCAGTACAACTCCTACCCTCTGACCTTCGGCGCTGGCACCATGCTGGACCTGAAG
431.	PSMA-7 LCDR1	artificial	aa	KASQDVGTAVD
432.	PSMA-7 LCDR2	artificial	aa	WASTRHT
433.	PSMA-7 LCDR3	artificial	aa	QQYNSYPLT
434.	PSMA-7 H	artificial	aa	EVQLQQSGPELVKPGTSVRISCKTSGYTFTEYTIHWVKQSHGKSLEWIGNINPNNGGTTYNQKFE DKATLTVDKSSSTAYMELRSLTSEDSAVYYCAAGWNFDYWGQGTTLTVSS
435.	PSMA-7 H	artificial	nt	GAAGTGCAGCTGGTGCAGTCCGGCCCTGAGCTGGTGAAGCCTGGCACCTCCGTGCGGATCTCTTG CAAGACCTCCGGCTACACCTTCACCGAGTACACCATCCACTGGGTGAAACAGTCCCACGGCAAGT CCCTGGAATGGATCGGCAACATCAACCCTAACGGCGGCACCACCTACAACCAGAAGTTCGAG GACAAGGCCACCCTGACCGTGGACAAGTCCTCCTCCACCGCCTACATGGAACTGCGGTCCCTGAC CTCCGAGGACTCCGCCGTGTACTACTGCGCCGCTGGCTGGAACTTCGACTACTGGGGCCAGGGCA CCACACTGACCGTGTCCTCC
436.	PSMA-7 HCDR1	artificial	aa	EYTIH
437.	PSMA-7 HCDR2	artificial	aa	NINPNNGGTTYNQKFED
438.	PSMA-7 HCDR3	artificial	aa	GWNFDY
439.	PSMA-7 LH	artificial	aa	DIVMTQSHKFMSTSVGDRVSIICKASQDVGTAVDWYQQKPGQSPKLLIYWASTRHTGVPDRFTGS GSGTDFTLTITNVQSEDLADYFCQQYNSYPLTFGAGTMLDLKGGGGSGGGGSGGGGSEVQLQQSG PELVKPGTSVRISCKTSGYTFTEYTIHWVKQSHGKSLEWIGNINPNNGGTTYNQKFEDKATLTVD KSSSTAYMELRSLTSEDSAVYYCAAGWNFDYWGQGTTLTVSS
440.	PSMA-7 LH	artificial	nt	GACATCGTGATGACCCAGTCCCACACAAGTTCATGTCCACCTCCGTGGGCGACCGGGTGTCCATCAT CTGCAAGGCCTCCCAGGATGTGGGCACCGCCGTGGACTGGTATCAGCAGAAGCCTGGCCAGTCCC CTAAGCTGCTGATCTACTGGGCCTCCACCAGACACACCGGCGTGCCTGACAGATTCACCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCACCAACGTGCAGTCCGAGGACCTGGCCGACTACTT CTGCCAGCAGTACAACTCCTACCCTCTGACCTTCGGCGCTGGCACCATGCTGGACCTGAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTGCAGCAGTCCGGC CCTGAGCTGGTGAAGCCTGGCACCTCCGTGCGGATCTCTTGCAAGACCTCCGGCTACACCTTCAC CGAGTACACCATCCACTGGGTGAAACAGTCCCACGGCAAGTCCCTGGAATGGATCGGCAACATCA

				ACCCTAACAACGGCGGCACCACCTACAACCAGAAGTTCGAGGACAAGGCCACCCTGACCGTGGAC AAGTCCTCCTCCACCGCCTACATGGAACTGCGGTCCCTGACCTCCGAGGACTCCGCCGTGTACTA CTGCGCCGCTGGCTGGAACTTCGACTACTGGGGCCAGGGCACCACACTGACCGTGTCCTCC
441.	PSMA-7 LH x I2C HL	artificial	aa	DIVMTQSHKFMSTSVGDRVSIICKASQDVGTAVDWYQQKPGQSPKLLIYWASTRHTGVPDRFTGS GSGTDFTLTITNVQSEDLADYFCQQYNSYPLTFGAGTMLDLKGGGGSGGGGSGGGGSEVQLQQSG PELVKPGTSVRISCKTSGYTFTEYTIHWVKQSHGKSLEWIGNINPNNGGTTYNQKFEDKATLTVD KSSSTAYMELRSLTSEDSAVYYCAAGWNFDYWGQGTTLTVSSGGGGSEVQLVESGGGLVQPGGSL KLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYL QMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEP SLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGGKA ALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
442.	PSMA-7 LH x I2C HL	artificial	nt	GACATCGTGATGACCCAGTCCCACACAAGTTCATGTCCACCTCCGTGGGCGACCGGGTGTCCATCAT CTGCAAGGCCTCCCAGGATGTGGGCACCGCCGTGGACTGGTATCAGCAGAAGCCTGGCCAGTCCC CTAAGCTGCTGATCTACTGGGCCTCCACCAGACACACCGGCGTGCCTGACAGATTCACCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCAGCAGCGTGCAGTCCGAGGACCTGGCCGACTACTT CTGCCAGCAGTACAACTCCTACCCCTCTGACCTTCGGCGCTGGCACCAAGCTGGAACCTGAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTGCAGCAGTCCGGC CCTGAGCTGGTGAAGCCTGGCACCTCCGTGCGGATCTCTTGCAAGACCTCCGGCTACACCTTCAC CGAGTACACCATCCACTGGGTGAAACAGTCCCACGGCAAGTCCCTGGAATGGATCGGCAACATCA ACCCTAACAACGGCGGCACCACCTACAACCAGAAGTTCGAGGACAAGGCCACCCTGACCGTGGAC AAGTCCTCCTCCACCGCCTACATGGAACTGCGGTCCCTGACCTCCGAGGACTCCGCCGTGTACTA CTGCGCCGCTGGCTGGAACTTCGACTACTGGGGCCAGGGCACCACACTGACCGTGTCCTCCGGAG GTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTG AAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGC TCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATATAATTATGCAACATATT ATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTA CAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGG TAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTG GTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCT TCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTAC ATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTG GGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCT GCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAG CAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
443.	PSMA-8 L	artificial	aa	DIVLTQSPASLAVSLGQRATISCRASESIDSYDNTFMHWYQQKPGQPPNLLIFRASILESGIPAR FSGSGSGTDFTLTIYPVEADDVATYYCHQSIEDPYTFGGGTKLEIK
444.	PSMA-8 L	artificial	nt	GACATCGTGCTGACCCAGTCTCCAGCCTCCCTGGCTGTGTCTCTGGGCCAGCGGGCCACCATCTC

				TTGCCGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATGCACTGGTATCAGCAGAAGC CTGGCCAGCCTCCTAACCTGCTGATCTTCCGGGCCTCTATCCTGGAATCCGGCATCCCTGCCCGG TTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTGACCATCTACCCTGTGGAGGCCGACGACGT GGCCACCTACTACTGCCACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGG AAATCAAG
445.	PSMA-8 LCDR1	artificial	aa	RASESIDSYDNTFMH
446.	PSMA-8 LCDR2	artificial	aa	RASILES
447.	PSMA-8 LCDR3	artificial	aa	HQSIEDPYT
448.	PSMA-8 H	artificial	aa	EVQLQQSGPELVKPGASVKMSCKASGYTFTGYVMHWVKQKPGQVLEWIGYINPYNDVTRYNGKFK GKATLTSDKYSSTAYMELSGLTSEDSAVYYCARGENWYYFDSWGRGATLTVSS
449.	PSMA-8 H	artificial	nt	GAAGTGCAGCTGCAGCAGTCCGGCCCTGAGCTGGTGAAGCCTGGCGCCTCCGTGAAGATGTCCTG CAAGGCCTCCGGCTACACCTTCACCGGCTACGTGATGCACTGGGTGAAACAGAAACCCGGCCAGG TGCTGGAATGGATCGGCTACATCAACCCTTACAACGACGTGACCCGGTACAACGGCAAGTTCAAG GGCAAGGCCACCCTGACCTCCGACAAGTACTCCTCCACCGCCTACATGGAACTGTCCGGCCTGAC CTCTGAGGACTCCGCCGTGTACTACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGG GCAGAGGCGCTACCCTGACCGTGTCTTCC
450.	PSMA-8 HCDR1	artificial	aa	GYVMH
451.	PSMA-8 HCDR2	artificial	aa	YINPYNDVTRYNGKFKG
452.	PSMA-8 HCDR3	artificial	aa	GENWYYFDS
453.	PSMA-8 LH	artificial	aa	DIVLTQSPASLAVSLGQRATISCRASESIDSYDNTFMHWYQQKPGQPPNLLIFRASILESGIPAR FSGSGSGTDFTLTIYPVEADDVATYYCHQSIEDPYTFGGGTKLEIKGGGGSGGGGSGGGGSEVQL QQSGPELVKPGASVKMSCKASGYTFTGYVMHWVKQKPGQVLEWIGYINPYNDVTRYNGKFKGKAT LTSDKYSSTAYMELSGLTSEDSAVYYCARGENWYYFDSWGRGATLTVSS
454.	PSMA-8 LH	artificial	nt	GACATCGTGCTGACCCAGTCTCCAGCCTCCCTGGCTGTGTCTCTGGGCCAGCGGGCCACCATCTC TTGCCGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATGCACTGGTATCAGCAGAAGC CTGGCCAGCCTCCTAACCTGCTGATCTTCCGGGCCTCTATCCTGGAATCCGGCATCCCTGCCCGG TTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTGACCATCTACCCTGTGGAGGCCGACGACGT GGCCACCTACTACTGCCACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGG AAATCAAGGGCGGAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTG CAGCAGTCCGGCCCTGAGCTGGTGAAGCCTGGCGCCTCCGTGAAGATGTCCTGCAAGGCCTCCGG CTACACCTTCACCGGCTACGTGATGCACTGGGTGAAACAGAAACCCGGCCAGGTGCTGGAATGGA TCGGCTACATCAACCCTTACAACGACGTGACCCGGTACAACGGCAAGTTCAAGGGCAAGGCCACC CTGACCTCCGACAAGTACTCCTCCACCGCCTACATGGAACTGTCCGGCCTGACCTCTGAGGACTC CGCCGTGTACTACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCGCTA CCCTGACCGTGTCTTCC
455.	PSMA-8 LH x I2C	artificial	aa	DIVLTQSPASLAVSLGQRATISCRASESIDSYDNTFMHWYQQKPGQPPNLLIFRASILESGIPAR

	HL			FSGSGSGTDFTLTIYPVEADDVATYYCHQSIEDPYTFGGGTKLEIKGGGSGGGGSGGGSGGGSEVQL QQSGPELVKPGASVKMSCKASGYTFTGYVMHWVKQKPGQVLEWIGYINPYNDVTRYNGKFKGKAT LTSDKYSSTAYMELSGLTSEDSAVYYCARGENWYYFDSWGRGATLTVSSGGGGSGGGSGGGSEVQLVESGGGL VQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDD SKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQ TVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSG SLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
456.	PSMA-8 LH x I2C HL	artificial	nt	GACATCGTGCTGACCCAGTCTCCAGCCTCCCTGGCTGTGTCTCTGGGCCAGCGGGCCACCATCTC TTGCCGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATGCACTGGTATCAGCAGAAGC CTGGCCAGCCTCCTAACCTGCTGATCTTCCGGGCCTCTATCCTGGAATCCGGCATCCCTGCCCGG TTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTGACCATCTACCCTGTGGAGGCCGACGACGT GGCCACCTACTACTGCCACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGG AAATCAAGGGCGGAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTG CAGCAGTCCGGCCCTGAGCTGGTGAAGCCTGGCGCCTCCGTGAAGATGTCCTGCAAGGCCTCCGG CTACACCTTCACCGGCTACGTGATGCACTGGGTGAAACAGAAACCCGGCCAGGGTGCTGGAATGGA TCGGCTACATCAACCCTTACAACGACGTGACCCGGTACAACGGCAAGTTCAAGGGCAAGGCCACC CTGACCTCCGACAAGTACTCCTCCACCGCCTACATGGAACTGTCCGGCCTGACCTCTGAGGACTC CGCCGTGTACTACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCGCTA CCCTGACCGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTG GTGCAGCCTGGAGGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGC CATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAAT ATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGAT TCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTG TGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTC TGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAG ACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCACTTGTGG CTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGG CACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCTCAGGC TCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATA TTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
457.	PSMA-9 L	artificial	aa	NIVMTQSQKFMSTSPGDRVRVTCKASQNVGSDVAWYQAKPGQSPRILIYSTSYRYSGVPDRFTAY GSGTDFTLTITNVQSEDLTEYFCQQYNSYPLTFGAGTKLELK
458.	PSMA-9 L	artificial	nt	AACATCGTGATGACCCAGTCCCAGAAATTCATGTCCACCTCTCCCGGCGATAGAGTGCGCGTGAC CTGCAAGGCCTCCCAGAACGTGGGCTCCGACGTGGCCTGGTATCAGGCCAAGCCTGGCCAGTCCC CTCGGATCCTGATCTACTCCACCTCCTACCGGTACTCCGGCGTGCCTGACAGATTCACCGCCTAC GGCTCCGGCACCGACTTCACCCTGACCATTACAAACGTGCAGTCCGAGGACCTGACCGAGTACTT CTGCCAGCAGTACAACTCCTACCCTCTGACCTTCGGCGCTGGCACCAAGCTGGAACTGAAG

459.	PSMA-9 LCDR1	artificial	aa	KASQNVGSDVA
460.	PSMA-9 LCDR2	artificial	aa	STSYRYS
461.	PSMA-9 LCDR3	artificial	aa	QQYNSYPLT
462.	PSMA-9 H	artificial	aa	QVQLKESGPGLVASSQSLSITCTVSGFSLTAYGINWVRQPPGKGLEWLGVIWPDGNTDYNSTLKS RLNIFKDNSKNQVFLKMSSFQTDDTARYFCARDSYGNFKRGWFDFWGQGTTLTVSS
463.	PSMA-9 H	artificial	nt	CAGGTGCAGCTGAAAGAGTCCGGCCCTGGCCTCCTCCCAGTCCCTGTCCATCACCTG CACCGTGTCAGGCTTCTCCCTGACCGCTACGGCATCAACTGGGTGCGCCAGCCTCCTGGCAAGG GCCTGGAATGGCTGGGCGTGATCTGGCCTGACGGCAACACCGACTACAACAGCACCCTGAAGTCC CGGCTGAACATCTTCAAGGACAACTCCAAGAACCAGGTGTTCCTGAAGATGTCCTCTTTCCAGAC CGACGACACCGCCCGGTACTTTTGCGCCAGGGACTCCTACGGCAACTTCAAGCGGGGCTGGTTCG ATTTTTGGGGCCAGGGCACCACACTGACCGTGTCCTCC
464.	PSMA-9 HCDR1	artificial	aa	AYGIN
465.	PSMA-9 HCDR2	artificial	aa	VIWPDGNTDYNSTLKS
466.	PSMA-9 HCDR3	artificial	aa	DSYGNFKRGWFDF
467.	PSMA-9 LH	artificial	aa	NIVMTQSQKFMSTSPGDRVRVTCKASQNVGSDVAWYQAKPGQSPRILIYSTSYRYSGVPDRFTAY GSGTDFTLTITNVQSEDLTEYFCQQYNSYPLTFGAGTKLELKGGGGSGGGGSGGGGSQVQLKESG PGLVASSQSLSITCTVSGFSLTAYGINWVRQPPGKGLEWLGVIWPDGNTDYNSTLKSRLNIFKDN SKNQVFLKMSSFQTDDTARYFCARDSYGNFKRGWFDFWGQGTTLTVSS
468.	PSMA-9 LH	artificial	nt	AACATCGTGATGACCCAGTCCCAGAAATTCATGTCCACCTCTCCCGGCGATAGAGTGCGCGTGAC CTGCAAGGCCTCCCAGAACGTGGGCTCCGACGTGGCCTGGTATCAGGCCAAGCCTGGCCAGTCCC CTCGGATCCTGATCTACTCCACCTCCTACCGGTACTCCGGCGTGCCTGACAGATTCACCGCCTAC GGCTCCGGCACCGACTTCACCCTGACCATTACAAACGTGCAGTCCGAGGACCTGACCGAGTACTT CTGCCAGCAGTACAACTCCTACCCTCTTCGGCGCTGGCACCAAGCTGGAACTGAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGAAAGAGTCCGGC CCTGGCCTGGTGGCCTCCTCCCAGTCCCTGTCCATCACCTGCACCGTGTCAGGCTTCTCCCTGAC CGCTTACGGCATCAACTGGGTGCGCCAGCCTCCTGGCAAGGGCCTGGAATGGCTGGGCGTGATCT GGCCTGACGGCAACACCGACTACAACAGCACCCTGAAGTCCCGGCTGAACATCTTCAAGGACAAC TCCAAGAACCAGGTGTTCCTGAAGATGTCCTCTTTCCAGACCGACGACACCGCCCGGTACTTTTG CGCCAGGGACTCCTACGGCAACTTCAAGCGGGGCTGGTTCGATTTTTGGGGCCAGGGCACCACAC TGACCGTGTCCTCC
469.	PSMA-9 LH x I2C HL	artificial	aa	NIVMTQSQKFMSTSPGDRVRVTCKASQNVGSDVAWYQAKPGQSPRILIYSTSYRYSGVPDRFTAY GSGTDFTLTITNVQSEDLTEYFCQQYNSYPLTFGAGTKLELKGGGGSGGGGSGGGGSQVQLKESG PGLVASSQSLSITCTVSGFSLTAYGINWVRQPPGKGLEWLGVIWPDGNTDYNSTLKSRLNIFKDN SKNQVFLKMSSFQTDDTARYFCARDSYGNFKRGWFDFWGQGTTLTVSSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT

				VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS
				LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
470.	PSMA-9 LH x I2C HL	artificial	nt	AACATCGTGATGACCCAGTCCCAGAAATTCATGTCCACCTCTCCCGGCGATAGAGTGCGCGTGAC
				CTGCAAGGCCTCCCAGAACGTGGGCTCCGACGTGGCCTGGTATCAGGCCAAGCCTGGCCAGTCCC
				CTCGGATCCTGATCTACTCCACCTCCTACCGGTACTCCGGCGTGCCTGACAGATTCACCGCCTAC
				GGCTCCGGCACCGACTTCACCCTGACCATTACAAACGTGCAGTCCGAGGACCTGACCGAGTACTT
				CTGCCAGCAGTACAACTCCCTACCCCTCTGACCTTCGGCGCTGGCACCAAGCTGGAACTGAAGGCG
				GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGAAAGAGTCCGGC
				CCTGGCCTGGTGGCCCTCCTCCCAGTCCCTGTCCATCACCTGCACCGTGTCAGGCTTCTCCCTGAC
				CGCTTACGGCATCAACTGGGTGCGCCAGCCTCCTGGCAAGGGCCTGGAATGGCTGGGCGTGATCT
				GGCCTGACGGCAACACCGACTACAACAGCGCACCCTGAAGTCCCGGCTGAACATCTTCAAGGACAAC
				TCCAAGAACCAGGTGTTCCTGAAGATGTCCTCTTTCCAGACCGACGACACCGCCCGGTACTTTTG
				CGCCAGGGACTCCTACGGCAACTTCAAGCGGGGCTGGTTCGATTTTTGGGGCCAGGGCACCACAC
				TGACCGTGTCCTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCCTGCCAGATTCTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
471.	PSMA-10 VL	artificial	aa	NIVMTQFPKSMSISVGERVTLTCKASENVGTYVSWYQQKPEQSPKMLIYGASNRFTGVPDRFTGS
				GSATDFILTISSVQTEDLVDYYCGQSYTFPYTFGGGTKLEMK
472.	PSMA-10 VL	artificial	nt	AACATCGTGATGACCCAGTTCCCTAAGTTCCATGTCCACATCTCCGTGGGCGACAGAGATGACCCTGAC
				CTGCAAGGCCTCCGAGAACGTGGGCACCTACGTGTCCTGGTATCAGCAGAAGCCTGAGCAGTCCC
				CTAAGATGCTGATCTACGGCGCCTCCAACAGGTTCACCGGCGTGCCTGACAGATTCACCGGCTCC
				GGCTCCGCCACCGACTTCATCTGACCATCTCCAGCGTGCAGACCGAGGACCTGGTGGACTACTA
				CTGCGGCCAGTCCTACACCTTCCCTACACCTTCGGCGGAGGGACCAAGCTGGAAATGAAG
473.	PSMA-10 LCDR1	artificial	aa	KASENVGTYVS
474.	PSMA-10 LCDR2	artificial	aa	GASNRFT
475.	PSMA-10 LCDR3	artificial	aa	GQSYTFPYT
476.	PSMA-10 VH	artificial	aa	EVKLEESGGGLVQPGGSMKLSCVASGFTFSNYWMNWVRQSPEKGLEWVAEIRSQSNNFATHYAES
				VKGRVIISRDDSKSSVYLQMNNLRAEDTGIYYCTRRWNNFWGQGTTLTVSS

477.	PSMA-10 VH	artificial	nt	GAAGTGAAGCTGGAAGAGTCCGGCGGAGGACTGGTGCAGCCTGGCGGCTCCATGAAGCTGTCCTG CGTGGCTTCCGGCTTCACCTTCTCCAACTACTGGATGAACTGGGTGCGCCAGTCCCCTGAGAAGG GCCTGGAATGGGTGGCCGAGATCCGGTCCCAGTCCAACACAACTTCGCCACCCACTACGCCGAGTCC GTGAAGGGCAGAGTGATCATCTCCCGGGACGACTCCAAGTCCTCCGTGTACCTGCAGATGAACAA CCTGCGGGCCGAGGACACCGGCATCTACTACTGCACCCGGCGGTGGAACAACTTTGGGGCCAGG GCACCACACTGACCGTGTCCTCC
478.	PSMA-10 HCDR1	artificial	aa	NYWMN
479.	PSMA-10 HCDR2	artificial	aa	EIRSQSNNFATHYAESVKG
480.	PSMA-10 HCDR3	artificial	aa	RWNNF
481.	PSMA-10 LH	artificial	aa	NIVMTQFPKSMSISVGERVTLTCKASENVGTYVSWYQQKPEQSPKMLIYGASNRFTGVPDRFTGS GSATDFILTISSVQTEDLVDYYCGQSYTFPYTFGGGTKLEMKGGGGSGGGGSGGGGSEVKLEESG GGLVQPGGSMKLSCVASGFTFSNYWMNWVRQSPEKGLEWVAEIRSQSNNFATHYAESVKGRVIIS RDDSKSSVYLQMNNLRAEDTGIYYCTRRWNNFWGQGTTLTVSS
482.	PSMA-10 LH	artificial	nt	AACATCGTGATGACCCAGTTCCCTAAGTCCATGTCCATCTCCGTGGGCGACAGAGATGTGACCCTGAC CTGCAAGGCCTCCGAGAACGTGGGCACCTACGTGTCCTGGTATCAGCAGAAGCCTGAGCAGTCCC CTAAGATGCTGATCTACGGCGCCTCCAACAGGTTCACCGGCGTGCCTGACAGATTCACCGGCTCC GGCTCCGGCACCGACTTCATCCTGACCATCTCCAGCGTGCAGACCGAGGACCTGGTGGACTACTA CTGCGGCCAGTCCTACACCTTCCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATGAAGGGCG GAGGGGGATCTGGCGGCGAGAAGTGGAGGGGGCGGATCCGAAGTGAAGCTGGAAGAGTCCGGC GGAGGACTGGTGCAGCCTGGCGGCTCCATGAAGCTGTCCTGCGTGGCTTCCGGCTTCACCTTCTC CAACTACTGGATGAACTGGGTGCGCCAGTCCCCTGAGAAGGGCCTGGAATGGTGGCCCGAGATCC GGTCCCAGTCCAACAACTTCGCCACCCACTACGCCGAGTCCGTGAAGGGCAGAGTGATCATCTCC CGGGACGACTCCAAGTCCTCCGTGTACCTGCAGATGAACAACCTGCGGGCCGAGGACACCGGCAT CTACTACTGCACCCGGCGGTGGAACAACTTTTGGGGCCAGGGCACCACACTGACCGTGTCCTCC
483.	PSMA-10 LH x I2C HL	artificial	aa	NIVMTQFPKSMSISVGERVTLTCKASENVGTYVSWYQQKPEQSPKMLIYGASNRFTGVPDRFTGS GSATDFILTISSVQTEDLVDYYCGQSYTFPYTFGGGTKLEMKGGGGSGGGGSGGGGSEVKLEESG GGLVQPGGSMKLSCVASGFTFSNYWMNWVRQSPEKGLEWVAEIRSQSNNFATHYAESVKGRVIIS RDDSKSSVYLQMNNLRAEDTGIYYCTRRWNNFWGQGTTLTVSSGGGGSEVQLVESGGGLVQPGGS LKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAY LQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQE PSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGGK AALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
484.	PSMA-10 LH x I2C HL	artificial	nt	AACATCGTGATGACCCAGTTCCCTAAGTCCATGTCCATCTCCGTGGGCGAGAGAGTGACCCTGAC CTGCAAGGCCTCCGAGAACGTGGGCACCTACGTGTCCTGGTATCAGCAGAAGCCTGAGCAGTCCC CTAAGATGCTGATCTACGGCGCCTCCAACAGGTTCACCGGCGTGCCTGACAGATTCACCGGCTCC GGCTCCGCCACCGACTTCATCCTGACCATCTCCAGCGTGCAGACCGAGGACCTGGTGGACTACTA CTGCGGCCAGTCCTACACCTTCCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATGAAGGGCG

				GAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGAAGCTGGAAGAGTCCGGC
				GGAGGACTGGTGCAGCCTGGCGGCTCCATGAAGCTGTCCTGCGTGGCTTCCGGCTTCACCTTCTC
				CAACTACTGGATGAACTGGGTGCGCCAGTCCCCTGAGAAGGGCCTGGAATGGGTGGCCGAGATCC
				GGTCCCAGTCCAACAACTTCGCCACCCACTACGCCGAGTCCGTGAAGGGCCAGATCATCTCC
				CGGGACGACTCCAAGTCCTCCGTGTACCTGCAGATGAACAACCTGCGGGCCGAGGACACCGGCAT
				CTACTACTGCACCCGGGCGGTGGAACAACTTTTGGGGCCAGGGCACCACACTGACCGTGTCCTCCG
				GAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCA
				TTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCA
				GGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACAT
				ATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTAT
				CTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTT
				CGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAG
				GTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAA
				CCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCACTTGTGGCTCCTCGACTGGGCTGT
				TACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAG
				GTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAG
				GCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTA
				CAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
485.	PSMA-A VL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISNYLAWYQQKTGKVPKFLIYEASTLQSGVPSRFSGG
				GSGTDFTLTISSLQPEDVATYYCQNYNSAPFTFGPGTKVDIK
486.	PSMA-A VL	artificial	nt	GACATCCAGATGACCCAGTCCCCCTCCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC
				CTGCCGGGCCTCCCAGGGCATCTCCAACTACCTGGCCTGGTATCAGCAGAAAACCGGCAAGGTGC
				CCAAGTTCCTGATCTACGAGGCCTCCACCCTGCAGTCCGGCGTGCCTTCCAGATTCTCTGGCGGC
				GGATCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACGTGGCCACCTACTA
				CTGCCAGAACTACAACTCCGCCCCCTTTCACCTTCGGCCCTGGCACCAAGGTGGACATCAAG
487.	PSMA-A LCDR1	artificial	aa	RASQGISNYLA
488.	PSMA-A LCDR2	artificial	aa	EASTLQS
489.	PSMA-A LCDR3	artificial	aa	QNYNSAPFT
490.	PSMA-A VH	artificial	aa	QVQLVESGGGVVQPGRSLRLSCAASGFAFSRYGMHWVRQAPGKGLEWVAVIWYDGSNKYYADSVK
				GRFTISRDNSKNTQYLQMNSLRAEDTAVYYCARGGDFLYYYYYGMDVWGQGTTVTVSS
491.	PSMA-A VH	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGAGGGGTGGTCCAGCCTGGCCGGTCCCTGAGACTGTCTTG
				CGCCGCCTCCGGCTTCGCCTTCTCCAGATACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGG
				GACTGGAATGGGTGGCCGTGATTTGGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAG
				GGCCGGTTCACCATCTCCCGGGACAACTCCAAGAACACCCAGTACCTGCAGATGAACTCCCTGAG
				GGCAGAGGACACCGCCGTGTACTACTGCGCCAGAGGCGGCGACTTCCTGTACTACTACTATTACG
				GCATGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCC
492.	PSMA-A HCDR1	artificial	aa	RYGMH

493.	PSMA-A HCDR2	artificial	aa	VIWYDGSNKYYADSVKG
494.	PSMA-A HCDR3	artificial	aa	GGDFLYYYYGMDV
495.	PSMA-A LH	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISNYLAWYQQKTGKVPKFLIYEASTLQSGVPSRFSGG GSGTDFTLTISSLQPEDVATYYCQNYNSAPFTFGPGTKVDIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFAFSRYGMHWVRQAPGKGLEWVAVIWYDGSNKYYADSVKGRFTISRD NSKNTQYLQMNSLRAEDTAVYYCARGGDFLYYYYGMDVWGQGTTVTVSS
496.	PSMA-A LH	artificial	nt	GACATCCAGATGACCCAGTCCCCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGCCTCCCAGGGCATCTCCAACTACCTGGCCTGGTATCAGCAGAAAACCGGCAAGGTGC CCAAGTTCCTGATCTACGAGGCCTCCACCCTGCAGTCCGGCGTGCCTTCCAGATTCTCTGGCGGC GGATCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACGTGGCCACCTACTA CTGCCAGAACTACAACTCCGCCCCCTTTCACCTTCGGCCCTGGCACCAAGGTGGACATCAAGGGCG GAGGGGGCAGTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGTGGTCCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTCCGGCTTCGCCTTCTC CAGATACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCGTGATTT GGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCAGAGGACACCGCCGTGTACTA CTGCGCCAGAGGCGGCGACTTCCTGTACTACTACTATTACGGCATGGACGTGTGGGGCCAGGGCA CCACCGTGACAGTGTCTTCC
497.	PSMA-A LH x I2C HL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISNYLAWYQQKTGKVPKFLIYEASTLQSGVPSRFSGG GSGTDFTLTISSLQPEDVATYYCQNYNSAPFTFGPGTKVDIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFAFSRYGMHWVRQAPGKGLEWVAVIWYDGSNKYYADSVKGRFTISRD NSKNTQYLQMNSLRAEDTAVYYCARGGDFLYYYYYGMDVWGQGTTVTVSSGGGGSEVQLVESGGG LVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRD DSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGS QTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFS GSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
498.	PSMA-A LH x I2C HL	artificial	nt	GACATCCAGATGACCCAGTCCCCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGCCTCCCAGGGCATCTCCAACTACCTGGCCTGGTATCAGCAGAAAACCGGCAAGGTGC CCAAGTTCCTGATCTACGAGGCCTCCACCCTGCAGTCCGGCGTGCCTTCCAGATTCTCTGGCGGC GGATCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACGTGGCCACCTACTA CTGCCAGAACTACAACTCCGCCCCCTTTCACCTTCGGCCCTGGCACCAAGGTGGACATCAAGGGCG GAGGGGGCAGTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGTGGTCCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTCCGGCTTCGCCTTCTC CAGATACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCGTGATTT GGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCAGAGGACACCGCCGTGTACTA CTGCGCCAGAGGCGGCGACTTCCTGTACTACTACTATTACGGCATGGACGTGTGGGGCCAGGGCA

				CCACCGTGACAGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGA TTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTA CGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTA AATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGAT GATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTA CTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGA CTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTG TGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACACAAAAACCAGGTC AGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCA GGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGA ATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCC TA
499.	PSMA-B VL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGITNYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFSLTISSLQPEDFATYYCQQYNSYPITFGQGTRLEIK
500.	PSMA-B VL	artificial	nt	GACATCCAGATGACCCAGTCACCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCACAGGGCATCACCAACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCTCCCTGACCATCTCCTCCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTACCCTATCACCTTCGGCCAGGGCACCCGGCTGGAAATCAAG
501.	PSMA-B LCDR1	artificial	aa	RASQGITNYLA
502.	PSMA-B LCDR2	artificial	aa	AASSLQS
503.	PSMA-B LCDR3	artificial	aa	QQYNSYPIT
504.	PSMA-B VH	artificial	aa	QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYVMEWVRQAPGKGLEWVAIIWYDGSNKYYADSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAGGYNWNYEYHYYGMDVWGQGTTVTVSS
505.	PSMA-B VH	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGCGGAGGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTG CGCTGCCTCCGGCTTCACCTTCTCCAACTACGTGATGCACTGGGTGCGCCAGGCTCCAGGCAAGG GACTGGAATGGGTGGCCATCATTTGGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAG GGCCGGTTCACCATCTCCCGGGACAACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAG GGCCGAGGACACCGCCGTGTACTACTGCGCTGGCGGCTACAACTGGAACTACGAGTACCACTACT ACGGCATGGACGTGTGGGGCCAGGGAACCACCGTGACCGTCTCC
506.	PSMA-B HCDR1	artificial	aa	NYVMH
507.	PSMA-B HCDR2	artificial	aa	IIWYDGSNKYYADSVKG
508.	PSMA-B HCDR3	artificial	aa	GYNWNYEYHYYGMDV
509.	PSMA-B LH	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGITNYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFSLTISSLQPEDFATYYCQQYNSYPITFGQGTRLEIKGGGGSGGGGSGGGGSGGGGSQVQLVESG

				GGVVQPGRSLRLSCAASGFTFSNYVMHWVRQAPGKGLEWVAIIWYDGSNKYYADSVKGRFTISRD NSKNTLYLQMNSLRAEDTAVYYCAGGYNWNYEYHYYGMDVWGQGTTVTVSS
510.	PSMA-B LH	artificial	nt	GACATCCAGATGACCCAGTCACCTCCCTCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCACAGGGCATCACCAACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCTCCCTGACCATCTCCTCCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTACCCTATCACCTTCGGCCAGGGCACCCGGCTGGAAATCAAGGGCG GAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTC CAACTACGTGATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCATCATTT GGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGCCGTGTACTA CTGCGCTGGCGGCTACAACTGGAACTACGAGTACCACTACTACGGCATGGACGTGTGGGGCCAGG GAACCACCGTGACCGTCTCCTCC
511.	PSMA-B LH x I2C HL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGITNYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFSLTISSLQPEDFATYYCQQYNSYPITFGQGTRLEIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFTFSNYVMHWVRQAPGKGLEWVAIIWYDGSNKYYADSVKGRFTISRD NSKNTLYLQMNSLRAEDTAVYYCAGGYNWNYEYHYYGMDVWGQGTTVTVSSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
512.	PSMA-B LH x I2C HL	artificial	nt	GACATCCAGATGACCCAGTCACCTCCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCACAGGGCATCACCAACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCTCCCTGACCATCTCCTCCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTACCCTATCACCTTCGGCCAGGGCACCCGGCTGGAAATCAAGGGCG GAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTC CAACTACGTGATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCATCATTT GGTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGCCGTGTACTA CTGCGCTGGCGGCTACAACTGGAACTACGAGTACCACTACTACGGCATGGACGTGTGGGGCCAGG GAACCACCGTGACCGTCTCCTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCCGCATAAGAA GTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGA

				GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTACTGGGCTTACTGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGTGGAACAGTCACACTCAC TTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
513.	PSMA-C VL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISHYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFTLTISSLQPEDFATYYCQQYNSFPLTFGGGTKVEIK
514.	PSMA-C VL	artificial	nt	GACATCCAGATGACCCAGTCTCCCTCCTCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCCCAGGGCATCTCTCACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTTCCCCTCTGACCTTCGGCGGAGGGACCAAGGTGGAGATCAAG
515.	PSMA-C LCDR1	artificial	aa	RASQGISHYLA
516.	PSMA-C LCDR2	artificial	aa	AASSLQS
517.	PSMA-C LCDR3	artificial	aa	QQYNSFPLT
518.	PSMA-C VH	artificial	aa	QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAPGKGLDWVAIIWHDGSNKYYADSVK GRFTISRDNSKKTLYLQMNSLRAEDTAVYYCARAWAYDYGDYEYYFGMDVWGQGTTVTVSS
519.	PSMA-C VH	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGAGGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTG TGCCGCCTCCGGCTTCACCTTCTCCTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGG GACTGGACTGGGTGGCCATCATCTGGCACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAG GGCCGGTTCACCATCTCCCGGGACAACTCCAAGAAAACCCTGTACCTGCAGATGAACTCCCTGAG GGCCGAGGACACCGCCGTGTACTACTGTGCCAGGGCCTGGGCCTACGACTACGGCGACTACGAGT ACTACTTCGGCATGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCC
520.	PSMA-C HCDR1	artificial	aa	SYGMH
521.	PSMA-C HCDR2	artificial	aa	IIWHDGSNKYYADSVKG
522.	PSMA-C HCDR3	artificial	aa	AWAYDYGDYEYYFGMDV
523.	PSMA-C LH	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISHYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFTLTISSLQPEDFATYYCQQYNSFPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAPGKGLDWVAIIWHDGSNKYYADSVKGRFTISRD NSKKTLYLQMNSLRAEDTAVYYCARAWAYDYGDYEYYFGMDVWGQGTTVTVSS
524.	PSMA-C LH	artificial	nt	GACATCCAGATGACCCAGTCTCCCTCCTCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCCCAGGGCATCTCTCACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC

				CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTTCCCTCTGACCTTCGGCGGAGGGACCAAGGTGGAGATCAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGTGCCGCCTCCGGCTTCACCTTCTC CTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAGTGGGTCCATCATCT GGCACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAAAACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGCCGTGTACTA CTGTGCCAGGGCCTGGGCCTACGACTACGGCGACTACGAGTACTACTATGCCGATTCAGTGAAAGG GCCAGGGCACCACCGTGACAGTGTCTTCC
525.	PSMA-C LH x I2C HL	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQGISHYLAWFQQKPGKAPKSLIYAASSLQSGVPSKFSGS GSGTDFTLTISSLQPEDFATYYCQQYNSFPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAPGKGLDWVAIIWHDGSNKYYADSVKGRFTISRD NSKKTLYLQMNSLRAEDTAVYYCARAWAYDYGDYEYYFGMDVWGQGTTVTVSSGGGGGSEVQLVES GGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTI SRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGG GGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPA RFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
526.	PSMA-C LH x I2C HL	artificial	nt	GACATCCAGATGACCCAGTCTCCCTCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCCCAGGGCATCTCTCACTACCTGGCCTGGTTCCAGCAGAAGCCTGGCAAGGCCC CTAAGTCCCTGATCTACGCCGCCTCCTCTCTGCAGTCCGGCGTGCCTTCCAAGTTCTCCGGCTCC GGCTCTGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTACAACTCCTTCCCTCTGACCTTCGGCGGAGGGACCAAGGTGGAGATCAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGC GGAGGGGGTGGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGTGCCGCCTCCGGCTTCACCTTCTC CTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAGTGGGTCCATCATCT GGCACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAAAACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGCCGTGTACTA CTGTGCCAGGGCCTGGGCCTACGACTACGGCGACTACGAGTACTACTATGCCGATTCAGTGAAAGG GCCAGGGCACCACCGTGACAGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCT GGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCTCATGTGCAGCCTCTGGATTCACCTT CAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCA TAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATC TCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGC CGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGG GCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGT GGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCAC

				ACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAA AACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCC AGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGA TGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCCTGGGTGTTCGGTGGAGGAACCAAAC TGACTGTCCTA
527.	PSMA-D VL	artificial	aa	GIVMTQSPATLSVSPGERATLSCRTSQSIGWNLAWYQQKPGQAPRLLIYGASSRTTGIPARFSGS GSGTEFTLTISSLQSEDSAVYYCQHYDNWPMCSFGQGTELEIK
528.	PSMA-D VL	artificial	nt	GGCATCGTGATGACCCAGTCCCCCGCCACCCTGTCTGTGTCTCCGGCGAGAGAGCCACCCTGAG CTGCCGGACCTCCCAGTCCATCGGCTGGAACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGACTGCTGATCTACGGCGCCTCCTCCAGAACCACCGGCATCCCTGCCAGGTTCTCCGGCTCT GGCTCCGGCACCGAGTTCACCCTGACCATCTCCAGCCTGCAGTCCGAGGACTCCGCCGTGTACTA CTGCCAGCACTACGACAACTGGCCTATGTGCTCCTTCGGCCAGGGCACCGAGCTGGAAATCAAG
529.	PSMA-D LCDR1	artificial	aa	RTSQSIGWNLA
530.	PSMA-D LCDR2	artificial	aa	GASSRTT
531.	PSMA-D LCDR3	artificial	aa	QHYDNWPMCS
532.	PSMA-D VH	artificial	aa	EVQLVQSGAEVKKPGESLKISCKGSGYSFTSYWIGWVRQMPGKGLEWMGIIYPGDSDTRYSPSFQ GQVTISADKSISTAYLQWSSLKASDTAMYYCARRMAAAGPFDYWGQGTLVTVSS
533.	PSMA-D VH	artificial	nt	GAAGTGCAGCTGGTGCAGTCTGGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTG CAAGGGCTCCGGCTACTCCTTCACCTCCTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGG GCCTGGAATGGATGGGCATCATCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAG GGCCAGGTGACCATCTCTGCCGACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAA GGCCTCCGACACCGCCATGTACTATTGCGCCAGGCGGATGGCCGCTGCCGGCCCTTTTGATTACT GGGGCCAGGGAACCCTGGTGACCGTGTCCTCC
534.	PSMA-D HCDR1	artificial	aa	SYWIG
535.	PSMA-D HCDR2	artificial	aa	IIYPGDSDTRYSPSFQG
536.	PSMA-D HCDR3	artificial	aa	RMAAAGPFDY
537.	PSMA-D LH	artificial	aa	GIVMTQSPATLSVSPGERATLSCRTSQSIGWNLAWYQQKPGQAPRLLIYGASSRTTGIPARFSGS GSGTEFTLTISSLQSEDSAVYYCQHYDNWPMCSFGQGTELEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKKPGESLKISCKGSGYSFTSYWIGWVRQMPGKGLEWMGIIYPGDSDTRYSPSFQGQVTISA DKSISTAYLQWSSLKASDTAMYYCARRMAAAGPFDYWGQGTLVTVSS
538.	PSMA-D LH	artificial	nt	GGCATCGTGATGACCCAGTCCCCCGCCACCCTGTCTGTGTCTCCGGCGAGAGAGCCACCCTGAG CTGCCGGACCTCCCAGTCCATCGGCTGGAACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGACTGCTGATCTACGGCGCCTCCTCCAGAACCACCGGCATCCCTGCCAGGTTCTCCGGCTCT GGCTCCGGCACCGAGTTCACCCTGACCATCTCCAGCCTGCAGTCCGAGGACTCCGCCGTGTACTA CTGCCAGCACTACGACAACTGGCCTATGTGCTCCTTCGGCCAGGGCACCGAGCTGGAAATCAAGG GCGGAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT

				GGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGCTACTCCTT CACCTCCTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGGGCCTGGAATGGATGGGCATCA TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCATCTCTGCC GACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAAGGCCTCCGACACCGCCATGTA CTATTGCGCCAGGCGGATGGCCGCTGCCGGCCCTTTTGATTACTGGGGCCAGGGAACCCTGGTGA CCGTGTCCTCC
539.	PSMA-D LH x I2C HL	artificial	aa	GIVMTQSPATLSVSPGERATLSCRTSQSIGWNLAWYQQKPGQAPRLLIYGASSRTTGIPARFSGS GSGTEFTLTISSLQSEDSAVYYCQHYDNWPMCSFGQGTELEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKKPGESLKISCKGSGYSFTSYWIGWVRQMPGKGLEWMGIIYPGDSDTRYSPSFQGQVTISA DKSISTAYLQWSSLKASDTAMYYCARRMAAAGPFDYWGQGTLVTVSSGGGGSEVQLVESGGGLVQ PGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSK NTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTV VTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSL LGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
540.	PSMA-D LH x I2C HL	artificial	nt	GGCATCGTGATGACCCAGTCCCCCGCCACCCTGTCTGTGTCTCCCGGCGCGAGAGCCCACCCTGAG CTGCCGGACCTCCCAGTCCATCGGCTGGAACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGACTGCTGATCTACGGCGCCTCCTCCTCCAGAACCACCGGCATCCCTGCCAGGTTCTCCGGCTCT GGCTCCGGCACCGAGTTCACCCTGACCATCTCCAGCCTGCAGTCCGAGGACTCCGCCGTGTACTA CTGCCAGCACTACGACAACTGGCCTATGTGCTCCTTCGGCCAGGGCACCGAGCTGGAAATCAAGG GCGGAGGGGGATCTGGCGGCGGAGGAAGTGGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT GGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGCTACTCCTT CACCTCCTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGGGCCTGGAATGGATGGGCATCA TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCATCTCTGCC GACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAAGGCCTCCGACACCGCCATGTA CTATTGCGCCAGGCGGATGGCCGCTGCCGGCCCTTTTGATTACTGGGGCCAGGGAACCCTGGTGA CCGTGTCCTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAA CTGGGTCCGCCAGGCTCCAGGAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATA ATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAA AACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAG ACATGGGAACTTCGGTAATAGCTACATACTATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCA CCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTT GTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTC GACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCC GTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTG CTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTG TGTTCTATGGTACAGCAACCGGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA

541.	PSMA-E VL	artificial	aa	DIVMTQTPLSLSVTPGQPASISCKSSQSLLHSDGKTFLYWYLQKPGQPPQLLIYEVSNRFSGVPD RFSGSGSGTDFTLKISRVEAEDVGLYYCMQSIQLPLTFGGGTKVEIK
542.	PSMA-E VL	artificial	nt	GACATCGTGATGACCCAGACCCACCCTCTGTCCCTGTCTGTGACCCCTGGCCAGCCTGCCTCCATCTC CTGCAAGTCCTCCCAGTCCCTGCTGCACTCCGACGGCAAGACCTTCCTGTACTGGTATCTGCAGA AGCCCGGCCAGCCTCCTCAGCTGCTGATCTACGAGGTGTCCAACCGGTTCTCCGGCGTGCCTGAC AGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCTGAGGA CGTGGGCCTGTACTACTGCATGCAGTCCATCCAGCTGCCTCTGACCTTCGGCGGAGGGACCAAGG TGGAGATCAAG
543.	PSMA-E LCDR1	artificial	aa	KSSQSLLHSDGKTFLY
544.	PSMA-E LCDR2	artificial	aa	EVSNRFS
545.	PSMA-E LCDR3	artificial	aa	MQSIQLPLT
546.	PSMA-E VH	artificial	aa	QVQLVESGGGVVQPGRSLRLSCAASGFTFISYGMHWVRQAPGKGLEWVAVISYDGSNKYYADSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARVLVGALYYYNYYGMDVWGQGTTVTVSS
547.	PSMA-E VH	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGGAGGGGTCGTGCAGCCTGGGCGGTCCCTGAGACTGTCTTG CGCCGCCTCCGGCTTCACCTTCATCTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGG GACTGGAATGGGTGGCCGTGATCTCCTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAG GGCCGGTTCACCATCTCCCGGGACAACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAG GGCCGAGGACACCGCCGTGTACTACTGTGCCAGGGTGCTGGTCGGCGCTCTGTACTACTACAACT ACTACGGCATGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCC
548.	PSMA-E HCDR1	artificial	aa	SYGMH
549.	PSMA-E HCDR2	artificial	aa	VISYDGSNKYYADSVKG
550.	PSMA-E HCDR3	artificial	aa	VLVGALYYYNYYGMDV
551.	PSMA-E LH	artificial	aa	DIVMTQTPLSLSVTPGQPASISCKSSQSLLHSDGKTFLYWYLQKPGQPPQLLIYEVSNRFSGVPD RFSGSGSGTDFTLKISRVEAEDVGLYYCMQSIQLPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQ LVESGGGVVQPGRSLRLSCAASGFTFISYGMHWVRQAPGKGLEWVAVISYDGSNKYYADSVKGRF TISRDNSKNTLYLQMNSLRAEDTAVYYCARVLVGALYYYNYYGMDVWGQGTTVTVSS
552.	PSMA-E LH	artificial	nt	GACATCGTGATGACCCAGACCCACCCTCTGTCCCTGTCTGTGACCCCTGGCCAGCCTGCCTCCATCTC CTGCAAGTCCTCCCAGTCCCTGCTGCACTCCGACGGCAAGACCTTCCTGTACTGGTATCTGCAGA AGCCCGGCCAGCCTCCTCAGCTGCTGATCTACGAGGTGTCCAACCGGTTCTCCGGCGTGCCTGAC AGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCTGAGGA CGTGGGCCTGTACTACTGCATGCAGTCCATCCAGCTGCCTCTGACCTTCGGCGGAGGGACCAAGG TGGAGATCAAGGGCGGAGGCGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAG CTGGTCGAGTCTGGGGGAGGGGTCGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTC CGGCTTCACCTTCATCTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAAT GGGTGGCCGTGATCTCCTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTC ACCATCTCCCGGGACAACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGA

				CACCGCCGTGTACTACTGTGCCAGGGTGCTGGTCGGCGCTCTGTACTACTACAACTACTACGGCA
				TGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCC
553.	PSMA-E LH x I2C HL	artificial	aa	DIVMTQTPLSLSVTPGQPASISCKSSQSLLHSDGKTFLYWYLQKPGQPPQLLIYEVSNRFSGVPD RFSGSGSGTDFTLKISRVEAEDVGLYYCMQSIQLPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQ LVESGGGVVQPGRSLRLSCAASGFTFISYGMHWVRQAPGKGLEWVAVISYDGSNKYYADSVKGRF TISRDNSKNTLYLQMNSLRAEDTAVYYCARVLVGALYYYNYYGMDVWGQGTTVTVSSGGGGSEVQ LVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKD RFTISRDDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGG GSGGGGSQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAP GTPARFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
554.	PSMA-E LH x I2C HL	artificial	nt	GACATCGTGATGACCCAGACCCCCCTCTGTCCCCTGTCTGTGACCCCCTGGCCAGCCTGCCTCCATCTC CTGCAAGTCCTCCCAGTCCCTGCTGCACTCCGACGGCAAGACCTTCCTGTATCTGGTATCTGCAGA AGCCCGGCCAGCCTCCTCAGCTGCTGATCTACGAGGTGTCCAACCGGTTCTCCGGCGTGCCTGAC AGGTTCTCTGGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCTGAGGA CGTGGGCCTGTACTACTGCATGCAGTCCATCCAGCTGCCTCTGACCTTCGGCGGAGGGACCAAGG TGGAGATCAAGGGCGGAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAG CTGGTCGAGTCTGGGGGAGGGGTCGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTC CGGCTTCACCTTCATCTCTTACGGCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAAT GGGTGGCCGTGATCTCCTACGACGGCTCCAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTC ACCATCTCCCGGGACAACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGA CACCGCCGTGTACTACTGTGCCAGGGTGCTGGTCGGCGCTCTGTACTACTACAACTACTACGGCA TGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAG CTGGTCGAGTCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTC TGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAGGGTTTGGAAT GGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGAC AGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAAC TGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATCCTACT GGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGC GGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGG TGGAACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACT GGGTCCAACAAAAACCAGGTCAGGCACCCCGGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCC GGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGT ACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTG GAGGAACCAAACTGACTGTCCTA
555.	PSMA-F VL	artificial	aa	AIQLTQSPSSLSASVGDRVTITCRASQGISSALAWYQQKSGKAPKLLIFDASSLESGVPSRFSGS GSGTDFTLTISSLQPEDFATYYCQQFNSYPLTFGGGTKVEIK
556.	PSMA-F VL	artificial	nt	GCCATCCAGCTGACCCAGAGTCCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC

				CTGCCGGGCCTCCCAGGGCATCTCTTCCGCCCTGGCCTGGTATCAGCAGAAGTCCGGCAAGGCCC CTAAGCTGCTGATCTTCGACGCCTCCTCTCTGGAATCCGGCGTGCCTTCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTTCAACTCCTACCCTCTGACCTTCGGCGGAGGGACCAAGGTGGAGATCAAG
557.	PSMA-F LCDR1	artificial	aa	RASQGISSALA
558.	PSMA-F LCDR2	artificial	aa	DASSLES
559.	PSMA-F LCDR3	artificial	aa	QQFNSYPLT
560.	PSMA-F VH	artificial	aa	QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYAMHWVRQAPGKGLEWVAVISYDGNNKYYADSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARAVPWGSRYYYYGMDVWGQGTTVTVSS
561.	PSMA-F VH	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGGAGGGGTCGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTG CGCCGCCTCCGGCTTCACCTTCTCCTCTTACGCCATGCACTGGGTGCGCCAGGCTCCAGGCAAGG GACTGGAATGGGTGGCCGTGATCTCCTACGACGGCAACAACAAGTACTACGCCGACTCCGTGAAG GGCCGGTTCACCATCTCCCGGGACAACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAG GGCTGAGGACACCGCCGTGTACTACTGCGCCAGAGCCGTGCCTTGGGGCTCCCGGTACTACTACT ACGGCATGGACGTGTGGGGCCAGGGCACCACCGTGACAGTGTCTTCC
562.	PSMA-F HCDR1	artificial	aa	SYAMH
563.	PSMA-F HCDR2	artificial	aa	VISYDGNNKYYADSVKG
564.	PSMA-F HCDR3	artificial	aa	AVPWGSRYYYYGMDV
565.	PSMA-F LH	artificial	aa	AIQLTQSPSSLSASVGDRVTITCRASQGISSALAWYQQKSGKAPKLLIFDASSLESGVPSRFSGS GSGTDFTLTISSLQPEDFATYYCQQFNSYPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQLVESG GGVVQPGRSLRLSCAASGFTFSSYAMHWVRQAPGKGLEWVAVISYDGNNKYYADSVKGRFTISRD NSKNTLYLQMNSLRAEDTAVYYCARAVPWGSRYYYYGMDVWGQGTTVTVSS
566.	PSMA-F LH	artificial	nt	GCCATCCAGCTGACCCAGAGTCCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCCCAGGGCATCTCTTCCGCCCTGGCCTGGTATCAGCAGAAGTCCGGCAAGGCCC CTAAGCTGCTGATCTTCGACGCCTCCTCTCTGGAATCCGGCGTGCCTTCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTTCAACTCCTACCCTCTGACCTTCGGCGGAGGGACCAAGGTGGAGATCAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAGGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGG GGAGGGGGTCGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTCCGGCTTCACCTTCTC CTCTTACGCCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCGTGATCT CCTACGACGGCAACAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCTGAGGACACCGCCGTGTACTA CTGCGCCAGAGCCGTGCCTTGGGGCTCCCGGTACTACTACGGCATGGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCTTCC
567.	PSMA-F LH x I2C HL	artificial	aa	AIQLTQSPSSLSASVGDRVTITCRASQGISSALAWYQQKSGKAPKLLIFDASSLESGVPSRFSGS GSGTDFTLTISSLQPEDFATYYCQQFNSYPLTFGGGTKVEIKGGGGSGGGGSGGGGSQVQLVESG

				GGVVQPGRSLRLSCAASGFTFSSYAMHWVRQAPGKGLEWVAVISYDGNNKYYADSVKGRFTISRD NSKNTLYLQMNSLRAEDTAVYYCARAVPWGSRYYYYGMDVWGQGTTVTVSSGGGGSEVQLVESGG GLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISR DDSKNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGG SQTVVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARF SGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
568.	PSMA-F LH x I2C HL	artificial	nt	GCCATCCAGCTGACCCAGAGTCCCTCCTCCCTGTCTGCCTCCGTGGGCGACAGAGTGACCATCAC CTGCCGGGCCTCCCAGGGCATCTCTTCCGCCCTGGCCTGGTATCAGCAGAAGTCCGGCAAGGCCC CTAAGCTGCTGATCTTCGACGCCTCCTCTCTGGAATCCGGCGTGCCTTCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGCAGCCTGAGGACTTCGCCACCTACTA CTGCCAGCAGTTCAACTCCCTACCCTCTTCGGCGGAGGGACCAAGGTGGAGATCAAGGGCG GAGGGGGCTCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCTCAGGTGCAGCTGGTCGAGTCTGGG GGAGGGGTCGTGCAGCCTGGCCGGTCCCTGAGACTGTCTTGCGCCGCCTCCGGCTTCACCTTCTC CTCTTACGCCATGCACTGGGTGCGCCAGGCTCCAGGCAAGGGACTGGAATGGGTGGCCGTGATCT CCTACGACGGCAACAACAAGTACTACGCCGACTCCGTGAAGGGCCGGTTCACCATCTCCCGGGAC AACTCCAAGAACACCCTGTACCTGCAGATGAACTCCCTGAGGGCTGAGGACACCGCCGTGTACTA CTGCGCCAGAGCCGTGCCTTGGGGCTCCCGGTACTACTACTACGGCATGGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGA GGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAA GTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAA GTAAATATAATAATTATATGCAACATATTATGCCGATTCAGTGAAGACAGGTTCACCATCTCCAGA GATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTA CTACTGTGTGAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAG GGACTCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGT TCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCAC TTGTGGCTCCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAG GTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTC TCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGC AGAATATTACTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTG TCCTA
569.	PSMA-J VL	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWFQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSNWLMYTFGQGTKLEIK
570.	PSMA-J VL	artificial	nt	GAGATCGTGCTGACCCAGTCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGAGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTTCCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA CTGCCAGCAGCGGTCCAACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAG

571.	PSMA-J LCDR1	artificial	aa	RASQSVSSYLA
572.	PSMA-J LCDR2	artificial	aa	DASNRAT
573.	PSMA-J LCDR3	artificial	aa	QQRSNWLMYT
574.	PSMA-J VH	artificial	aa	EVQLVQSGAEVKKPGESLKISCKGSGYSFTSYWIGWARQMPGKGLEWMGIIYPGDSDTRYSPSFQ GQVTISADKSISTAYLQWSSLKASDTAMYYCSAANSSHWYFDLWGRGTLVTVSS
575.	PSMA-J VH	artificial	nt	GAAGTGCAGCTGGTGCAGTCTGGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTG CAAGGGCTCCGGGTACTCCTTCACCTCCTACTGGATCGGCTGGGCCAGGCAGATGCCAGGCAAGG GCCTGGAATGGATGGGCATCATCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAG GGCCAGGTGACCATCTCTGCCGACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAA GGCCTCCGACACCGCCATGTACTATTGCTCCCGCCGCCAACTCCTCCCACTGGTACTTCGACCTGT GGGGCAGAGGCACCCTGGTGACCGTGTCTTCC
576.	PSMA-J HCDR1	artificial	aa	SYWIG
577.	PSMA-J HCDR2	artificial	aa	IIYPGDSDTRYSPSFQG
578.	PSMA-J HCDR3	artificial	aa	ANSSHWYFDL
579.	PSMA-J LH	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWFQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSNWLMYTFGQGTKLEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKKPGESLKISCKGSGYSFTSYWIGWARQMPGKGLEWMGIIYPGDSDTRYSPSFQGQVTISA DKSISTAYLQWSSLKASDTAMYYCSAANSSHWYFDLWGRGTLVTVSS
580.	PSMA-J LH	artificial	nt	GAGATCGTGCTGACCCAGTCCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGAGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTTCCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA CTGCCAGCAGCGGTCCCAACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAGG GCGGAGGGGGATCTGGGGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT GGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGGTACTCCTT CACCTCCTACTGGATCGGCTGGGCCAGGCAGATGCCAGGCAAGGGCCTGGAATGGGCATCA TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCATCTCTGCC GACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAAGGCCTCCGACACCGCCATGTA CTATTGCTCCCGCCGCCAACTCCTCCCACTGGTACTTCGACCTGTGGGGCAGAGGCACCCTGGTGA CCGTGTCTTCC
581.	PSMA-J LH x I2C HL	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWFQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSNWLMYTFGQGTKLEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKKPGESLKISCKGSGYSFTSYWIGWARQMPGKGLEWMGIIYPGDSDTRYSPSFQGQVTISA DKSISTAYLQWSSLKASDTAMYYCSAANSSHWYFDLWGRGTLVTVSSGGGGSGGGGSGGGGSQVQ PGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSK NTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTV

				VTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSL LGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
582.	PSMA-J LH x I2C HL	artificial	nt	GAGATCGTGCTGACCCAGTCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTTCCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA CTGCCAGCAGCGGTCCAACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAGG GCGGAGGGGGATCTGGGGGCGGAGGAAGTGGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT GGCGCCGAAGTGAAGAAGCCCGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGGTACTCCTT CACCTCCTACTGGATCGGCTGGGCCAGGCAGATGCCCAGGCAAGGGCCTGGAATGGATGGGCATCA TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCATCTCTGCC GACAAGTCCATCTCCACCGCCTACCTGCAGTGGTCCTCCCTGAAGGCCTCCGACACCGCCATGTA CTATTGCTCCGCCGCCAACTCCTCCCACTGGTACTTCGACCTGTGGGGCAGAGGCACCCTGGTGA CCGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAA CTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATA ATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAA AACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAG ACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCA CCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTT GTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTC GACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCC GTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTG CTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTG TGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
583.	PSMA-L VL	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWYQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSDWLMYTFGQGTKLEIK
584.	PSMA-L VL	artificial	nt	GAGATCGTGCTGACCCAGTCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGAGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA CTGCCAGCAGCGGTCCGACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAG
585.	PSMA-L LCDR1	artificial	aa	RASQSVSSYLA
586.	PSMA-L LCDR2	artificial	aa	DASNRAT
587.	PSMA-L LCDR3	artificial	aa	QQRSDWLMYT
588.	PSMA-L VH	artificial	aa	EVQLVQSGAEVKTPGESLKISCKGSGYTFTSYWIGWVRQMPGKGPEWMGIIYPGDSDTRYSPSFQ GQVTFSADKSISTAYLQWNSLKTSDTAMYYCATANPSYWYFDLWGRGTLVTVSS

589.	PSMA-L VH	artificial	nt	GAAGTGCAGCTGGTGCAGTCTGGCGCCGAAGTGAAAAACCCCTGGCGAGTCCCTGAAGATCTCCTG CAAGGGCTCCGGCTACACCTTCACCTCTTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGG GCCCTGAGTGGATGGGCATCATCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAG GGCCAGGTGACCTTCTCCGCCGACAAGTCCATCTCCACCGCCTACCTGCAGTGGAACTCCCTGAA AACCTCCGACACCGCCATGTACTATTGCGCCACCCGCCAACCCTAGCTACTGGTACTTCGACCTGT GGGGCAGAGGCACCCTGGTGACCGTGTCTTCC
590.	PSMA-L HCDR1	artificial	aa	SYWIG
591.	PSMA-L HCDR2	artificial	aa	IIYPGDSDTRYSPSFQG
592.	PSMA-L HCDR3	artificial	aa	ANPSYWYFDL
593.	PSMA-L LH	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWYQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSDWLMYTFGQGTKLEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKTPGESLKISCKGSGYTFTSYWIGWVRQMPGKGPEWMGIIYPGDSDTRYSPSFQGQVTFSA DKSISTAYLQWNSLKTSDTAMYYCATANPSYWYFDLWGRGTLVTVSS
594.	PSMA-L LH	artificial	nt	GAGATCGTGCTGACCCAGTCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGAGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA CTGCCAGCAGCGGTCCGACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAGG GCGGAGGGGGATCTGGCGGCGGAGGAAGTGGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT GGCGCCGAAGTGAAAAACCCCTGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGCTACACCTT CACCTCTTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGGGCCCCTGAGTGGGCATCA TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCTTCTCCGCC GACAAGTCCATCTCCACCGCCTACCTGCAGTGGAACTCCCTGAAAACCTCCGACACCGCCATGTA CTATTGCGCCACCGCCAACCCTAGCTACTGGTACTTCGACCTGTGGGGCAGAGGCACCCTGGTGA CCGTGTCTTCC
595.	PSMA-L LH x I2C HL	artificial	aa	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWYQQKPGQAPRLLIYDASNRATGIPARFSGS GSGTDFTLTISSLEPEDFAVYYCQQRSDWLMYTFGQGTKLEIKGGGGSGGGGSGGGGSEVQLVQS GAEVKTPGESLKISCKGSGYTFTSYWIGWVRQMPGKGPEWMGIIYPGDSDTRYSPSFQGQVTFSA DKSISTAYLQWNSLKTSDTAMYYCATANPSYWYFDLWGRGTLVTVSSGGGGSEVQLVESGGGLVQ PGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSK NTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTV VTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSL LGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
596.	PSMA-L LH x I2C HL	artificial	nt	GAGATCGTGCTGACCCAGTCCCCTGCCACCCTGTCTCTGTCTCCCGGCGAGAGAGCCACCCTGAG CTGCCGGGCCTCCCAGTCCGTGTCCTCCTACCTGGCCTGGTATCAGCAGAAGCCTGGACAGGCCC CTAGGCTGCTGATCTACGACGCCTCCAACAGGGCTACCGGCATCCCTGCCCGGTTCTCCGGCTCT GGCTCCGGCACCGACTTCACCCTGACCATCTCCAGCCTGGAACCTGAGGACTTCGCCGTGTACTA

				CTGCCAGCAGCGGTCCGACTGGCTGATGTATACCTTCGGCCAGGGCACCAAGCTGGAAATCAAGG
				GCGGAGGGGGATCTGGCGGCGGAGGAAGTGGAGGGGGCGGATCCGAAGTGCAGCTGGTGCAGTCT
				GGCGCCGAAGTGAAAAACCCCTGGCGAGTCCCTGAAGATCTCCTGCAAGGGCTCCGGCTACACCTT
				CACCTCTTACTGGATCGGCTGGGTGCGCCAGATGCCTGGCAAGGGCCCTGAGTGGATGGGCATCA
				TCTACCCTGGCGACTCCGACACCCGGTACTCTCCCAGCTTCCAGGGCCAGGTGACCTTCTCCGCC
				GACAAGTCCATCTCCACCGCCTACCTGCAGTGGAACTCCCTGAAAACCTCCGACACCGCCATGTA
				CTATTGCGCCACCGCCAACCCTAGCTACTGGTACTTCGACCTGTGGGGCAGAGGCACCCTGGTGA
				CCGTGTCTTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG
				CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCATGAA
				CTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATA
				ATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAA
				AACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAG
				ACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCA
				CCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTT
				GTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTCCTC
				GACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCACCCC
				GTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTG
				CTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTG
				TGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
597.	PM 99-A8 VL	artificial	aa	DIQMTQSPSTLAASAGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSRFSGSG
				SGTAFTLTISSVQTDDFATYYCQQWSRNSPYTFGQGTKLEIK
598.	PM 99-A8 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGCGGGGGAGAAAGTCACCATCAC
				CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAAGCCCCTA
				AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTTCGCTTCAGTGGCAGTGGG
				TCTGGGACCGCATTTACTCTCACAATCAGCTCCGTGCAGACTGATGACTTTGCCACTTATTACTG
				TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
599.	PM 99-A8 LCDR1	artificial	aa	RASSSVTYMH
600.	PM 99-A8 LCDR2	artificial	aa	DTSKVAS
601.	PM 99-A8 LCDR3	artificial	aa	QQWSRNSPYT
602.	PM 99-A8 VH	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK
				GRFTISRDNAKNTLYLQMDSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSS
603.	PM 99-A8 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG
				GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATGCCAAAAACACCCTGTACCTGCAAATGGACAGTCTGAG
				GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA

604.	PM 99-A8 HCDR1	artificial	aa	DFFMA
605.	PM 99-A8 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
606.	PM 99-A8 HCDR3	artificial	aa	RGNSGYYVMDA
607.	PM 99-A8 HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMDSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLAASAGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTAFTLTISSVQTDDFATYYCQQWSRNSPYTFGQGTKLEIK
608.	PM 99-A8 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGGACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGCGGGGGA GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGCATTTACTCTCACAATCAGCTCCGTGCAGACTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
609.	PM 99-A8 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMDSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGSGGGGS GGGGSDIQMTQSPSTLAASAGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTAFTLTISSVQTDDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
610.	PM 99-A8 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGGACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGCGGGGGA GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGCATTTACTCTCACAATCAGCTCCGTGCAGACTGATGACTT

				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
611.	PM 86-A10 VL	artificial	aa	DIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSRFSGSG
				SGTEFTLTISSPQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
612.	PM 86-A10 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGACAGAGTCACCATCAC
				CTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAAGCCCCTA
				AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGCTTCAGTGGCAGTGGG
				TCTGGGACCGAATTTACTCTCACAATCAGCTCCCCGCAGCCTGATGACTTTGCCACTTATTACTG
				TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGCTGGAAATCAAA
613.	PM 86-A10 LCDR1	artificial	aa	RASSSVTYMH
614.	PM 86-A10 LCDR2	artificial	aa	DTSKVAS
615.	PM 86-A10 LCDR3	artificial	aa	QQWSRNSPYT
616.	PM 86-A10 VH	artificial	aa	EVQLLESDGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNNLRSEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSS
617.	PM 86-A10 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGTTAGTGCAGCCTGGAGGGTCCCTAAACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG
				GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGCCTGAG
				GTCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACCGGTCACCGTCTCCTCA
618.	PM 86-A10 HCDR1	artificial	aa	DFFMA
619.	PM 86-A10 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
620.	PM 86-A10 HCDR3	artificial	aa	RGNSGYYVMDA
621.	PM 86-A10 HL	artificial	aa	EVQLLESDGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNNLRSEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS

				GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSPQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
622.	PM 86-A10 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAATCTGAG GTCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCCGCAGCCTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGC TGGAAATCAAA
623.	PM 86-A10 HL x I2C HL	artificial	aa	EVQLLESDGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNNLRSEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSPQPDDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
624.	PM 86-A10 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAATCTGAG GTCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCCGCAGCCTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGC TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA ATAATTATGCAACATATTATGCCGATTCAGTGAAAGGACAGGTTCACCATCTCCAGAGATGATTCA

				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGACTCTGG TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACT GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
625.	PM 86-B4-2 VL	artificial	aa	DIQMTQSPSTLAASPGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPNRFSGSG SGTEFTLTISSLQPDDIATYYCQQWSRNSPYTFGQGTKLEIK
626.	PM 86-B4-2 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTCCGGGGGACAGAGTCACCATCAC CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAATCCCCTA AATTATTGATTTATGACACATCCAAGTGGCTTCTGGAGTCCCAAATCGCTTCAGTGGCAGTGGG TCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACATTGCCACTTATTACTG TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
627.	PM 86-B4-2 LCDR1	artificial	aa	RASSSVTYMH
628.	PM 86-B4-2 LCDR2	artificial	aa	DTSKVAS
629.	PM 86-B4-2 LCDR3	artificial	aa	QQWSRNSPYT
630.	PM 86-B4-2 VH	artificial	aa	EVQLLESDGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSS
631.	PM 86-B4-2 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
632.	PM 86-B4-2 HCDR1	artificial	aa	DFFMA
633.	PM 86-B4-2 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
634.	PM 86-B4-2 HCDR3	artificial	aa	RGNSGYYVMDA
635.	PM 86-B4-2 HL	artificial	aa	EVQLLESDGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLAASPGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPNR FSGSGSGTEFTLTISSLQPDDIATYYCQQWSRNSPYTFGQGTKLEIK
636.	PM 86-B4-2 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG

				GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCCTGCATCTCCGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAATCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACAT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
637.	PM 86-B4-2 HL x I2C HL	artificial	aa	EVQLLESDGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGSGGGGS GGGGSDIQMTQSPSTLAASPGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPNR FSGSGSGTEFTLTISSLQPDDIATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
638.	PM 86-B4-2 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCCTGCATCTCCGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAATCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACAT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTTGGTGGAACAGTCACACTCACTTGTGGCTC CTCGACTGGGGCTGTTACATCTGGCAACTACCCAACTGGGTCCAACAAAACCAGGTCAGGCAC

				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
639.	PM 98-B4 VL	artificial	aa	DIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSRFSGSG SGTAYTLTISSLQTDDFATYYCQQWSRNSPYTFGQGTKLEIK
640.	PM 98-B4 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGAGAAAGTCACCATCAC CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAATCCCCTA AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGCTTCAGTGGCAGTGGG TCTGGGACCGCATATACTCTCACAATCAGCTCCCTGCAGACTGATGACTTTGCCACTTATTACTG TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
641.	PM 98-B4 LCDR1	artificial	aa	RASSSVTYMH
642.	PM 98-B4 LCDR2	artificial	aa	DTSKVAS
643.	PM 98-B4 LCDR3	artificial	aa	QQWSRNSPYT
644.	PM 98-B4 VH	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWIRQAPGKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSQSTLYLQMDSLTAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSS
645.	PM 98-B4 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGATCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCACACAAAGCACCCTGTACCTGCAAATGGACAGTCTGAC GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
646.	PM 98-B4 HCDR1	artificial	aa	DFFMA
647.	PM 98-B4 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
648.	PM 98-B4 HCDR3	artificial	aa	RGNSGYYVMDA
649.	PM 98-B4 HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWIRQAPGKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSQSTLYLQMDSLTAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTAYTLTISSLQTDDFATYYCQQWSRNSPYTFGQGTKLEIK
650.	PM 98-B4 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGATCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCACACAAAGCACCCTGTACCTGCAAATGGACAGTCTGAC GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGG TGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC

				CAGGCAAATCCCCCTAAATTATTGATTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGCATATACTCTCACAATCAGCTCCCTGCAGACTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
651.	PM 98-B4 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWIRQAPGKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSQSTLYLQMDSLTAEDTAVYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTAYTLTISSLQTDDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
652.	PM 98-B4 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGATCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCACACAAGCACCCTGTACCTGCAAATGGACAGTCTGAC GGCTGAGGACACGGCCGTTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGCATATACTCTCACAATCAGCTCCCTGCAGACTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAATCCGGAGGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG CAGCCTGGAGGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA AAAAACACTGCCTATCTACAAATGAACAACTTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCACTTGTGGCTC CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
653.	PM 86-C3 VL	artificial	aa	DIQMTQSPSTLAASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPNRFSGSG SGTEFTLTISSLQTDDSATYYCQQWSRNSPYTFGQGTKLEIK

654.	PM 86-C3 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGTGGGGGACAGAGTCACCATCAC CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAAGCCCCTA AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAATCGCTTCAGTGGCAGTGGG TCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGACTGATGACTCTGCCACTTATTACTG TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
655.	PM 86-C3 LCDR1	artificial	aa	RASSSVTYMH
656.	PM 86-C3 LCDR2	artificial	aa	DTSKVAS
657.	PM 86-C3 LCDR3	artificial	aa	QQWSRNSPYT
658.	PM 86-C3 VH	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSS
659.	PM 86-C3 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGTGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC GGCTGAGGACACGGCCATTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
660.	PM 86-C3 HCDR1	artificial	aa	DFFMA
661.	PM 86-C3 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
662.	PM 86-C3 HCDR3	artificial	aa	RGNSGYYVMDA
663.	PM 86-C3 HL	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLAASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPNR FSGSGSGTEFTLTISSLQTDDSATYYCQQWSRNSPYTFGQGTKLEIK
664.	PM 86-C3 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGTGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC GGCTGAGGACACGGCCATTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAATCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGACTGATGACTC TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
665.	PM 86-C3 HL x I2C	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK

	HL			GRFTISRDNAKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLAASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPNR FSGSGSGTEFTLTISSLQTDDSATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
666.	PM 86-C3 HL x l2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGTGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC GGCTGAGGACACGGCCATTTATACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGGCTGCATCTGTGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAATCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGACTGATGACTC TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGGCTTACTGGGGCCAAGGGACTCTGG TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACT GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACACTCACTGTGGCTC CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
667.	PM 86-E12 VL	artificial	aa	DIQMTQSPSTLSASAGDRVTITCRASSSVTYMHWYQQKPGTAPKLLIYDTSKVASGVPSRFSGSG SGTEFTLTISSVQPEDIATYYCQQWSRNSPYTFGQGTKLEIK
668.	PM 86-E12 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGCGGGGGACAGAGTCACCATCAC CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCACAGCCCCTA AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGCTTCAGTGGCAGTGGG TCTGGGACCGAATTTACTCTCACAATCAGCTCCGTGCAGCCTGAAGACATTGCCACTTATTACTG TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA

669.	PM 86-E12 LCDR1	artificial	aa	RASSSVTYMH
670.	PM 86-E12 LCDR2	artificial	aa	DTSKVAS
671.	PM 86-E12 LCDR3	artificial	aa	QQWSRNSPYT
672.	PM 86-E12 VH	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPTKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSS
673.	PM 86-E12 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAACGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTACTGTGCAAGACGGGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
674.	PM 86-E12 HCDR1	artificial	aa	DFFMA
675.	PM 86-E12 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
676.	PM 86-E12 HCDR3	artificial	aa	RGNSGYYVMDA
677.	PM 86-E12 HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPTKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASAGDRVTITCRASSSVTYMHWYQQKPGTAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSVQPEDIATYYCQQWSRNSPYTFGQGTKLEIK
678.	PM 86-E12 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAACGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATGCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGGCGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGCGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCACAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCGTGCAGCCTGAAGACAT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
679.	PM 86-E12 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPTKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNAKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASAGDRVTITCRASSSVTYMHWYQQKPGTAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSVQPEDIATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT

				VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS
				LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
680.	PM 86-E12 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAACGAAGG
				GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATGCAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG
				GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC
				GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGCGGGGGA
				CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC
				CAGGCACAGCCCCCTAAATTATTTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC
				TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCGTGCAGCCTGAAGACAT
				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCCTGCCAGATTCTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
681.	PM F1-A10 VL	artificial	aa	DIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSRFSGSG
				SGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
682.	PM F1-A10 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTAGGGGACAGAGTCACCATCAC
				CTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAAGCCCCTA
				AATTATTTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTTCGCTTCAGTGGCAGTGGG
				TCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTTTGCCACTTATTACTG
				TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGCTGGAAATCAAA
683.	PM F1-A10 LCDR1	artificial	aa	RASSVTYMH
684.	PM F1-A10 LCDR2	artificial	aa	DTSKVAS
685.	PM F1-A10 LCDR3	artificial	aa	QQWSRNSPYT
686.	PM F1-A10 VH	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSS

687.	PM F1-A10 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
688.	PM F1-A10 HCDR1	artificial	aa	DFFMA
689.	PM F1-A10 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
690.	PM F1-A10 HCDR3	artificial	aa	RGNSGYYVMDA
691.	PM F1-A10 HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
692.	PM F1-A10 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGC TGGAAATCAAA
693.	PM F1-A10 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
694.	PM F1-A10 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG

				GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC
				GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA
				CAGAGTCACCATCACCTGCCGGGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC
				CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC
				TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTT
				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGGCAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGGCTGTTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
695.	PM 99-F1 VL	artificial	aa	DIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSRFSGSG
				SGTSFTLTISSLQPEDIATYYCQQWSRNSPYTFGQGTKLEIK
696.	PM 99-F1 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGACAGAGTCACCATCAC
				CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAATCCCCTA
				AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTTCAGTGGCAGTGGG
				TCTGGGACCTCATTTACTCTCACAATCAGCTCCCTGCAGCCTGAAGACATTGCCACTTATTACTG
				TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
697.	PM 99-F1 LCDR1	artificial	aa	RASSSVTYMH
698.	PM 99-F1 LCDR2	artificial	aa	DTSKVAS
699.	PM 99-F1 LCDR3	artificial	aa	QQWSRNSPYT
700.	PM 99-F1 VH	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSS
701.	PM 99-F1 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG
				GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG
				GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA

702.	PM 99-F1 HCDR1	artificial	aa	DFFMA
703.	PM 99-F1 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
704.	PM 99-F1 HCDR3	artificial	aa	RGNSGYYVMDA
705.	PM 99-F1 HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTSFTLTISSLQPEDIATYYCQQWSRNSPYTFGQGTKLEIK
706.	PM 99-F1 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGCGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCTCATTTACTCTCACAATCAGCTCCCTGCAGCCTGAAGACAT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGCACCAAGC TGGAAATCAAA
707.	PM 99-F1 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLRLSCAASGFTFSDFFMAWVRQAPGRGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARRGNSGYYVMDAWGQGTTVTVSSGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTSFTLTISSLQPEDIATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
708.	PM 99-F1 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAGACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAGGG GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAG GGCTGAGGACACGGCCGTTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC GGTGGTGGCGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGGTACCAGCAAGC CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCTCATTTACTCTCACAATCAGCTCCCTGCAGCCTGAAGACAT

				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
709.	PM 99-F5 VL	artificial	aa	DIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSRFSGSG
				SGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
710.	PM 99-F5 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGACAGAGTCACCATCAC
				CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAATCCCCTA
				AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGCTTCAGTGGCAGTGGG
				TCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTTTGCCACTTATTACTG
				TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
711.	PM 99-F5 LCDR1	artificial	aa	RASSSVTYMH
712.	PM 99-F5 LCDR2	artificial	aa	DTSKVAS
713.	PM 99-F5 LCDR3	artificial	aa	QQWSRNSPYT
714.	PM 99-F5 VH	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVSTIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSS
715.	PM 99-F5 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG
				GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC
				GGCTGAGGACACGGCCATTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG
				CCTGGGGTCAAGGAACTACCGGTCACCGTCTCCTCA
716.	PM 99-F5 HCDR1	artificial	aa	DFFMA
717.	PM 99-F5 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
718.	PM 99-F5 HCDR3	artificial	aa	RGNSGYYVMDA
719.	PM 99-F5 HL	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVSTIVSDGGSTYYRDSVK
				GRFTISRDNSKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS

				GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIK
720.	PM 99-F5 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCTCAACCATTGTTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC GGCTGAGGACACGGCCATTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAATCCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
721.	PM 99-F5 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVSTIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMNSLTAEDTAIYYCAKRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGDRVTITCRASSSVTYMHWYQQKPGKSPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLQPDDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
722.	PM 86-F6 VL	artificial	aa	DIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSRFSGSG SGTEFTLTISSLEPEDFATYYCQQWSRNSPYTFGQGTKLEIK
723.	PM 86-F6 VL	artificial	nt	GACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGAGAAAGTCACCATCAC CTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGCCAGGCAAAGCCCCTA AATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTTCAGTGGCAGTGGG TCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGGAGCCTGAAGACTTTGCCACTTATTACTG TCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGCTGGAAATCAAA
724.	PM 86-F6 LCDR1	artificial	aa	RASSSVTYMH
725.	PM 86-F6 LCDR2	artificial	aa	DTSKVAS
726.	PM 86-F6 LCDR3	artificial	aa	QQWSRNSPYT
727.	PM 86-F6 VH	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMDSLTSEDTAIYYCARRGNSGYYVMDAWGQGTTVTVSS
728.	PM 86-F6 VH	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG

				GGCCGTTTCACTATTTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGGACAGTCTGAC GTCTGAGGACACGGCCATTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCA
729.	PM 86-F6 HCDR1	artificial	aa	DFFMA
730.	PM 86-F6 HCDR2	artificial	aa	TIVSDGGSTYYRDSVKG
731.	PM 86-F6 HCDR3	artificial	aa	RGNSGYYVMDA
732.	PM 86-F6 HL	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMDSLTSEDTAIYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLEPEDFATYYCQQWSRNSPYTFGQGTKLEIK
733.	PM 86-F6 HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATTTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGGACAGTCTGAC GTCTGAGGACACGGCCATTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGGAGCCTGAAGACTT TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC TGGAAATCAAA
734.	PM 86-F6 HL x I2C HL	artificial	aa	EVQLLESGGGLVQPGGSLKLSCAASGFTFSDFFMAWVRQAPGKGLEWVATIVSDGGSTYYRDSVK GRFTISRDNSKNTLYLQMDSLTSEDTAIYYCARRGNSGYYVMDAWGQGTTVTVSSGGGGSGGGGS GGGGSDIQMTQSPSTLSASVGEKVTITCRASSSVTYMHWYQQKPGKAPKLLIYDTSKVASGVPSR FSGSGSGTEFTLTISSLEPEDFATYYCQQWSRNSPYTFGQGTKLEIKSGGGGSEVQLVESGGGLV QPGGSLKLSCAASGFTFNKYAMNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDS KNTAYLQMNNLKTEDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQT VVTQEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGS LLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
735.	PM 86-F6 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAAACTCTCCTG TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG GGCTGGAGTGGGTCGCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG GGCCGTTTCACTATTTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGGACAGTCTGAC GTCTGAGGACACGGCCATTTATTACTGTGCAAGACGCGGCAATTCGGGGTACTATGTTATGGATG CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCC GGTGGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA

				GAAAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC
				CAGGCAAAGCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC
				TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGGAGCCTGAAGACTT
				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCCGGTACTCCTGCCAGATTCTTCAGGCTCC
				CTGCTTGGAGGCAAGGCTGCCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA
				CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
736.	PM99-F5 HL-I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGTCTGGTGGAGGCTTAGTGCAGCCTGGAGGGTCCCTAAACTCTCCTG
				TGCAGCCTCAGGATTCACTTTCAGTGACTTTTTCATGGCCTGGGTCCGCCAGGCTCCAGGGAAGG
				GGCTGGAGTGGGTCTCAACCATTGTTTCTGATGGTGGTAGCACTTACTATCGCGACTCCGTGAAG
				GGCCGTTTCACTATCTCCAGAGATAATTCAAAAAACACCCTGTACCTGCAAATGAACAGTCTGAC
				GGCTGAGGACACGGCCATTTATTACTGTGCAAAACGCGGCAATTCGGGGTACTATGTTATGATG
				CCTGGGGTCAAGGAACTACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCC
				GGTGGTGGTTCTGACATCCAGATGACTCAGTCTCCATCAACCCTGTCTGCATCTGTGGGGGA
				CAGAGTCACCATCACCTGCCGTGCCAGCTCCAGTGTGACTTACATGCACTGGTACCAGCAGAAGC
				CAGGCAAATCCCCTAAATTATTGATTTATGACACATCCAAAGTGGCTTCTGGAGTCCCAAGTCGC
				TTCAGTGGCAGTGGGTCTGGGACCGAATTTACTCTCACAATCAGCTCCCTGCAGCCTGATGACTT
				TGCCACTTATTACTGTCAGCAGTGGAGTAGGAACTCACCCTACACGTTTGGACAGGGGACCAAGC
				TGGAAATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTG
				CAGCCTGGAGGGTCATTGAAACTCTCATGTGTGCAGCCTCTGGATTCACCTTCAATAAGTACGCCAT
				GAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATA
				ATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCA
				AAAAACACTGCCTATCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGT
				GAGACATGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGG
				TCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACT
				GTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGCTC
				CTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACCAGGTCAGGCAC
				CCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCCGGTACTCCTGCCAGATTCTTCAGGCTCC

				CTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTA CTGTGTTCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
737.	5'PM3-VH-A-XhoI	artificial	nt	CCG GAT CTC GAG TCT GGC GGC GGA CTG GTG AAG CCT GGC GRG TCC CTG ARG CTG TCC TGT
738.	3'PM3-VH-B	artificial	nt	CCA GTA CAT GTA GTA GTC GGA GAA GGT GAA GCC GGA GGC GRY ACA GGA CAG CYT CAG GGA
739.	5'PM3-VH-C	artificial	nt	TAC TAC ATG TAC TGG RTC CGC CAG RCC CCT GRG AAG SGG CTG GAA TGG GTG KCC ATC ATC TCC GAC GGC (SEQ ID NO. 739)
740.	3'PM3-VH-D	artificial	nt	GGC GTT GTC CCG GGA GAT GGT GAA CCG GCC CTT GAT GAT GTC GGA GTA GTA GGT GTA GTA GCC GCC GTC GGA GAT GAT
741.	5'PM3-VH-E	artificial	nt	TCC CGG GAC AAC GCC AAG AAC ARC CTG TAC CTG CAG ATG ARC TCC CTG ARG KCC GAG GAC ACC GCC RTG TAC TAC TGC RCC CGG GGC
742.	3'PM3-VH-F-BstEII	artificial	nt	CGA TAC GGT GAC CAG GGT GCC CTG GCC CCA GTA ATC CAT GGC GCC GTG TCT CAG CAG AGG GAA GCC CCG GGY GCA GTA GTA
743.	5'PM4-VH-A-XhoI	artificial	nt	CTT GAT CTC GAG TCT GGC GCC GAA STG RWG RAG CCT GGC GCC TCC GTG AAG STG TCC TGC AAG GCC TCC GGC TAC
744.	3'PM4-VH-B	artificial	nt	CCA TTC CAG GCC CTG CYC AGG CSY CTG CCG CAS CCA GTT GAT GTC GAA GTA GGT GAA GGT GTA GCC GGA GGC CTT
745.	5'PM4-VH-C	artificial	nt	CAG GGC CTG GAA TGG ATS GGC GGC ATC TCC CCT GGC GAC GGC AAC ACC AAC TAC AAC GAG AAC TTC AAG
746.	3'PM4-VH-D	artificial	nt	AT GTA GGC GGT GGA GMT GGA CKT GTC TMT GGT CAK TGT GRC CYT GCC CTT GAA GTT CTC GTT GTA
747.	5'PM4-VH-E	artificial	nt	C TCC ACC GCC TAC ATS SAG CTG TCC CGG CTG ASA TCT GAS GAC ACC GCC GTG TAC TWC TGC GCC AGG GAC GGC
748.	3'PM4-VH-F-BstEII	artificial	nt	AGA CAC GGT CAC CGT GGT GCC CTG GCC CCA AGA GTC CAT GGC GTA GTA AGG GAA GTT GCC GTC CCT GGC GCA
749.	5'PM8-VH-A-XhoI	artificial	nt	CTT GAT CTC GAG TCC GGC SCT GAG STG RWG AAG CCT GGC GCC TCC GTG AAG RTG TCC TGC AAG GCC TCC GGC TAC
750.	3'PM8-VH-B	artificial	nt	CCA TTC CAG CMS CTG GCC GGG TKY CTG TYT CAC CCA GTG CAT CAC GTA GCC GGT GAA GGT GTA GCC GGA GGC CTT GCA
751.	5'PM8-VH-C	artificial	nt	CCC GGC CAG SKG CTG GAA TGG ATS GGC TAC ATC AAC CCT TAC AAC GAC GTG ACC CGG TAC AAC GGC AAG TTC AAG
752.	3'PM8-VH-D	artificial	nt	TTC CAT GTA GGC GGT GGA GGM GKA CKT GTC KCT GGT AAK GGT GRC TYT GCC CTT GAA CTT GCC GTT GTA
753.	5'PM8-VH-E	artificial	nt	TCC ACC GCC TAC ATG GAA CTG TCC RGC CTG ASG TCT GAG GAC ACC GCC GTG TAC TAC TGC GCC AGG GGC

754.	3'PM8-VH-F-BstEII	artificial	nt	CGA TAC GGT GAC CAG AGT GCC TCT GCC CCA GGA GTC GAA GTA GTA CCA GTT CTC GCC CCT GGC GCA GTA GTA
755.	5'PM3-VL-A-SacI	artificial	nt	CTT GAT GAG CTC CAG ATG ACC CAG TCC CCC ARS TYC MTG TCC RCC TCC GTG GGC GAC AGA GTG ACC
756.	3'PM3-VL-B	artificial	nt	GCC GGG CTT CTG CTG AWA CCA GGC CAC GTT GGT GTC CAC GTT CTG GGA GGC CTT GCA GGT GAY GGT CAC TCT GTC GCC
757.	5'PM3-VL-C	artificial	nt	CAG CAG AAG CCC GGC MAG KCC CCT AAG KCC CTG ATC TAC TCC GCC TCC TAC CGG TAC TCT
758.	3'PM3-VL-D	artificial	nt	CAG GGT GAA GTC GGT GCC GGA CYC GGA GCC GGA GAA CCG GKM AGG CAC GYC AGA GTA CCG GTA GGA
759.	5'PM3-VL-E	artificial	nt	ACC GAC TTC ACC CTG ACC ATC TCC ARC STG CAG YCT GAG GAC YTC GCC RMG TAC TWC TGC CAG CAG TAC GAC
760.	3'PM3-VL-F-BsiWI/SpeI	artificial	nt	CGA GTA ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT GTA AGG GTA GGA GTC GTA CTG CTG GCA
761.	5'PM4-VL-A-SacI	artificial	nt	CTT GAT GAG CTC GTG ATG ACC CAG TCC CCC CTG TCC CTG CCT GTG AYC CTG GGC SAM CMG GCC TCC ATC TCC TGC CGG
762.	3'PM4-VL-B	artificial	nt	AAA CCA GTG CAG GTA GGT ATT GCC GTT GGA GTG CAC CAG GGA CTG GGA GGA CCG GCA GGA GAT GGA GGC
763.	5'PM4-VL-C	artificial	nt	ACC TAC CTG CAC TGG TTT CWG CAG ARG CCT GGC CAG TCC CCT ARG CKG CTG ATC TAC ACC GTG TCC AAC CGG
764.	3'PM4-VL-D	artificial	nt	CAG GGT GAA GTC GGT GCC GGA GCC GGA GCC AGA GAA CCT GTC AGG CAC GCC GGA GAA CCG GTT GGA CAC GGT
765.	5'PM4-VL-E	artificial	nt	GGC ACC GAC TTC ACC CTG AAG ATC TCC CGG GTG GAG GCC GAA GAT STG GGC GTG TAC TWT TGC TCC CAG TCC ACC
766.	3'PM4-VL-F-BsiWI/SpeI	artificial	nt	ACT CAG ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT AGG CAC GTG GGT GGA CTG GGA GCA
767.	5'PM8-VL-A-SacI	artificial	nt	CTT GAT GAG CTC GTG ATG ACC CAG TCT CCA SYC TCC CTG SCT GTG ACT CTG GGC CAG CSG GCC TCC ATC TCT TGC CGG
768.	3'PM8-VL-B	artificial	nt	CCA GTG CAT GAA GGT GTT GTC GTA GGA GTC GAT GGA CTC GGA GGC CCG GCA AGA GAT GGA GGC
769.	5'PM8-VL-C	artificial	nt	ACC TTC ATG CAC TGG TWT CAG CAG ARG CCT GGC CAG YCT CCT MRC CKG CTG ATC TWC CGG GCC TCT ATC CTG GAA
770.	3'PM8-VL-D	artificial	nt	CAG GGT GAA GTC GGT GCC GGA GCC AGA GCC GGA GAA CCG GKC AGG GAY GCC GGA TTC CAG GAT AGA GGC CCG
771.	5'PM8-VL-E	artificial	nt	ACC GAC TTC ACC CTG AMA ATC TMC CST GTG GAG GCC GAS GAC GTG GSC RYC TAC TAC TGC CAC CAG

772.	3'PM8-VL-F-BsiWI/SpeI	artificial	nt	ACT CAG ACT AGT CGT ACG CTT GAT TTC CAG CTT GGT CCC TCC GCC GAA GGT GTA AGG GTC CTC GAT GGA CTG GTG GCA GTA GTA
773.	PM84D7-H	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQAPEQGLEWMGGISPGDGN TNYNENFKGRVTMTIDTSSSTAYIELSRLTSDDTAVYYCARDGNFPYYAMDSWGQGTT VTVSS
774.	PM84D7-HCDR1	artificial	aa	YFDIN
775.	PM84D7-HCDR2	artificial	aa	GISPGDGNTNYNENFKG
776.	PM84D7-HCDR3	artificial	aa	DGNFPYYAMDS
777.	PM84D7-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGGCCGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCATAGACAC GTCCAGCTCCACCGCCTACATCGAGCTGTCCCGGCTGACATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTGACCGTCTCCTCA
778.	PM84D7-L	artificial	aa	DIVMTQSPLSLPVTLGQQASISCRSSQSLVHSNGNTYLHWFQQRPGQSPKLLIYTVSNR FSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCSQSTHVPTFGGGTKLEIK
779.	PM84D7-LCDR1	artificial	aa	RSSQSLVHSNGNTYLH
780.	PM84D7-LCDR2	artificial	aa	TVSNRFS
781.	PM84D7-LCDR3	artificial	aa	SQSTHVPT
782.	PM84D7-L	artificial	nt	GACATCGTGATGACCCAGTCCCCCCTGTCCCTGTCCCTGTGACCCTGGGCCAACAGG CCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGCACTCCAACGGCAATACCTAC CTGCACTGGTTTCAGCAGAGGCCTGGCCAGTCCCCTAAGCTGCTGATCTACACCGT GTCCAACCGGTTCTCCGGCGTGCCTGACAGGTTCTCTGGCTCCGGCTCCGGCACC GACTTCACCCTGAAGATCTCCCGGGTGGAGGCCGAAGATGTGGGCGTGTACTATT GCTCCCAGTCCACCCACGTGCCTACCTTCGGCGGAGGGACCAAGCTGGAAATCAA G
783.	PM84D7-HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQAPEQGLEWMGGISPGDGN TNYNENFKGRVTMTIDTSSSTAYIELSRLTSDDTAVYYCARDGNFPYYAMDSWGQGTT VTVSSGGGGSGGGGSGGGGSDIVMTQSPLSLPVTLGQQASISCRSSQSLVHSNGNTY LHWFQQRPGQSPKLLIYTVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCSQ STHVPTFGGGTKLEIK
784.	PM84D7-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGGCGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCATAGACAC

				GTCCAGCTCCACCGCCTACATCGAGCTGTCCCGGCTGACATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTGACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGG CTCCGGTGGTGGTTCTGACATCGTGATGACCCAGTCCCCCCTGTCCCTGCCTG TGACCCTGGGCCAACAGGCCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGCA CTCCAACGGCAATACCTACCTGCACTGGTTTCAGCAGAGGCCTGGCCAGTCCCCTA AGCTGCTGATCTACACCGTGTCCAACCGGTTCTCCGGCGTGCCTGACAGGTTCTCT GGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCCGAAG ATGTGGGCGTGTACTATTGCTCCCAGTCCACCCACGTGCCTACCTTCGGCGGAGG GACCAAGCTGGAAATCAAG
785.	PM84D7 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQAPEQGLEWMGGISPGDGN TNYNENFKGRVTMTIDTSSSTAYIELSRLTSDDTAVYYCARDGNFPYYAMDSWGQGTT VTVSSGGGGSGGGGSGGGGSDIVMTQSPLSLPVTLGQQASISCRSSQSLVHSNGNTY LHWFQQRPGQSPKLLIYTVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCSQ STHVPTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMN WVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDT AVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEP SLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSG SLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
786.	PM84D7 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGGCGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCATAGACAC GTCCAGCTCCACCGCCTACATCGAGCTGTCCCGGCTGACATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTGACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCGG CTCCGGTGGTGGTGGTTCTGACATCGTGATGACCCAGTCCCCCCTGTCCCTGCCTG TGACCCTGGGCCAACAGGCCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGCA CTCCAACGGCAATACCTACCTGCACTGGTTTCAGCAGAGGCCTGGCCAGTCCCCTA AGCTGCTGATCTACACCGTGTCCAACCGGTTCTCCGGCGTGCCTGACAGGTTCTCT GGCTCCGGCTCCGGCACCGACTTCACCCTGAAGATCTCCCGGGTGGAGGCCGAAG ATGTGGGCGTGTACTATTGCTCCCAGTCCACCCACGTGCCTACCTTCGGCGGAGG GACCAAGCTGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAG TCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTC TGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGC

				CGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTA TCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACA TGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTC TGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTG GTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGA ACAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCC AAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTA AGTTCCTCGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAG GCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGT TCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
787.	PM76A9-H	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAMDYWGQGTL VTVSS
788.	PM76A9-HCDR1	artificial	aa	DYYMY
789.	PM76A9-HCDR2	artificial	aa	IISDGGYYTYYSDIIKG
790.	PM76A9-HCDR3	artificial	aa	GFPLLRHGAMDY
791.	PM76A9-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
792.	PM76A9-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWYQQKPGQAPKSLIYSASYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYPYTFGGGTKLEIK
793.	PM76A9-LCDR1	artificial	aa	KASQNVDTNVA
794.	PM76A9-LCDR2	artificial	aa	SASYRYS
795.	PM76A9-LCDR3	artificial	aa	QQYDSYPYT
796.	PM76A9-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAAGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCCTAAGTCCCTGATCTACTCCGCCTCCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGGCGTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACGTACTACTGCCAGCAGTACGAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
797.	PM76A9-HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAMDYWGQGTL

				VTVSSGGGGSGGGSGGGGSGGGSDIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWY QQKPGQAPKSLIYSASYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYP YTFGGGTKLEIK
798.	PM76A9-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGC GGCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCC TGTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTG ATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGC GTCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCA CGTACTACTGCCAGCAGTACGACTCCCTACACCTTCGGCGGAGGGACCAAG CTGGAAATCAAG
799.	PM76A9 HL x I2C HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAMDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWY QQKPGQAPKSLIYSASYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYP YTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQ APGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYY CVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVS PGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLG GKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
800.	PM76A9 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGC GGCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCC TGTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTG

				ATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGC GTCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCA CGTACTACTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGGACCAAG CTGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAG GAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTC ACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGA ATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAA ATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAA CTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCA CCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTC TCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCA CACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGG GTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCT CGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCC CTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATG GTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
801.	PM76A9-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACAACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACAGTGTCCTCT
802.	PM76A9-L codon optimized	artificial	nt	GACATCCAGATGACCCAGTCCCCATCCTCCCTGTCTGCCTCCGTGGGCGACAGAGT GACCATCACATGCAAGGCCTCCCAGAACGTGGACACCAACGTGGCATGGTATCAG CAGAAGCCAGGCCAGGCCCCCTAAGTCCCTGATCTACTCTGCCTCCTACCGGTACTC CGACGTGCCCCTCCAGGTTCTCTGGCTCCGCCTCTGGCACCGACTTCACCCTGACCA TCTCTTCCGTGCAGTCCGAGGACTTCGCTACCTACTACTGCCAGCAGTACGACTCC TACCCTTACACCTTCGGCGGAGGCACCAAGCTGGAAATCAAG
803.	PM76A9-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACAACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTAC

				TGGGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGC GGAGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCC TGTCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCCCTAAGTCCCTG ATCTACTCTGCCTCCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGC CTCTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTA CCTACTACTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGCACCAAG CTGGAAATCAAG
804.	PM76A9 HL x I2C HL_ codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGC GGAGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCC TGTCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCCCTAAGTCCCTG ATCTACTCTGCCTCCTACCGGTACTCCGACATCCAGATGACCCAGTCCCCATCCTCCC CTCTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTA CCTACTACTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGCACCAAG CTGGAAATCAAGTCCGGCGGAGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGA GGGGGACTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGC TTTACCTTCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCCAGGGAAAGGCCT GGAATGGGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCT GACTCCGTGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTA TCTGCAGATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGC ACGGCAACTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACA CTGGTCACCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGT GGCGGATCCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCG GCACCGTGACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTA CCCTAACTGGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGC ACCAAGTTTCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAG GCAAGGCCGCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTA CTGTGTGCTGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACC GTGCTG

805.	PM76B10-H	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAMDYWGQGTL VTVSS
806.	PM76B10-HCDR1	artificial	aa	DYYMY
807.	PM76B10-HCDR2	artificial	aa	IISDGGYYTYYSDIIKG
808.	PM76B10-HCDR3	artificial	aa	GFPLLRHGAMDY
809.	PM76B10-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
810.	PM76B10-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWYQQKPGQAPKSLIYSASYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYPYTFGGGTKLEIK
811.	PM76B10-LCDR1	artificial	aa	KASQNVDTNVA
812.	PM76B10-LCDR2	artificial	aa	SASYRYS
813.	PM76B10-LCDR3	artificial	aa	QQYDSYPYT
814.	PM76B10-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAAGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGATCTACTCCGCCTCCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCGTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACGTACTACTGCCAGCAGTACGAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
815.	PM76B10-HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAMDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWY QQKPGQAPKSLIYSASYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYP YTFGGGTKLEIK
816.	PM76B10-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGC

				GGCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCC TGTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTG ATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGC GTCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCA CGTACTACTGCCAGCAGTACGGACTCCCTACCCTTACACCTTCGGCGGAGGGACCAAG CTGGAAATCAAG
817.	PM76B10 HL x I2C HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMYWVRQAPGKGLEWVAIISDGGYY TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAMDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCKASQNVDTNVAWY QQKPGQAPKSLIYSASYRYSGVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYDSYP YTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQ APGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYY CVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVS PGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLG GKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
818.	PM76B10 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCATCATCTCCGACGGCGG CTACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACACGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATGGATTAC TGGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGC GGCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCC TGTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAAGGCCTCCCAGAACGT GGACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTG ATCTACTCCGCCTCCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGC GTCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCA CGTACTACTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGGACCAAG CTGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAG GAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTC ACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGA ATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAA ATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAA CTTCGGTAATAGCTACATATCCTACTGGGGCTTACTGGGGCCAAGGGACTCTGGTCA

				CCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTC TCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCA CACTCACTTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGG GTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCT CGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCC CTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATG GTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
819.	PM76B10-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGAGTCCCTGA GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGGCT ACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTACTG GGGCCAGGGCACCCTGGTCACAGTGTCCTCT
820.	PM76B10-L codon optimized	artificial	nt	GACATCCAGATGACCCAGTCCCCATCCTCCCTGTCTGCCTCCGTGGGCGACAGAGT GACCATCACATGCAAGGCCTCCCAGAACGTGGACACCAACGTGGCATGGTATCAG CAGAAGCCAGGCCAGGCCCCTAAGTCCCTGATCTACTCTGCCTCCTACCGGTACTC CGACGTGCCCTCCAGGTTCTCTGGCTCCGGCCTCTGGCACCGACTTCACCCTGACCA TCTCTTCCGTGCAGTCCGAGGACTTCGCTACCTACTACTGCCAGCAGTACGACTCC TACCCTTACACCTTCGGCGGAGGCACCAAGCTGGAAATCAAG
821.	PM76B10-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGAGTCCCTGA GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTACTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGGCT ACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTACTG GGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCGG AGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCTG TCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCAAGGCCTCCCAGAACGTGG ACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCAGGCCCCTAAGTCCCTGAT CTACTCTGCCTCCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGGCCT CTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTACC TACTACTGCCAGCAGTACGACTCCTACCCTTACACCTTCGGCGGAGGCACCAAGCT GGAAATCAAG
822.	PM76B10 HL x I2C	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGAGTCCCTGA

	HL codon optimized			GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACATGTACTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCATCATCTCCGACGGCGGCT ACTACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCATGGATTACTG GGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCGG AGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCTG TCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCAAGGCCTCCCAGAACGTGG ACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCAGGCCCCTAAGTCCCTGAT CTACTCTGCCTCCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGGCCT CTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTACC TACTACTGCCAGCAGTACGACTCCCTACCCTTACACCTTCGGCGGAGGCACCAAGCT GGAAATCAAGTCCGGCGGAGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGAGG GGGACTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTT ACCTTCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTGG AATGGGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCTGAC TCCGTGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCT GCAGATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACG GCAACTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTG GTCACCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGC GGATCCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCA CCGTGACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCC TAACTGGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACC AAGTTTCTGGCCCCCTGGCACCCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCA AGGCCGCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTG TGTGCTGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACACAAAGCTGACCGTG CTG
823.	PM34C7-H	artificial	aa	EVQLLEQSGAELVKPGASVKLSCTASGFNIKDTYMDWVKQRPEQGLEWIARIDPANGD SKYDPKFQGKATITADTSSNTAYLQLSSLTSEDTAVYYCARGGMIWYFDVWGQGTTVT VSS
824.	PM34C7-HCDR1	artificial	aa	DTYMD
825.	PM34C7-HCDR2	artificial	aa	RIDPANGDSKYDPKFQG
826.	PM34C7-HCDR3	artificial	aa	GGMIWYFDV
827.	PM34C7-H	artificial	nt	GAGGTGCAGCTGCTCGAGCAGTCTGGGGCAGAGCTTGTGAAGCCAGGGGCCTCA GTCAAGTTGTCCTGCACAGCTTCTGGCTTCAACATTAAAGACACCTATATGGACTGG GTGAAGCAGAGGCCTGAACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGA

				ATGGTGATAGTAAATATGACCCGAAATTCCAGGGCAAGGCCACTATAACAGCAGAC ACATCCTCCAACACAGCCTACCTGCAGCTCAGCAGCCTGACATCTGAGGACACTGC CGTCTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAG GGACCACGGTCACCGTCTCCTCA
828.	PM34C7-L	artificial	aa	ELVLTQSPTTMAASPGEKITITCSASSSISSNYLHWYQQKPGFSPKLLIYRTSNLASGVP ARFSGSGSGTSYSLTIGTMEAEDVATYYCQQGSSLPYTFGGGTKLEIK
829.	PM34C7-LCDR1	artificial	aa	SASSSISSNYLH
830.	PM34C7-LCDR2	artificial	aa	RTSNLAS
831.	PM34C7-LCDR3	artificial	aa	QQGSSLPYT
832.	PM34C7-L	artificial	nt	GAGCTCGTGCTCACCCAGTCTCCAACCACCATGGCTGCATCTCCCGGGGAGAAGA TCACTATCACCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTTGCATTGGTATC AGCAGAAGCCAGGATTCTCCCCCTAAACTCTTGATTTATAGGACATCCAATCTGGCTT CTGGAGTCCCAGCTCGCTTCAGTGGCAGTGGGTCTGGGACCTCTTACTCTCTCACA ATTGGCACCATGGAGGCTGAAGATGTTGCCACTTACTACTGCCAGCAGGGTAGTAG TTTACCGTACACGTTCGGAGGGGGGACCAAGCTTGAGATCAAA
833.	PM34C7-HL	artificial	aa	EVQLLEQSGAELVKPGASVKLSCTASGFNIKDTYMDWVKQRPEQGLEWIARIDPANGD SKYDPKFQGKATITADTSSNTAYLQLSSLTSEDTAVYYCARGGMIWYFDVWGQGTTVT VSSGGGGSGGGGSGGGGSELVLTQSPTTMAASPGEKITITCSASSSISSNYLHWYQQK PGFSPKLLIYRTSNLASGVPARFSGSGSGTSYSLTIGTMEAEDVATYYCQQGSSLPYTF GGGTKLEIK
834.	PM34C7-HL	artificial	nt	GAGGTGCAGCTGCTCGAGCAGTCTGGGGGCAGAGCTTGTGAAGCCAGGGGCCTCA GTCAAGTTGTCCTGCACAGCTTCTGGCTTCAACATTAAAGACACCTATATGGACTGG GTGAAGCAGAGGCCTGAACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGA ATGGTGATAGTAAATATGACCCGAAATTCCAGGGCAAGGCCACTATAACAGCAGAC ACATCCTCCAACACAGCCTACCTGCAGCTCAGCAGCCTGACATCTGAGGACACTGC CGTCTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAG GGACCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCG GTGGTGGTGGTTCTGAGCTCGTGCTCACCCAGTCTCCAACCACCATGGCTGCATCT CCCGGGGAGAAGATCACTATCACCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTA CTTGCATTGGTATCAGCAGAAGCCAGGATTCTCCCCCTAAACTCTTGATTTATAGGAC ATCCAATCTGGCTTCTGGAGTCCCAGCTCGCTTCAGTGGCAGTGGGTCTGGGACCT CTTACTCTCTCACAATTGGCACCATGGAGGCTGAAGATGTTGCCACTTACTACTGCC AGCAGGGTAGTAGTTTACCGTACACGTTCGGAGGGGGGACCAAGCTTGAGATCAAA
835.	PM34C7 HL x I2C HL	artificial	aa	EVQLLEQSGAELVKPGASVKLSCTASGFNIKDTYMDWVKQRPEQGLEWIARIDPANGD SKYDPKFQGKATITADTSSNTAYLQLSSLTSEDTAVYYCARGGMIWYFDVWGQGTTVT VSSGGGGSGGGGSGGGGSELVLTQSPTTMAASPGEKITITCSASSSISSNYLHWYQQK

				PGFSPKLLIYRTSNLASGVPARFSGSGSGTSYSLTIGTMEAEDVATYYCQQGSSLPYTF GGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAPG KGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCVR HGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSPG GTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGGK AALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
836.	PM34C7 HL x I2C HL	artificial	nt	GAGGTGCAGCTGCTCGAGCAGTCTGGGGGCAGAGCTTGTGAAGCCAGGGGCCTCA GTCAAGTTGTCCTGCACAGCTTCTGGCTTCAACATTAAAGACACCTATATGGACTGG GTGAAGCAGAGGCCTGAACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGA ATGGTGATAGTAAATATGACCCGAAATTCCAGGGCAAGGCCACTATAACAGCAGAC ACATCCTCCAACACAGCCTACCTGCAGCTCAGCAGCCTGACATCTGAGGACACTGC CGTCTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAG GGACCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCG GTGGTGGTGGTTCTGAGCTCGTGCTCACCCAGTCTCCAACCACCATGGCTGCATCT CCCGGGGAGAAGATCACTATCACCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTA CTTGCATTGGTATCAGCAGAAGCCAGGATTCTCCCCTAAACTCTTGATTTATAGGAC ATCCAATCTGGCTTCTGGAGTCCCAGCTCGCTTCAGTGGCAGTGGGTCTGGGACCT CTTACTCTCTCACAATTGGCACCATGGAGGCTGAAGATGTTGCCACTTACTACTGCC AGCAGGGTAGTAGTTTACCGTACACGTTCGGAGGGGGGACCAAGCTTGAGATCAAA TCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGC AGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGT ACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCG CATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGG TTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGA AAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGC TACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGG TGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTG ACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGG CTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAAC CAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCCGGTAC TCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAG GGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGC TGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
837.	PM49B9-H	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSS

838.	PM49B9-HCDR1	artificial	aa	YFDIN
839.	PM49B9-HCDR2	artificial	aa	GISPGDGNTNYNENFKG
840.	PM49B9-HCDR3	artificial	aa	DGNFPYYAMDS
841.	PM49B9-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCA
842.	PM49B9-L	artificial	aa	DIVMTQTPLSLPVTLGDPASISCRSSQSLVYSNGNTYLNWYQQRPGQSPRLLIYKVSNR FSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCSQSTHVPYTFGQGTKLEIK
843.	PM49B9-LCDR1	artificial	aa	RSSQSLVYSNGNTYLN
844.	PM49B9-LCDR2	artificial	aa	KVSNRFS
845.	PM49B9-LCDR3	artificial	aa	SQSTHVPYT
846.	PM49B9-L	artificial	nt	GACGTCGTGATGACTCAGACTCCACTCTCCCTGCCCGTCACCCTTGGAGACCCGG CCTCCATCTCCTGCAGGTCTAGTCAAAGCCTCGTATACAGTAACGGAAACACCTACT TGAATTGGTATCAACAGAGGCCAGGCCAATCTCCAAGACTCCTAATTTATAAGGTTT CTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGGCAGTGGGTCAGGCACTGA TTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGATGTTGGGGTTTACTACTGCT CTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGGGACCAAGCTGGAGATCAAA
847.	PM49B9-HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSSGGGGSGGGGSGGGGSDIVMTQTPLSLPVTLGDPASISCRSSQSLVYSNGNT YLNWYQQRPGQSPRLLIYKVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCS QSTHVPYTFGQGTKLEIK
848.	PM49B9-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGG CTCCGGTGGTGGTTCTGACGTCGTGATGACTCAGACTCCACTCTCCCTGCCCG TCACCCTTGGAGACCCGGCCTCCATCTCCTGCAGGTCTAGTCAAAGCCTCGTATAC AGTAACGGAAACACCTACTTGAATTGGTATCAACAGAGGCCAGGCCAATCTCCAAG

				ACTCCTAATTTATAAGGTTTCTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGG CAGTGGGTCAGGCACTGATTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGAT GTTGGGGTTTACTACTGCTCTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGG GACCAAGCTGGAGATCAAA
849.	PM49B9 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSSGGGGSGGGGSGGGGSDIVMTQTPLSLPVTLGDPASISCRSSQSLVYSNGNT YLNWYQQRPGQSPRLLIYKVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCS QSTHVPYTFGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYA MNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKT EDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVT QEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPA RFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
850.	PM49B9 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGG CTCCGGTGGTGGTTCTGACGTCGTGATGACTCAGACTCCACTCTCCCCTGCCCG TCACCCTTGGAGACCCGGCCTCCATCTCCTGCAGGTCTAGTCAAAGCCTCGTATAC AGTAACGGAAACACCTACTTGAATTGGTATCAACAGAGGCCAGGCCAATCTCCAAG ACTCCTAATTTATAAGGTTTCTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGG CAGTGGGTCAGGCACTGATTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGAT GTTGGGGTTTACTACTGCTCTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGG GACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAG TCTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTC TGGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGG GTTTGGAATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGC CGATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTA TCTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACA TGGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTC TGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTG GTGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGA ACAGTCACACTCACTTGTGGCTCCTCGACTGGGGGCTGTTACATCTGGCAACTACCC

				AAACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTA AGTTCCTCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAG GCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGT TCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
851.	PM29G1-H	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSS
852.	PM29G1-HCDR1	artificial	aa	YFDIN
853.	PM29G1-HCDR2	artificial	aa	GISPGDGNTNYNENFKG
854.	PM29G1-HCDR3	artificial	aa	DGNFPYYAMDS
855.	PM29G1-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACCGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCA
856.	PM29G1-L	artificial	aa	DVVMTQSPLSLPVTLGEPASISCRSSQSLVYSNGNTYLHWYQQKPGQSPRLLIYKVSN RFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYFCSQSTHVPYTFGQGTKLEIK
857.	PM29G1-LCDR1	artificial	aa	RSSQSLVYSNGNTYLH
858.	PM29G1-LCDR2	artificial	aa	KVSNRFS
859.	PM29G1-LCDR3	artificial	aa	SQSTHVPYT
860.	PM29G1-L	artificial	nt	GACGTCGTGATGACTCAGTCTCCACTCTCCCTGCCCGTCACCCTTGGAGAGCCGG CCTCCATCTCCTGCAGGTCTAGTCAAAGCCTCGTATACAGTAACGGAAACACCTACT TGCATTGGTATCAACAGAAGCCAGGCCAATCTCCAAGACTCCTAATTTATAAGGTTT CTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGGCAGTGGGTCAGGCACTGA TTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGATGTTGGGGTTTATTTCTGCT CTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGGGACCAAGCTGGAGATCAAA
861.	PM29G1-HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSSGGGGSGGGGSGGGGSGGGGSDVVMTQSPLSLPVTLGEPASISCRSSQSLVYSNGN TYLHWYQQKPGQSPRLLIYKVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYFC SQSTHVPYTFGQGTKLEIK
862.	PM29G1-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACGCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCTGGCGAC

				GGCAACACCAACTACAACGAGAAGCTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGG CTCCGGTGGTGGTTCTGACGTCGTGATGACTCAGTCTCCACTCTCCCTGCCCG TCACCCTTGGAGAGCCGGCCTCCATCTCCTGCAGGTCTAGTCAAGCCTCGTATAC AGTAACGGAAACACCTACTTGCATTGGTATCAACAGAAGCCAGGCCAATCTCCAAG ACTCCTAATTTATAAGGTTTCTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGG CAGTGGGTCAGGCACTGATTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGAT GTTGGGGTTTATTTCTGCTCTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGGG ACCAAGCTGGAGATCAAA
863.	PM29G1 HL x I2C HL	artificial	aa	QVQLVQSGAEVKKPGASVKLSCKASGYTFTYFDINWVRQTPEQGLEWMGGISPGDGN TNYNENFKGRVTMTRDTSNSTAYMELSRLRSDDTAVYYCARDGNFPYYAMDSWGQG TTVTVSSGGGGSGGGGSGGGGSDVVMTQSPLSLPVTLGEPASISCRSSQSLVYSNGN TYLHWYQQKPGQSPRLLIYKVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDVGVYFC SQSTHVPYTFGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYA MNWVRQAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKT EDTAVYYCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVT QEPSLTVSPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPA RFSGSLLGGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
864.	PM29G1 HL x I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGAAGAAGCCTGGCGCCTCCGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTG CGGCAGACGCCTGAGCAGGGCCTGGAATGGGATGGGCGGCATCTCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGGGTCACAATGACCAGAGACAC GTCCAACTCCACCGCCTACATGGAGCTGTCCCGGCTGAGATCTGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGG CTCCGGTGGTGGTGGTTCTGACGTCGTGATGACTCAGTCTCCACTCTCCCTGCCCG TCACCCTTGGAGAGCCGGCCTCCATCTCCTGCAGGTCTAGTCAAAGCCTCGTATAC AGTAACGGAAACACCTACTTGCATTGGTATCAACAGAAGCCAGGCCAATCTCCAAG ACTCCTAATTTATAAGGTTTCTAACCGGTTCTCTGGGGTCCCAGACAGATTCAGCGG CAGTGGGTCAGGCACTGATTTCACACTGAAAATCAGCAGGGTGGAGGCTGAGGAT GTTGGGGTTTATTTCTGCTCTCAAAGTACACATGTTCCGTACACGTTTGGCCAGGGG ACCAAGCTGGAGATCAAATCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGT CTGGAGGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCT GGATTCACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGG

				TTTGGAATGGGTTGCTCGCATAAGAAGTAAATAATAATTATGCAACATATTATGCC GATTCAGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTAT CTACAAATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACAT GGGAACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCT GGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGG TGGTTCTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAA CAGTCACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCA AACTGGGTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAA GTTCCTCGGCCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAG GCTGCCCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGT TCTATGGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
865.	PM29G1-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCAGGCGCCGAAGTGAAGAAACCTGGCGCCTCTGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTC CGCCAGACCCCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGAGTGACCATGACCAGGGACA CCTCTAACTCCACCGCCTACATGGAACTGTCCCGGCTGAGATCCGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACCGTGACAGTGTCCTCT
866.	PM29G1-L codon optimized	artificial	nt	GATGTGGTCATGACCCAGTCCCCACTGTCCCTGCCTGTGACCCTGGGCGAGCCTG CCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGTACTCCAACGGCAATACCTAC CTGCACTGGTATCAGCAGAAGCCTGGCCAGTCCCCTAGGCTGCTGATCTACAAGGT GTCCAACCGGTTCTCCGGCGTGCCCGACAGATTCTCCGGCTCCGGCTCTGGCACC GACTTCACACTGAAGATCTCCAGGGTGGAGGCTGAGGACGTGGGCGTGTACTTCT GCTCCCAGTCCACCCACGTGCCCTACACCTTCGGACAGGGCACCAAGCTGGAAAT CAAG
867.	PM29G1-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCAGGCGCCGAAGTGAAGAAACCTGGCGCCTCTGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTC CGCCAGACCCCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCCTGGCGAC GGCAACACCAACTACAACGAGAAGTTCAAGGGCAGAGTGACCATGACCAGGGACA CCTCTAACTCCACCGCCTACATGGAACTGTCCCGGCTGAGATCCGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGG ATCTGGCGGAGGCGGCTCCGATGTGGTCATGACCCAGTCCCCACTGTCCCTGCCT GTGACCCTGGGCGAGCCTGCCTCCATCTCCTGCCGGTCCTCCCAGTCCCTGGTGT ACTCCAACGGCAATACCTACCTGCACTGGTATCAGCAGAAGCCTGGCCAGTCCCCT AGGCTGCTGATCTACAAGGTGTCCAACCGGTTCTCCGGCGTGCCCGACAGATTCTC

				CGGCTCCGGCTCTGGCACCGACTTCACACTGAAGATCTCCAGGGTGGAGGCTGAG GACGTGGGCGTGTACTTCTGCTCCCAGTCCACCCACGTGCCCTACACCTTCGGACA GGGCACCAAGCTGGAAATCAAG
868.	PM29G1 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCAGGCGCCGAAGTGAAGAAACCTGGCGCCTCTGTGA AGCTGTCCTGCAAGGCCTCCGGCTACACCTTCACCTACTTCGACATCAACTGGGTC CGCCAGACCCCCTGAGCAGGGCCTGGAATGGATGGGCGGCATCTCCCCCTGGCGAC GGCAACACCAACTACAACGAGAACTTCAAGGGCAGAGTGACCATGACCAGGGACA CCTCTAACTCCACCGCCTACATGGAACTGTCCCGGCTGAGATCCGACGACACCGCC GTGTACTACTGCGCCAGGGACGGCAACTTCCCTTACTACGCCATGGACTCTTGGGG CCAGGGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGG ATCTGGCGGAGGCGGCTCCGATGTGGTCATGACCCAGTCCCCACTGTCCCTGCCT GTGACCCTGGGCGAGCCTGCCTCCATCTCCTGCCGGTCCTCCTCCCAGTCCCTGGTGT ACTCCAACGGCAATACCTACCTGCACTGGTATCAGCAGAAGCCTGGCCAGTCCCCT AGGCTGCTGATCTACAAGGTGTCCAACCGGTTCTCCGGCGTGCCCGACAGATTCTC CGGCTCCGGCTCTGGCACCGACTTCACACTGAAGATCTCCAGGGTGGAGGCTGAG GACGTGGGCGTGTACTTCTGCTCCCAGTCCACCCACGTGCCCTACACCTTCGGACA GGGCACCAAGCTGGAAATCAAGTCTGGCGGAGGGGGCTCTGAAGTGCAGCTGGTG GAAAGCGGAGGGGGACTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCC GCCAGCGGCTTTACCTTCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAG GGAAAGGCCTGGAATGGGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCAC CTACTACGCTGACTCCGTGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGA ACACCGCCTATCTGCAGATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATT GTGTGCGGCACGGCAACTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGA CAGGGAACACTGGTCACCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGA TCTGGCGGTGGCGGATCCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCT CCCCAGGCGGCACCGTGACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTC CGGCAACTACCCTAACTGGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTG ATCGGCGGCACCAAGTTTCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCC TGCTGGGAGGCAAGGCCGCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGG CCGAGTACTACTGTGTGCTGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCAC AAAGCTGACCGTGCTG
869.	PM08B6-H	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSS
870.	PM08B6-HCDR1	artificial	aa	DTYMD
871.	PM08B6-HCDR2	artificial	aa	RIDPANGDSKYDPKFQG

872.	PM08B6-HCDR3	artificial	aa	GGMIWYFDV
873.	PM08B6-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCA
874.	PM08B6-L	artificial	aa	EIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQQKPGLPPRLLIYRTSNLASGVP DRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPYTFGQGTKLEIK
875.	PM08B6-LCDR1	artificial	aa	SASSSISSNYLH
876.	PM08B6-LCDR2	artificial	aa	RTSNLAS
877.	PM08B6-LCDR3	artificial	aa	QQGSSLPYT
878.	PM08B6-L	artificial	nt	GAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCCGGGGAGAAGG TCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTTGCATTGGTATC AGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATCCAATCTGGCTT CTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATTTCACTCTCACA ATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGCAGGGTAGTAG TTTACCGTACACGTTCGGACACAAGGGACCAAGCTTGAGATCAAA
879.	PM08B6-HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGVPDRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPY TFGQGTKLEIK
880.	PM08B6-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCC GGGGAGAAGGTCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT

				TCACTCTCACAATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
881.	PM08B6 HL X I2C HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGVPDRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPY TFGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQA PGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYC VRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSP GGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGG KAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
882.	PM08B6 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCC GGGGAGAAGGTCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAATCC GGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTAC GCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCA TAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTT CACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAA AACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCT ACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGT GGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGA CTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGC TCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACC AGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACT CCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAG

				GGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGC TGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
883.	PM08B6-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCCGGATCGACCCTGCCAA CGGCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCT
884.	PM08B6-L codon optimized	artificial	nt	GAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGTCTCCCGGCGAGAAAG TGACCCTGTCCTGCTCCGCCCTCCTCCTCCATCTCCTCCAACTACCTGCACTGGTATC AGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCGGACCTCCAACCTGGC CTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTG ACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTACTGCCAGCAGGGCT CCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAAATCAAG
885.	PM08B6-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCCGGATCGACCCTGCCAA CGGCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCT GGTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGT CTCCCGGCGAGAAAGTGACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAAC TACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAG
886.	PM08B6 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCCGGATCGACCCTGCCAA CGGCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCT

				GGTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGT CTCCCGGCGAGAAAGTGACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAAC TACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAGTCTGGCGGAGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGAGGGGGA CTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTTACCT TCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTGGAATG GGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGGCTGACTCCG TGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCTGCAG ATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACGGCAA CTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTGGTCA CCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGCGGAT CCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCACCGT GACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCCTAACT GGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACCAAGTT TCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCAAGGCC GCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTGTGTGC TGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGTGCTG
887.	PM08E11-H	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSS
888.	PM08E11-HCDR1	artificial	aa	DTYMD
889.	PM08E11-HCDR2	artificial	aa	RIDPANGDSKYDPKFQG
890.	PM08E11-HCDR3	artificial	aa	GGMIWYFDV
891.	PM08E11-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCA
892.	PM08E11-L	artificial	aa	EIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQQKPGLPPRLLIYRTSNLASGIP DRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYTFGQGTKLEIK
893.	PM08E11-LCDR1	artificial	aa	SASSSISSNYLH

894.	PM08E11-LCDR2	artificial	aa	RTSNLAS
895.	PM08E11-LCDR3	artificial	aa	QQGSSLPYT
896.	PM08E11-L	artificial	nt	GAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCCGGGGAGAGGG CCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTTGCATTGGTATC AGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATCCAATCTGGCTT CTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATTTCACTCTCACA ATTAGCAGGCTGGAGGCTGAAGATTTTGCCACTTACTACTGCCAGCAGGGTAGTAG TTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
897.	PM08E11-HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGIPDRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYT FGQGTKLEIK
898.	PM08E11-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCC GGGGAGAGGGCCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGGCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
899.	PM08E11 HL X I2C HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYTITDTYMDWVRQAPGQGLEWIARIDPANGD SKYDPKFQGRVTMTADTSTNTVYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGIPDRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYT FGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAP GKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCV RHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSPG GTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGGK AALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
900.	PM08E11 HL X I2C	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAACCAGGGCCTCAGTCA

	HL			AGGTGTCCTGCAAAGCTTCTGGCTACACCATTACAGACACCTATATGGACTGGGTG AGGCAGGCGCCTGGACAGGGCCTGGAATGGATTGCAAGGATTGATCCTGCGAATG GTGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATGACAGCAGACACA TCCACCAACACAGTCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCC GGGGAGAGGGCCACTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGGCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAATCC GGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTAC GCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCA TAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTT CACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAA AACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCT ACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGT GGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGA CTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGC TCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACC AGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACT CCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAG GGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGC TGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
901.	PM08E11-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCGGATCGACCCTGCCAA CGGCGACTCCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCT
902.	PM08E11-L codon optimized	artificial	nt	GAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCTGTGTCTCCCGGCGAGAGG CCACCCTGTCCTGCTCCGCCCTCCTCCTCCATCTCCTCCAACTACCTGCACTGGTAT CAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCGGACCTCCAACCTGG

				CCTCTGGCATCCCCGACAGGTTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCT GACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTACTGCCAGCAGGGC TCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAAATCAAG
903.	PM08E11-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCCGGATCGACCCTGCCAA CGGCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCT GGTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCTGTGT CTCCCGGCGAGAGAGCCACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAAC TACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCATCCCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAG
904.	PM08E11 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCATCACCGACACCTACATGGACTGGGT GCGGCAGGCTCCTGGACAGGGCCTGGAATGGATCGGCCCCGGATCGACCCTGCCAA CGGCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATGACCGCCGAC ACCTCCACCAACACCGTGTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAG GGCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCT GGTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCTGTGT CTCCCGGCGAGAGAGCCACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAAC TACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCATCCCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAGTCTGGCGGAGGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGAGGGGGA CTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTTACCT TCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTGGAATG GGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCTGACTCCG TGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCTGCAG ATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACGGCAA

				CTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTGGTCA CCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGCGGAT CCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCACCGT GACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCCTAACT GGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACCAAGTT TCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCAAGGCC GCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTGTGTGC TGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGTGCTG
905.	PM95H6-H	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSS
906.	PM95H6-HCDR1	artificial	aa	DTYMD
907.	PM95H6-HCDR2	artificial	aa	RIDPANGDSKYDPKFQG
908.	PM95H6-HCDR3	artificial	aa	GGMIWYFDV
909.	PM95H6-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCA
910.	PM95H6-L	artificial	aa	EIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQQKPGLPPRLLIYRTSNLASGVP DRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPYTFGQGTKLEIK
911.	PM95H6-LCDR1	artificial	aa	SASSSISSNYLH
912.	PM95H6-LCDR2	artificial	aa	RTSNLAS
913.	PM95H6-LCDR3	artificial	aa	QQGSSLPYT
914.	PM95H6-L	artificial	nt	GAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCCGGGGAGAAGG TCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTTGCATTGGTATC AGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATCCAATCTGGCTT CTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATTTCACTCTCACA ATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGCAGGGTAGTAG TTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
915.	PM95H6-HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGVPDRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPY

				TFGQGTKLEIK
916.	PM95H6-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCC GGGGAGAAGGTCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
917.	PM95H6 HL X I2C HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATLAVSPGEKVTLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGVPDRFSGSGSGTDFTLTISRLEPEDFATYYCQQGSSLPY TFGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQA PGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYC VRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSP GGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGG KAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
918.	PM95H6 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCCTGGCTGTATCTCCC GGGGAGAAGGTCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAGTCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGCCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAATCC

				GGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTAC GCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCA TAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTT CACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAA AACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCT ACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGT GGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGACTGTTGTGA CTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGC TCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACC AGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACT CCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAG GGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGC TGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
919.	PM95H6-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGGCAGGGCCTGGAATGGATCGGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCT
920.	PM95H6-L codon optimized	artificial	nt	GAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGTCTCCCGGCGAGAAAG TGACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAACTACCTGCACTGGTATC AGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCGGACCTCCAACCTGGC CTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTG ACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTACTGCCAGCAGGGCT CCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAAATCAAG
921.	PM95H6-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGGCAGGGCCTGGAATGGATCGGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCT GTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGTC TCCCGGCGAGAAAGTGACCCTGTCCTGCTCCGCCTCCTCCATCTCCTCCAACT

				ACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAG
922.	PM95H6 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGCAGGGCCTGGAATGGATCGGCGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCTG GTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCCTGGCTGTGTC TCCCGGCGAGAAAGTGACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAACT ACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCGTGCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAACCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAGTCTGGCGGAGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGAGGGGGA CTGGTGCAGCCCGGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTTACCT TCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTGGAATG GGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCTGACTCCG TGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCTGCAG ATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACGGCAA CTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTGGTCA CCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGCGGAT CCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCACCGT GACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCCTAACT GGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACCAAGTT TCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCAAGGCC GCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTGTGTGC TGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGTGCTG
923.	PM95A8-H	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSS
924.	PM95A8-HCDR1	artificial	aa	DTYMD

925.	PM95A8-HCDR2	artificial	aa	RIDPANGDSKYDPKFQG
926.	PM95A8-HCDR3	artificial	aa	GGMIWYFDV
927.	PM95A8-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCA
928.	PM95A8-L	artificial	aa	EIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQQKPGLPPRLLIYRTSNLASGIP DRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYTFGQGTKLEIK
929.	PM95A8-LCDR1	artificial	aa	SASSSISSNYLH
930.	PM95A8-LCDR2	artificial	aa	RTSNLAS
931.	PM95A8-LCDR3	artificial	aa	QQGSSLPYT
932.	PM95A8-L	artificial	nt	GAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCCGGGGAGAGGG CCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTTGCATTGGTATC AGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATCCAATCTGGCTT CTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATTTCACTCTCACA ATTAGCAGGCTGGAGGCTGAAGATTTTGCCACTTACTACTGCCAGCAGGGTAGTAG TTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
933.	PM95A8-HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGIPDRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYT FGQGTKLEIK
934.	PM95A8-HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCC GGGGAGAGGGCCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT

				TCACTCTCACAATTAGCAGGCTGGAGGCTGAAGATTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAA
935.	PM95A8 HL X I2C HL	artificial	aa	QVQLVQSGAEVMKPGASVKVSCKASGYNFKDTYMDWVKQTPEQGLEWMGRIDPANG DSKYDPKFQGRVTITADTSTNTAYMELSSLRSEDTAVYYCARGGMIWYFDVWGQGTTV TVSSGGGGSGGGGSGGGGSEIVLTQSPATMSVSPGERATLSCSASSSISSNYLHWYQ QKPGLPPRLLIYRTSNLASGIPDRFSGSGSGTDFTLTISRLEAEDFATYYCQQGSSLPYT FGQGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQAP GKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYCV RHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSPG GTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGGK AALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
936.	PM95A8 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGGGCAGAGGTTATGAAGCCAGGGGCCTCAGTCA AGGTGTCCTGCAAAGCTTCTGGCTACAACTTTAAAGACACCTATATGGACTGGGTGA AGCAGACGCCTGAACAGGGCCTGGAATGGATGGGAAGGATTGATCCTGCGAATGG TGATAGTAAATATGACCCGAAATTCCAGGGCAGGGTCACTATAACAGCAGACACAT CCACCAACACAGCCTACATGGAGCTCAGCAGCCTGAGATCTGAGGACACTGCCGT CTATTATTGTGCTAGAGGCGGGATGATATGGTACTTCGATGTCTGGGGCCAAGGGA CCACGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTG GTGGTGGTTCTGAGATCGTGCTCACCCAGTCTCCAGCCACCATGTCTGTATCTCCC GGGGAGAGGGCCACTCTCTCCTGCAGTGCCAGCTCAAGTATAAGTTCCAATTACTT GCATTGGTATCAGCAGAAGCCAGGATTGCCCCCTAGACTCTTGATTTATAGGACATC CAATCTGGCTTCTGGAATCCCAGATCGCTTCAGTGGCAGTGGGTCTGGGACCGATT TCACTCTCACAATTAGCAGGCTGGAGGCTGAAGATTTTTGCCACTTACTACTGCCAGC AGGGTAGTAGTTTACCGTACACGTTCGGACAAGGGACCAAGCTTGAGATCAAATCC GGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGAGGATTGGTGCAG CCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCACCTTCAATAAGTAC GCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAATGGGTTGCTCGCA TAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCAGTGAAAGACAGGTT CACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAATGAACAACTTGAA AACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAACTTCGGTAATAGCT ACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCACCGTCTCCTCAGGT GGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGACTGTTGTGA CTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCACACTCACTTGTGGC TCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGGTCCAACAAAAACC AGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCTCGCCCCCGGTACT CCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCCTCACCCTCTCAG

				GGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGGTACAGCAACCGC TGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
937.	PM95A8-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGCAGGGCCTGGAATGGATGGGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCT
938.	PM95A8-HCDR1 codon optimized	artificial	nt	GAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCCGTGTCTCCCGGCGAGAGGG CTACCCTGTCCTGCTCCGCCTCCTCCATCTCCTCCAACTACCTGCACTGGTATC AGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCGGACCTCCAACCTGGC CTCTGGCATCCCCGACAGGTTCTCCGGCTCTGGCTCCGGCACCGACTTCACCCTG ACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTACTGCCAGCAGGGCT CCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAAATCAAG
939.	PM95A8-HCDR2 codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGCAGGGCCTGGAATGGATGGGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCTG GTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCCGTGTC TCCCGGCGAGAGGGCTACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAACT ACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCATCCCCCGACACAGGTTCTCCGGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAG
940.	PM95A8 HL x I2C HL_codon optimized	artificial	nt	CAGGTGCAGCTGGTCCAGTCTGGCGCCGAAGTGATGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACAACTTCAAGGACACCTACATGGACTGGGTG AAACAGACCCCTGAGCAGGGCCTGGAATGGATGGGCCGGATCGACCCTGCCAACG GCGACTCCAAGTACGACCCTAAGTTCCAGGGCAGAGTGACCATCACCGCCGACAC CTCCACCAACACCGCCTACATGGAACTGTCCTCCCTGCGGTCTGAGGACACCGCC GTGTACTACTGCGCCAGGGGCGGCATGATCTGGTACTTCGACGTGTGGGGCCAGG GCACCACCGTGACAGTGTCCTCTGGCGGCGGAGGAAGTGGAGGTGGAGGATCTG

				GTGGAGGCGGCTCCGAGATCGTGCTGACCCAGTCTCCTGCCACCATGTCCGTGTC TCCCGGCGAGAGGGCTACCCTGTCCTGCTCCGCCTCCTCCTCCATCTCCTCCAACT ACCTGCACTGGTATCAGCAGAAGCCTGGCCTGCCTCCTCGGCTGCTGATCTACCG GACCTCCAACCTGGCCTCTGGCATCCCCCGACAGGTTCTCCGGCTCTGGCTCCGGC ACCGACTTCACCCTGACCATCTCCCGGCTGGAAGCTGAGGACTTCGCCACCTACTA CTGCCAGCAGGGCTCCTCCCTGCCTTACACCTTCGGACAGGGCACCAAGCTGGAA ATCAAGTCTGGCGGAGGGGGCTCTGAAGTGCAGCTGGTGGAAAGCGGAGGGGGA CTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTTACCT TCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTGGAATG GGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGGCTGACTCCG TGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCTGCAG ATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACGGCAA CTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTGGTCA CCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGCGGAT CCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCACCGT GACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCCTAACT GGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACCAAGTT TCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCAAGGCC GCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTGTGTGC TGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGTGCTG
941.	PM07A12-H	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAFDYWGQGTL VTVSS
942.	PM07A12-HCDR1	artificial	aa	DYYMS
943.	PM07A12-HCDR2	artificial	aa	SISDGGSNTYYSDIIKG
944.	PM07A12-HCDR3	artificial	aa	GFPLLRHGAFDY
945.	PM07A12-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGGC CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
946.	PM07A12-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQQKPGQAPKSLIYSATYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPYTFGGGTKLEIK
947.	PM07A12-LCDR1	artificial	aa	RASQNVDTNVA

948.	PM07A12-LCDR2	artificial	aa	SATYRYS
949.	PM07A12-LCDR3	artificial	aa	QQYNSYPYT
950.	PM07A12-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAGGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGATCTACTCCGCCACCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACCGTACTACTGCCAGCAGTACAAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
951.	PM07A12-HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAFDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIK
952.	PM07A12-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACAACATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAG
953.	PM07A12 HL X I2C HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAFDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQ APGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYY CVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVS PGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLG GKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL

954.	PM07A12 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGG AGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCA CCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAA TGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAG TGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAA TGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAAC TTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCAC CGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCAC ACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTC GCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCC TCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGG TACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
955.	PM07A12-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACATGTCCTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACAACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACAGTGTCCTCT
956.	PM07A12-L codon optimized	artificial	nt	GACATCCAGATGACCCAGTCCCCATCCTCCCTGTCTGCCTCCGTGGGCGACAGAGT GACCATCACATGCCGGGCCTCCCAGAACGTGGACACCAACGTGGCATGGTATCAG

				CAGAAGCCAGGCCAGGCCCCTAAGTCCCTGATCTACTCTGCCACCTACCGGTACTC CGACGTGCCCTCCAGGTTCTCTGGCTCCGCCTCTGGCACCGACTTCACCCTGACCA TCTCTTCCGTGCAGTCCGAGGACTTCGCTACCTACTACTGCCAGCAGTACAACTCC TACCCTTACACCTTCGGCGGAGGCACCAAGCTGGAAATCAAG
957.	PM07A12-HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTCCTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACAACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCG GAGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCT GTCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCCGGGCCTCCCAGAACGTG GACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCAGGCCCCTAAGTCCCTGA TCTACTCTGCCACCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGCC TCTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTAC CTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGCACCAAGC TGGAAATCAAG
958.	PM07A12 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGCTCCCTG AGACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTCCTGGGT CCGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACA ACGCTAAGAACAACCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCG GAGGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCT GTCTGCCTCCGTGGGCGACAGAGTGACCATCACATGCCGGGCCTCCCAGAACGTG GACACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCAGGCCCCTAAGTCCCTGA TCTACTCTGCCACCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGCC TCTGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTAC CTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGCACCAAGC TGGAAATCAAGCGGGACTGTGGCGCTCTGAAGTGCAGCTGGTGGAAAGCGGAG GGGGACTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCT TTACCTTCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCAGGGAAAGGCCTG GAATGGGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCTGA CTCCGTGAAGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATC

				TGCAGATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCAC GGCAACTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACT GGTCACCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGG CGGATCCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGC ACCGTGACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACC CTAACTGGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCAC CAAGTTTCTGGCCCCCTGGCACCCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGC AAGGCCGCTCTGACCCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACT GTGTGCTGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGT GCTG
959.	PM07F8-H	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAFDYWGQGTL VTVSS
960.	PM07F8-HCDR1	artificial	aa	DYYMS
961.	PM07F8-HCDR2	artificial	aa	SISDGGSNTYYSDIIKG
962.	PM07F8-HCDR3	artificial	aa	GFPLLRHGAFDY
963.	PM07F8-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
964.	PM07F8-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQQKPGQAPKSLIYSATYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPYTFGGGTKLEIK
965.	PM07F8-LCDR1	artificial	aa	RASQNVDTNVA
966.	PM07F8-LCDR2	artificial	aa	SATYRYS
967.	PM07F8-LCDR3	artificial	aa	QQYNSYPYT
968.	PM07F8-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAGGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGATCTACTCCGCCACCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGGCGTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACGTACTACTGCCAGCAGTACAAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
969.	PM07F8-HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAFDYWGQGTL

				VTVSSGGGGSGGGSGGGGSGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIK
970.	PM07F8-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAG
971.	PM07F8 HL X I2C HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAFDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQ APGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYY CVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVS PGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLG GKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
972.	PM07F8 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGGGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCTTCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA

				TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGG AGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCA CCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAA TGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAG TGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAA TGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAAC TTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCAC CGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCAC ACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTC GCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCC TCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGG TACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
973.	PM07F8-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGAGTCCCTGA GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTCCTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGGCT CCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACTGG GGCCAGGGCACCCTGGTCACAGTGTCCTCT
974.	PM07F8-H codon optimized	artificial	nt	GACATCCAGATGACCCAGTCCCCATCCTCCCTGTCTGCCTCCGTGGGCGACAGAGT GACCATCACATGCCGGGCCTCCCAGAACGTGGACACCAACGTGGCATGGTATCAG CAGAAGCCAGGCCAGGCCCCCTAAGTCCCTGATCTACTCTGCCACCTACCGGTACTC CGACGTGCCCTCCAGGTTCTCTGGCTCCGCCTCTGGCACCGACTTCACCCTGACCA TCTCTTCCGTGCAGTCCGAGGACTTCGCTACCTACTACTGCCAGCAGTACAACTCC TACCCTTACACCTTCGGCGGAGGCACCAAGCTGGAAATCAAG
975.	PM07F8-H codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGAGTCCCTGA GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACTACATGTCCTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGGCT CCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACTGG

				GGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCGGA GGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCTGT CTGCCTCCGTGGGCGACAGAGTGACCATCACATGCCGGGCCTCCCAGAACGTGGA CACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCCCCTAAGTCCCTGATC TACTCTGCCACCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGCCTC TGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTACCT ACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGCACCAAGCTG GAAATCAAG
976.	PM07F8 HL x I2C HL codon optimized	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTCAAGCCTGGCGGAGTCCCTGA GACTGTCTTGCGCTGCCTCCGGCTTCACCTTCTCCGACTACATGTCCTGGGTC CGCCAGGCTCCTGGCAAGGGACTGGAATGGGTGGCCTCCATCTCCGACGGCGGCT CCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCAGGGACAAC GCCAAGAACTCCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGCCG TGTACTACTGCGCCAGGGGCTTCCCACTGCTGAGACACGGCGCCTTCGATTACTGG GGCCAGGGCACCCTGGTCACAGTGTCCTCTGGCGGAGGCGGAAGTGGAGGCGGA GGAAGCGGAGGCGGCGGATCCGACATCCAGATGACCCAGTCCCCATCCTCCCTGT CTGCCTCCGTGGGCGACAGAGTGACCATCACATGCCGGGCCTCCCAGAACGTGGA CACCAACGTGGCATGGTATCAGCAGAAGCCAGGCCCCCTAAGTCCCTGATC TACTCTGCCACCTACCGGTACTCCGACGTGCCCTCCAGGTTCTCTGGCTCCGCCTC TGGCACCGACTTCACCCTGACCATCTCTTCCGTGCAGTCCGAGGACTTCGCTACCT ACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGCACCAAGCTG GAAATCAAGTCCGGCGGAGGGGGCTCTCTGAAGTGCAGCTGGTGGAAAGCGGAGGG GGACTGGTGCAGCCCGGGGGAAGTCTGAAGCTGTCCTGTGCCGCCAGCGGCTTTA CCTTCAACAAGTACGCCATGAATTGGGTCCGACAGGCCCCCAGGGAAAGGCCTGGA ATGGGTGGCACGGATCCGGTCCAAGTACAACAACTACGCCACCTACTACGCTGACT CCGTGAAGGGACAGATTCACCATCAGCCGGGACGACTCTAAGAACACCGCCTATCTG CAGATGAACAACCTGAAAACCGAGGATACAGCTGTGTACTATTGTGTGCGGCACGG CAACTTCGGCAACTCCTACATCTCCTACTGGGCCTATTGGGGACAGGGAACACTGG TCACCGTGTCTAGCGGAGGTGGCGGAAGTGGGGGAGGCGGATCTGGCGGTGGCG GATCCCAGACCGTGGTCACCCAGGAACCTTCCCTGACCGTCTCCCCAGGCGGCAC CGTGACCCTGACCTGTGGCTCCTCTACCGGCGCTGTGACCTCCGGCAACTACCCTA ACTGGGTGCAGCAGAAACCCGGACAGGCTCCTAGAGGCCTGATCGGCGGCACCAA GTTTCTGGCCCCTGGCACCCCTGCCAGATTCTCCGGCTCCCTGCTGGGAGGCAAG GCCGCTCTGACCCTGTCTGGCGTGCAGCCTGAGGACGAGGCCGAGTACTACTGTG TGCTGTGGTACTCCAACAGATGGGTGTTCGGAGGCGGCACAAAGCTGACCGTGCT G

977.	PM07E5-H	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAIDYWGQGTL VTVSS
978.	PM07E5-HCDR1	artificial	aa	DYYMS
979.	PM07E5-HCDR2	artificial	aa	SISDGGSNTYYSDIIKG
980.	PM07E5-HCDR3	artificial	aa	GFPLLRHGAIDY
981.	PM07E5-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
982.	PM07E5-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQQKPGQAPKSLIYSATYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPYTFGGGTKLEIK
983.	PM07E5-LCDR1	artificial	aa	RASQNVDTNVA
984.	PM07E5-LCDR2	artificial	aa	SATYRYS
985.	PM07E5-LCDR3	artificial	aa	QQYNSYPYT
986.	PM07E5-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAGGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGATCTACTCCGCCACCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCGTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACGTACTACTGCCAGCAGTACAAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
987.	PM07E5-HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAIDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIK
988.	PM07E5-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCG

				GCGGCTCCGGTGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAG
989.	PM07E5 HL X I2C HL	artificial	aa	QVQLVESGGGLVKPGGSLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNNLYLQMNSLRAEDTAVYYCARGFPLLRHGAIDYWGQGTL VTVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWY QQKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYP YTFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQ APGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYY CVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVS PGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLG GKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
990.	PM07E5 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGGCGGACTGGTGAAGCCTGGCGGGGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACAATCTGTACCTGCAGATGAACTCCCTGAGGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGGG AGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCA CCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAA TGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAG TGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAA TGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAAC TTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCAC

				CGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCAC ACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTC GCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCC TCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGG TACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
991.	PM07D3-H	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAIDYWGQGTLV TVSS
992.	PM07D3-HCDR1	artificial	aa	DYYMS
993.	PM07D3-HCDR2	artificial	aa	SISDGGSNTYYSDIIKG
994.	PM07D3-HCDR3	artificial	aa	GFPLLRHGAIDY
995.	PM07D3-H	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGCGGCGGACTGGTGAAGCCTGGCGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCA
996.	PM07D3-L	artificial	aa	DIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQQKPGQAPKSLIYSATYRYSDV PSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPYTFGGGTKLEIK
997.	PM07D3-LCDR1	artificial	aa	RASQNVDTNVA
998.	PM07D3-LCDR2	artificial	aa	SATYRYS
999.	PM07D3-LCDR3	artificial	aa	QQYNSYPYT
1000.	PM07D3-L	artificial	nt	GACATCCAGATGACCCAGTCCCCCAGCTCCCTGTCCGCCTCCGTGGGCGACAGAG TGACCATCACCTGCAGGGCCTCCCAGAACGTGGACACCAACGTGGCCTGGTATCA GCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGATCTACTCCGCCACCTACCGGTAC TCTGACGTGCCTTCCCGGTTCTCCGGCTCCGGCTCCGGCACCGACTTCACCCTGA CCATCTCCAGCGTGCAGTCTGAGGACTTCGCCACGTACTACTGCCAGCAGTACAAC TCCTACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCAAG
1001.	PM07D3-HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAIDYWGQGTLV TVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQ QKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPY TFGGGTKLEIK

1002.	PM07D3-HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGCGGCGGACTGGTGAAGCCTGGCGGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC TGGAAATCAAG
1003.	PM07D3 HL X I2C HL	artificial	aa	QVQLVESGGGLVKPGESLRLSCAASGFTFSDYYMSWVRQAPGKGLEWVASISDGGSN TYYSDIIKGRFTISRDNAKNSLYLQMNSLKAEDTAVYYCARGFPLLRHGAIDYWGQGTLV TVSSGGGGSGGGGSGGGGSDIQMTQSPSSLSASVGDRVTITCRASQNVDTNVAWYQ QKPGQAPKSLIYSATYRYSDVPSRFSGSASGTDFTLTISSVQSEDFATYYCQQYNSYPY TFGGGTKLEIKSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVRQA PGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVYYC VRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTVSP GGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLLGG KAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
1004.	PM07D3 HL X I2C HL	artificial	nt	CAGGTGCAGCTGGTCGAGTCTGGGGCGGCGGACTGGTGAAGCCTGGCGGAGTCCCTG AGGCTGTCCTGTGCCGCCTCCGGCTTCACCTTCTCCGACTACTACATGAGCTGGGT CCGCCAGGCCCCTGGGAAGGGGCTGGAATGGGTGGCCTCCATCTCCGACGGCGGG CTCCAACACCTACTACTCCGACATCATCAAGGGCCGGTTCACCATCTCCCGAGACA ACGCCAAGAACACAGCCTGTACCTGCAGATGAACTCCCTGAAGGCCGAGGACACCGC CGTGTACTACTGCGCCCCCGGGGCTTCCCTCTGCTGAGACACGGCGCCATCGATTACT GGGGCCAGGGCACCCTGGTCACCGTCTCCTCAGGTGGTGGTTCTGGCGGCG GCGGCTCCGGTGGTGGTTCTGACATCCAGATGACCCAGTCCCCCAGCTCCCT GTCCGCCTCCGTGGGCGACAGAGTGACCATCACCTGCAGGGCCTCCCAGAACGTG GACACCAACGTGGCCTGGTATCAGCAGAAGCCCGGCCAGGCCCCTAAGTCCCTGA TCTACTCCGCCACCTACCGGTACTCTGACGTGCCTTCCCGGTTCTCCGGCTCCGCG TCCGGCACCGACTTCACCCTGACCATCTCCAGCGTGCAGTCTGAGGACTTCGCCAC GTACTACTGCCAGCAGTACAACTCCTACCCTTACACCTTCGGCGGAGGGACCAAGC

				TGGAAATCAAGTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGAGG AGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTCA CCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGAA TGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTCAG TGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAAA TGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAAC TTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCAC CGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCT CAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCAC ACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGGG TCCAACAAAAACCAGGTCAGGCACCCCCGTGGTCTAATAGGTGGGACTAAGTTCCTC GCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCCC TCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATGG TACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
1005.	PM26C9-H	artificial	aa	QVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVMHWVRQTPGQRLEWIGYINPYNDV TRYNGKFKGRVTITSDKSSSTAYMELSSLRSEDTAVYYCARGENWYYFDSWGRGTLVT VSS
1006.	PM26C9-HCDR1	artificial	aa	GYVMH
1007.	PM26C9-HCDR2	artificial	aa	YINPYNDVTRYNGKFKG
1008.	PM26C9-HCDR3	artificial	aa	GENWYYFDS
1009.	PM26C9-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCCGGCCCTGAGGTGGTGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGATGCACTGGGT GAGACAGACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAAC GACGTGACCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACA AGTCCTCCTCCACCGCCTACATGGAACTGTCCAGCCTGAGGTCTGAGGACACCGC CGTGTACTACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGA GGCACTCTGGTCACCGTCTCCTCC
1010.	PM26C9-L	artificial	aa	DVVMTQSPLSLAVTLGQPASISCRASESIDSYDNTFMHWYQQRPGQSPSLLIYRASILQ SGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIK
1011.	PM26C9-LCDR1	artificial	aa	RASESIDSYDNTFMH
1012.	PM26C9-LCDR2	artificial	aa	RASILQS
1013.	PM26C9-LCDR3	artificial	aa	HQSIEDPYT
1014.	PM26C9-L	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCCGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTAGCCTGCTGATCTACCGGGCCT CTATCCTGCAATCCGGCGTCCCTGACCGGTTCTCCGGCTCTGGCTCCGGTACCGA

				CTTCACCCTGAAAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AG
1015.	PM26C9-LH	artificial	aa	DVVMTQSPLSLAVTLGQPASISCRASESIDSYDNTFMHWYQQRPGQSPSLLIYRASILQ SGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIKGGGSG GGGSGGGGSQVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVMHWVRQTPGQRLE WIGYINPYNDVTRYNGKFKGRVTITSDKSSSTAYMELSSLRSEDTAVYYCARGENWYYF DSWGRGTLVTVSS
1016.	PM26C9-LH	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCCGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTAGCCTGCTGATCTACCGGGCCT CTATCCTGCAATCCGGCGTCCCTGACCGGTTCTCCGGCTCTGGCTCCGGTACCGA CTTCACCCTGAAAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AGGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGGTGC AGCTGGTCCAGTCCGGCCCTGAGGTGGTGAAGCCTGGCGGCCTCCGTGAAGGTGTC CTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGATGCACTGGGTGAGACAG ACACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAACGACGTGA CCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACAAGTCCTCC TCCACCGCCTACATGGAACTGTCCAGCCTGAGGTCTGAGGACACCGCCGTGTACTA CTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCACTCTG GTCACCGTCTCCTCC
1017.	PM26C9 LH X I2C HL	artificial	aa	DVVMTQSPLSLAVTLGQPASISCRASESIDSYDNTFMHWYQQRPGQSPSLLIYRASILQ SGVPDRFSGSGSGTDFTLKISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIKGGGSG GGGSGGGGSQVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVMHWVRQTPGQRLE WIGYINPYNDVTRYNGKFKGRVTITSDKSSSTAYMELSSLRSEDTAVYYCARGENWYYF DSWGRGTLVTVSSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVR QAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVY YCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTV SPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLL GGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
1018.	PM26C9 LH X I2C HL	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCCGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGACAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTAGCCTGCTGATCTACCGGGCCT CTATCCTGCAATCCGGCGTCCCTGACCGGTTCTCCGGCTCTGGCTCCGGTACCGA CTTCACCCTGAAAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC

				CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AGGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTCTCAGGTGC AGCTGGTCCAGTCCGGCCCTGAGGTGGTGAAGCCTGGCGCCTCCGTGAAGGTGTC CTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGATGCACTGGGTGAGACAG ACACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAACGACGTGA CCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACAAGTCCTCC TCCACCGCCTACATGGAACTGTCCAGCCTGAGGTCTGAGGACACCGCCGTGTACTA CTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCACTCTG GTCACCGTCTCCTCCGGAGGTGGTGGATCCGAGGGTGCAGCTGGTCGAGTCTGGAG GAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATTC ACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGGA ATGGGTTGCTCGCATAAGAAGTAAATATAATTATGCAACATATTATGCCGATTCA GTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACAA ATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGAA CTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTCA CCGTCTCCTCAGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTGGTTC TCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTCA CACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTGG GTCCAACAAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCCT CGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGCC CTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTATG GTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
1019.	PM26H4-H	artificial	aa	QVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVLHWVKQTPGQRLEWIGYINPYNDVT RYNGKFKGRVTITSDTSASTAYMELSGLTSEDTAVYYCARGENWYYFDSWGRGTLVTV SS
1020.	PM26H4-HCDR1	artificial	aa	GYVLH
1021.	PM26H4-HCDR2	artificial	aa	YINPYNDVTRYNGKFKG
1022.	PM26H4-HCDR3	artificial	aa	GENWYYFDS
1023.	PM26H4-H	artificial	nt	CAGGTGCAGCTGGTCCAGTCCGGCCCTGAGGTGGTGAAGCCTGGCGCCTCCGTGA AGGTGTCCTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGCTGCACTGGGT GAAACAGACACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAAC GACGTGACCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACA CGTCCGCCTCCACCGCCTACATGGAACTGTCCGGCCTGACGTCTGAGGACACCGC CGTGTATTACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGA GGCACTCTGGTCACCGTCTCCTCC
1024.	PM26H4-L	artificial	aa	DVVMTQSPLSLAVTLGQRASISCRASESIDSYGNTFMHWYQQRPGQSPRLLIYRASILE

				SGVPARFSGSGSGTDFTLAISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIK
1025.	PM26H4-LCDR1	artificial	aa	RASESIDSYGNTFMH
1026.	PM26H4-LCDR2	artificial	aa	RASILES
1027.	PM26H4-LCDR3	artificial	aa	HQSIEDPYT
1028.	PM26H4-L	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCGGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGGCAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTCGCCTGCTGATCTACCGGGCCT CTATCCTGGAATCCGGCGTCCCTGCCCGGTTCTCCGGCTCTGGCTCCGGCACCGA CTTCACCCTGGCAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AG
1029.	PM26H4-LH	artificial	aa	DVVMTQSPLSLAVTLGQRASISCRASESIDSYGNTFMHWYQQRPGQSPRLLIYRASILE SGVPARFSGSGSGTDFTLAISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIKGGGSG GGGSGGGGSQVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVLHWVKQTPGQRLEW IGYINPYNDVTRYNGKFKGRVTITSDTSASTAYMELSGLTSEDTAVYYCARGENWYYFD SWGRGTLVTVSS
1030.	PM26H4-LH	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCGGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGGCAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTCGCCTGCTGATCTACCGGGGCCT CTATCCTGGAATCCGGCGTCCCTGCCCGGTTCTCCGGCTCTGGCTCCGGCACCGA CTTCACCCTGGCAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AGGGTGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTCTCAGGTGC AGCTGGTCCAGTCCGGCCCTGAGGTGGTGAAGCCTGGCGCCTCCGTGAAGGTGTC CTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGCTGCACTGGGTGAAACAG ACACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAACGACGTGA CCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACAAGTCCGC CTCCACCGCCTACATGGAACTGTCCGGCCTGACGTCTGAGGACACCGCCGTGTATT ACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCACTCT GGTCACCGTCTCCTCC
1031.	PM26H4 LH X I2C HL	artificial	aa	DVVMTQSPLSLAVTLGQRASISCRASESIDSYGNTFMHWYQQRPGQSPRLLIYRASILE SGVPARFSGSGSGTDFTLAISRVEAEDVGVYYCHQSIEDPYTFGGGTKLEIKGGGSG GGGSGGGGSQVQLVQSGPEVVKPGASVKVSCKASGYTFTGYVLHWVKQTPGQRLEW IGYINPYNDVTRYNGKFKGRVTITSDTSASTAYMELSGLTSEDTAVYYCARGENWYYFD SWGRGTLVTVSSSGGGGSEVQLVESGGGLVQPGGSLKLSCAASGFTFNKYAMNWVR QAPGKGLEWVARIRSKYNNYATYYADSVKDRFTISRDDSKNTAYLQMNNLKTEDTAVY

				YCVRHGNFGNSYISYWAYWGQGTLVTVSSGGGGSGGGGSGGGGSQTVVTQEPSLTV SPGGTVTLTCGSSTGAVTSGNYPNWVQQKPGQAPRGLIGGTKFLAPGTPARFSGSLL GGKAALTLSGVQPEDEAEYYCVLWYSNRWVFGGGTKLTVL
1032.	PM26H4 LH X I2C HL	artificial	nt	GACGTCGTGATGACCCAGTCTCCACTCTCCCTGGCTGTGACTCTGGGCCAGCGGG CCTCCATCTCTTGCCGGGGCCTCCGAGTCCATCGACTCCTACGGCAACACCTTCATG CACTGGTATCAGCAGAGGCCTGGCCAGTCTCCTCGCCCTGCTGATCTACCGGGGCCT CTATCCTGGAATCCGGCGTCCCTGCCCGGTTCTCCGGCTCTGGCTCCGGCACCGA CTTCACCCTGGCAATCTCCCGTGTGGAGGCCGAGGACGTGGGCGTCTACTACTGC CACCAGTCCATCGAGGACCCTTACACCTTCGGCGGAGGGACCAAGCTGGAAATCA AGGGTGGTGGTGGTTCTGGCGGCGGCGGCTCCGGTGGTGGTTCTCAGGTGC AGCTGGTCCAGTCCGGCGCCCTGAGGTGGTGAAGCCTGGCGCCTCCGTGAAGGTGTC CTGCAAGGCCTCCGGCTACACCTTCACCGGCTACGTGCTGCACTGGGTGAAACAG ACACCCGGCCAGCGGCTGGAATGGATCGGCTACATCAACCCTTACAACGACGTGA CCCGGTACAACGGCAAGTTCAAGGGCAGAGTCACCATTACCAGCGACAAGTCCGC CTCCACCGCCTACATGGAACTGTCCGGCCTGACGTCTGAGGACACCGCCGTGTATT ACTGCGCCAGGGGCGAGAACTGGTACTACTTCGACTCCTGGGGCAGAGGCACTCT GGTCACCGTCTCCTCCGGAGGTGGTGGATCCGAGGTGCAGCTGGTCGAGTCTGGA GGAGGATTGGTGCAGCCTGGAGGGTCATTGAAACTCTCATGTGCAGCCTCTGGATT CACCTTCAATAAGTACGCCATGAACTGGGTCCGCCAGGCTCCAGGAAAGGGTTTGG AATGGGTTGCTCGCATAAGAAGTAAATATAATAATTATGCAACATATTATGCCGATTC AGTGAAAGACAGGTTCACCATCTCCAGAGATGATTCAAAAAACACTGCCTATCTACA AATGAACAACTTGAAAACTGAGGACACTGCCGTGTACTACTGTGTGAGACATGGGA ACTTCGGTAATAGCTACATATCCTACTGGGCTTACTGGGGCCAAGGGACTCTGGTC ACCGTCTCCTCAGGTGGTGGTTCTGGCGGCGGCTCCGGTGGTGGTTGGTT CTCAGACTGTTGTGACTCAGGAACCTTCACTCACCGTATCACCTGGTGGAACAGTC ACACTCACTTGTGGCTCCTCGACTGGGGCTGTTACATCTGGCAACTACCCAAACTG GGTCCAACACAAAACCAGGTCAGGCACCCCGTGGTCTAATAGGTGGGACTAAGTTCC TCGCCCCCGGTACTCCTGCCAGATTCTCAGGCTCCCTGCTTGGAGGCAAGGCTGC CCTCACCCTCTCAGGGGTACAGCCAGAGGATGAGGCAGAATATTACTGTGTTCTAT GGTACAGCAACCGCTGGGTGTTCGGTGGAGGAACCAAACTGACTGTCCTA
1033.	huPSMArat140-169	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGGCGCCCGC GGTGGCTGTGCGCCGGGGCGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTGGACGAATTGAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA

			CAATTCAATCTCAGTGGAAAGAGTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT
			GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG
			AAGACGGAAATGAGATCTTCAAAACATCATTAGCTGAACTGTCACCCCCGGGATATG
			AGAACATATCAGATGTAGTGCCACCATACAGTGCCTTCTCTCCACAAGGGACACCC
			GAGGGGGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTAAATTGGA
			GCGGGACATGAAGATCAATTGCTCCGGGAAAAATTGTGATTGCCAGATACGGGAAAG
			TTTTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTC
			TCTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT
			GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA
			GGCGACCCTCTCACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT
			TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC
			ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG
			GGAAGTCTCAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAATTTTTCTACA
			CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG
			ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACAGGTATGTCATTCTCGGAGGTC
			ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT
			TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG
			AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC
			GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGGTGGAGTGGCTTATATCAA
			TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCCTGAT
			GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCGATGAAGGCTTCGA
			AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG
			AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG
			ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT
			CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT
			TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG
			TGTTCGAGCTAGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG
			TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA
			TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA
			AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT
			ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGAGAGCATTTATCGATCCATT
			AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA
			CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGATGCCCTGTTTGACATTGAAA
			GCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGGC
			AGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGAT
			TACAAGGACGACGATGACAAGTAA

1034.	huPSMArat140-169	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFKTSLAELSPPGYENISDVVPPYSAFSPQGTPEGDLVYVNY ARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAPG VKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVHPI GYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVTRI YNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRPR RTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMYS LVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGIA SGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDK
1035.	huPSMArat191-258	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGCGGCGCCCGC GGTGGCTGTGCGCCGGGGCGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTTGGACGAATTGAAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA CAAATTCAATCTCAGTGGAAAGAGTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG AAAATGTGTCGGATATTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG AGGGCGACCTAGTGTATGTGAACTATGCGCGCGCACTGAAGACTTTTTTTAAATTGGAG CGGGTCATGAAGATCAATTGTTCTGGGAAGATTGTCATCGCCAGATATGGCCCAAGT GTTCAGAGGAAACAAGGTTAAAAACGCTCAGCTGGCAGGTGCAAAAGGAATCATTC TGTACTCAGACCCTGCTGATTACTTTGTTCCTGGCGTGAAGTCCTACCCAGATGGCT GGAACCTCCCTGGAGGTGGCGTTCAGCGTGGAAACGTCCTAAATCTCAATGGTGCA GGCGACCCGTTAACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG GGAAGCTTGAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAATTTTTCTACA CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACAGGTATGTCATTCTCGGAGGTC ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC

				GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCTGAT GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCGATGAAGGCTTCGA AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG TGTTCGAGCTAGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGAGAGCATTTATCGATCCATT AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGATGCCCCTGTTTGACATTGAAA GCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGGC AGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGAT TACAAGGACGACGATGACAAGTAA
1036.	huPSMArat191-258	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERVMKINCSGKIVIARYGQVFRGNKVKNAQLAGAKGIILYSDPADYFVPG VKSYPDGWNLPGGGVQRGNVLNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVHP IGYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVTR IYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRPR RTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMYS LVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGIA SGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDK
1037.	huPSMArat281-284	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGGCGGCGCCGC GGTGGCTGTGCGCCGGGGCGGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTGGACGAATTGAAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA

CAAATTCAATCTCAGTGGAAAGAGTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG AAAATGTGTCGGATATTTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG AGGGCGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTTAAATTGGAGC GGGACATGAAGATCAATTGCTCCGGGAAAAATTGTGATTGCCAGATACGGGGAAAGTT TTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTCT CTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA GGCGACCCGTTAACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCATGAGTT CACAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG GGAAGCTTGAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAATTTTTCTACA CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACCGGTATGTCATTCTCGGAGGTC ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCCTGAT GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCCGATGAAGGCTTCGA AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG TGTTCGAGCTAGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGAGAGCATTTATCGATCCATT AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGATGCCCTGTTTGACATTGAAA GCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGGC AGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGAT TACAAGGACGACGATGACAAGTAA			

1038.	huPSMArat281-284	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAP GVKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRHEFTEAVGLPSIPVH PIGYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVT RIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRP RRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMY SLVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGI ASGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDK
1039.	huPSMArat300-344	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGGCGGCGCCCGC GGTGGCTGTGCGCCGGGGCGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTTGGACGAATTGAAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA CAAATTCAATCTCAGTGGAAAGAGTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG AAAATGTGTCGGATATTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG AGGGCGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTTAAATTGGAGC GGGACATGAAGATCAATTGCTCCGGGAAAATTGTGATTGCCAGATACGGGAAAGTT TTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTCT CTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA GGCGACCCGTTAACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACGATGATGC CCAGAAACTATTAGAACATATGGGTGGCTCCGCACCCCCTGACAGCAGCTGGAAGG GAGGACTAAAAGTGCCTTACAACGTGGGACCTGGCTTCGCTGGAAACTTCTCAAAA CAAAAGGTCAAGCTGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACCGGTATGTCATTCTCGGAGGTC ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC

				GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCTGAT GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCGATGAAGGCTTCGA AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG TGTTCGAGCTAGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGAGAGCATTTATCGATCCATT AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGATGCCCCTGTTTGACATTGAAA GCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGGC AGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGAT TACAAGGACGACGATGACAAGTAA
1040.	huPSMArat300-344	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAP GVKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVH PIGYDDAQKLLEHMGGSAPPDSSWKGGLKVPYNVGPGFAGNFSKQKVKLHIHSTNEVT RIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRP RRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMY SLVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGI ASGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDDK
1041.	huPSMArat598-617	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGGCGGCGCCGC GGTGGCTGTGCGCCGGGGCGGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTGGACGAATTGAAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA

CAAATTCAATCTCAGTGGAAAGAGTTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG AAAATGTGTCGGATATTTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG AGGGCGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTTAAATTGGAGC GGGACATGAAGATCAATTGCTCCGGGAAAAATTGTGATTGCCAGATACGGGGAAAGTT TTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTCT CTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA GGCGACCCTCTCACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG GGAAGTCTCAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAATTTTTCTACA CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACAGGTATGTCATTCTCGGAGGTC ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGCTGGAGACCTAGG AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCCTGAT GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCCGATGAAGGCTTCGA AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG TGTTCGAGCTCGCCAACTCCATAGTGCTGCCTTTTGATTGCCAAAAGCAATCCAATAGT CTCTGAAGAAACATGCTGAGACTATCTACAACATTTCAATGAATCATCCCACAGGAGA TGAAGACATATAGTGTAAGCTTCGATTCACTTTTCTCTGCAGTGAAGAATTTTTACCGA AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGAGAGCATTTATCGATCCATT AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGACGCGTTGTTTGACATTGAAA GCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGGC AGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGAT TACAAGGACGACGATGACAAGTAA			

1042.	huPSMArat598-617	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAP GVKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVH PIGYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVT RIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRP RRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMY SLVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGI ASGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCQSYAVALKKHAETIYNISMNHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDDK
1043.	huPSMArat683-690	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGCGGCGCCCGC GGTGGCTGTGCGCCGGGGCGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT AATATGAAGGCATTTTTGGACGAATTGAAAGCCGAGAACATCAAAAAGTTCTTATAC AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA CAAATTCAATCTCAGTGGAAAGAGTTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG AAAATGTGTCGGATATTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG AGGGCGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTTAAATTGGAGC GGGACATGAAGATCAATTGCTCCGGGAAAATTGTGATTGCCAGATACGGGAAAGTT TTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTCT CTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA GGCGACCCTCTCACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG GGAAGTCTCAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAAATTTTTCTACA CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACAGGTATGTCATTCTCGGAGGTC ACCGCGACTCATGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT

				TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCTGAT GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCCGATGAAGGCTTCGA AGGCAAATCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAACTGGGAAACAAATAAATT CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG TGTTCGAGCTCGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGCGCGCATTTATCGATCCATT AGGCTTACCAGGAAGGCCTTTCTACAGGCATATCATCTACGCTCCAAGCAGTCACA ACAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGACGCGTTGTTTGACATTGAA AGCAAGGTGGACCCTTCTAAGGCCTGGGGCGAAGTGAAGAGGCAGATTTATGTGG CAGCCTTCACCGTGCAGGCAGCCGCAGAGACCTTGAGTGAGGTAGCCTCCGGGGA TTACAAGGACGACGATGACAAGTAA
1044.	huPSMArat683-690	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAP GVKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVH PIGYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVT RIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRP RRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMY SLVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGI ASGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPGRPFYRHIIYAPSSHNKYAGESFPGI YDALFDIESKVDPSKAWGEVKRQIYVAAFTVQAAAETLSEVASGDYKDDDDK
1045.	huPSMArat716-	artificial	nt	ATGTGGAATCTGCTTCACGAAACAGACTCGGCTGTCGCCACCGCGCGGCGCCCGC

	750		GGTGGCTGTGCGCCGGGGCGCTGGTCCTGGCGGGTGGATTCTTTCTCCTGGGCTT
			CCTCTTTGGGTGGTTTATCAAATCCTCCAACGAAGCTACTAATATTACTCCAAAACAT
			AATATGAAGGCATTTTTTGGACGAATTGAAAGCCCGAGAACATCAAAAAGTTCTTATAC
			AATTTTACCCAGATACCACACTTAGCAGGAACCGAACAAAACTTCCAGCTTGCAAAA
			CAAATTCAATCTCAGTGGAAAGAGTTTGGCCTGGACTCTGTTGAGCTGGCACATTAT
			GACGTCCTGTTGTCTTACCCAAATAAAACTCATCCCAATTACATCTCAATCATTAATG
			AAGACGGAAATGAGATCTTCAACACATCCTTATTTGAACCCCCTCCTCCAGGCTATG
			AAAATGTGTCGGATATTGTGCCACCTTTCAGCGCTTTCTCTCCCCAAGGAATGCCCG
			AGGGCGACCTAGTGTATGTGAACTATGCACGGACTGAAGACTTTTTTTAAATTGGAGC
			GGGACATGAAGATCAATTGCTCCGGGAAAATTGTGATTGCCAGATACGGGAAAGTT
			TTTAGAGGAAATAAAGTTAAAAATGCTCAGCTGGCAGGCGCCAAAGGAGTGATTCT
			CTACTCTGACCCTGCTGATTACTTTGCTCCCGGGGTGAAGTCATATCCAGATGGCT
			GGAATCTTCCCGGAGGTGGTGTGCAGCGTGGAAACATCCTAAATCTCAATGGTGCA
			GGCGACCCTCTCACCCCAGGTTACCCCGCAAATGAATACGCTTATAGGCGGGGAAT
			TGCAGAAGCTGTTGGTCTGCCAAGTATTCCAGTTCATCCAATCGGATACTATGACGC
			ACAGAAGCTGCTAGAAAAGATGGGTGGCTCCGCACCACCAGACAGCAGCTGGAGG
			GGAAGTCTCAAGGTGCCCTACAACGTTGGACCTGGATTTACTGGAAATTTTTCTACA
			CAGAAAGTCAAAATGCACATCCATTCTACCAATGAGGTGACAAGAATCTACAATGTG
			ATCGGTACTCTCAGGGGAGCAGTGGAGCCAGACAGGTATGTCATTCTCGGAGGTC
			ACCGCGACTCATGGGTCTTTGGTGGTATCGACCCTCAGAGCGGAGCAGCTGTGGT
			TCATGAAATCGTGAGGAGCTTCGGAACACTGAAGAAGGAAGGCTGGAGACCTAGG
			AGAACAATCTTGTTTGCAAGTTGGGATGCAGAGGAATTTGGTCTGCTTGGTTCTACC
			GAGTGGGCAGAAGAGAACTCAAGACTCCTGCAAGAGCGTGGAGTGGCTTATATCAA
			TGCTGACTCCTCTATAGAAGGCAACTACACCCTGAGAGTTGACTGTACACCCCCTGAT
			GTACAGTTTGGTACACAATCTAACAAAAGAACTGAAAAGCCCCCGATGAAGGCTTCGA
			AGGCAAATCCCCTTTATGAAAGCTGGACTAAAAAGAGTCCTTCCCCTGAGTTCAGTGG
			AATGCCCAGGATCAGCAAATTGGGCTCTGGAAATGACTTTGAGGTGTTTTTCCAACG
			ACTGGGAATTGCTTCCGGCAGAGCACGCTATACTAAAAAACTGGGAAACAAATAAATT
			TTTTAAGGAAGTATGCTGATAAAATCTACAGCATTTCTATGAAGCATCCACAGGAGA
			CAGTGGCTATCCCCTGTATCACAGCGTCTATGAAACCTATGAGTTGGTCGAAAAGTT
			TGAAGACATATAGTGTATCATTCGATTCACTTTTCTCTGCAGTGAAGAATTTTACCGA
			TTACGATCCAATGTTCAAATATCACCTGACTGTGGCTCAGGTTCGAGGCGGGATGG
			AATTGCTTCTAAGTTTAGTGAGAGGCTCCAGGACTTCGACAAAAGCAATCCAATAGT
			TGTTCGAGCTCGCCAACTCCATAGTGCTGCCTTTTGATTGCCGAGATTATGCCGTAG
			ATTGAGAATGATGAACGATCAACTGATGTTTCTGGAGCGCGCATTTATCGATCCATT
			AGGCTTACCAGACCGCCCTTTTTATAGACATGTCATCTACGCTCCAAGCAGTCACAA

				CAAGTACGCAGGGGAGTCCTTCCCAGGAATCTATGACGCGTTGTTTGACATTAATAA CAAAGTCGATACTTCTAAGGCCTGGAGAGAAGTGAAAAGACAGATTTCTATTGCAGC CTTTACAGTGCAAGCTGCAGCAGAGACTCTGAGAGAAGTAGACTCCGGGGATTACA AGGACGACGATGACAAGTAA
1046.	huPSMArat716-750	artificial	aa	MWNLLHETDSAVATARRPRWLCAGALVLAGGFFLLGFLFGWFIKSSNEATNITPKHNM KAFLDELKAENIKKFLYNFTQIPHLAGTEQNFQLAKQIQSQWKEFGLDSVELAHYDVLLS YPNKTHPNYISIINEDGNEIFNTSLFEPPPPGYENVSDIVPPFSAFSPQGMPEGDLVYVN YARTEDFFKLERDMKINCSGKIVIARYGKVFRGNKVKNAQLAGAKGVILYSDPADYFAP GVKSYPDGWNLPGGGVQRGNILNLNGAGDPLTPGYPANEYAYRRGIAEAVGLPSIPVH PIGYYDAQKLLEKMGGSAPPDSSWRGSLKVPYNVGPGFTGNFSTQKVKMHIHSTNEVT RIYNVIGTLRGAVEPDRYVILGGHRDSWVFGGIDPQSGAAVVHEIVRSFGTLKKEGWRP RRTILFASWDAEEFGLLGSTEWAEENSRLLQERGVAYINADSSIEGNYTLRVDCTPLMY SLVHNLTKELKSPDEGFEGKSLYESWTKKSPSPEFSGMPRISKLGSGNDFEVFFQRLGI ASGRARYTKNWETNKFSGYPLYHSVYETYELVEKFYDPMFKYHLTVAQVRGGMVFELA NSIVLPFDCRDYAVVLRKYADKIYSISMKHPQEMKTYSVSFDSLFSAVKNFTEIASKFSE RLQDFDKSNPIVLRMMNDQLMFLERAFIDPLGLPDRPFYRHVIYAPSSHNKYAGESFPGI YDALFDINNKVDTSKAWREVKRQISIAAFTVQAAAETLREVDSGDYKDDDDK
1047.	*Macaca fascicularis* CD3ε 1-27	*Macaca fascicularis*	aa	QDGNEEMGSITQTPYQVSISGTTILTC
1048.	*Macaca fascicularis* CD3ε 1-27	*Macaca fascicularis*	aa	QDGNEEMGSITQTPYQVSISGTTVILT
1049.	*Macaca mulatta* CD3ε 1-27	*Macaca mulatta*	aa	QDGNEEMGSITQTPYHVSISGTTVILT

Claims

1. A bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε (epsilon) chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, and 8, and a second binding domain capable of binding to prostate-specific membrane antigen (PSMA).

2. The bispecific single chain antibody molecule of claim 1, wherein at least one of said first or second binding domain is CDR-grafted, humanized or human.

3. The bispecific single chain antibody molecule according to any one of claims 1 or 2, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region comprising CDR-L1, CDR-L2 and CDR-L3 selected from:
   (a) CDR-L1 as depicted in SEQ ID NO. 27, CDR-L2 as depicted in SEQ ID NO. 28 and CDR-L3 as depicted in SEQ ID NO. 29;
   (b) CDR-L1 as depicted in SEQ ID NO. 117, CDR-L2 as depicted in SEQ ID NO. 118 and CDR-L3 as depicted in SEQ ID NO. 119; and
   (c) CDR-L1 as depicted in SEQ ID NO. 153, CDR-L2 as depicted in SEQ ID NO. 154 and CDR-L3 as depicted in SEQ ID NO. 155.

4. The bispecific single chain antibody molecule according to any one of claims 1 or 2, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region comprising CDR-H 1, CDR-H2 and CDR-H3 selected from:
   (a) CDR-H1 as depicted in SEQ ID NO. 12, CDR-H2 as depicted in SEQ ID NO. 13 and CDR-H3 as depicted in SEQ ID NO. 14;
   (b) CDR-H1 as depicted in SEQ ID NO. 30, CDR-H2 as depicted in SEQ ID NO. 31 and CDR-H3 as depicted in SEQ ID NO. 32;
   (c) CDR-H1 as depicted in SEQ ID NO. 48, CDR-H2 as depicted in SEQ ID NO. 49 and CDR-H3 as depicted in SEQ ID NO. 50;

(d) CDR-H1 as depicted in SEQ ID NO. 66, CDR-H2 as depicted in SEQ ID NO. 67 and CDR-H3 as depicted in SEQ ID NO. 68;

(e) CDR-H1 as depicted in SEQ ID NO. 84, CDR-H2 as depicted in SEQ ID NO. 85 and CDR-H3 as depicted in SEQ ID NO. 86;

(f) CDR-H1 as depicted in SEQ ID NO. 102, CDR-H2 as depicted in SEQ ID NO. 103 and CDR-H3 as depicted in SEQ ID NO. 104;

(g) CDR-H1 as depicted in SEQ ID NO. 120, CDR-H2 as depicted in SEQ ID NO. 121 and CDR-H3 as depicted in SEQ ID NO. 122;

(h) CDR-H1 as depicted in SEQ ID NO. 138, CDR-H2 as depicted in SEQ ID NO. 139 and CDR-H3 as depicted in SEQ ID NO. 140;

(i) CDR-H1 as depicted in SEQ ID NO. 156, CDR-H2 as depicted in SEQ ID NO. 157 and CDR-H3 as depicted in SEQ ID NO. 158; and

(j) CDR-H1 as depicted in SEQ ID NO. 174, CDR-H2 as depicted in SEQ ID NO. 175 and CDR-H3 as depicted in SEQ ID NO. 176.

5. The bispecific single chain antibody molecule according to any one of claims 1 to 3, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region selected from the group consisting of a VL region as depicted in SEQ ID NO. 35, 39, 125, 129, 161 or 165.

6. The bispecific single chain antibody molecule according to any one of claims 1 or 2 and 4, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region selected from the group consisting of a VH region as depicted in SEQ ID NO. 15, 19, 33, 37, 51, 55, 69, 73, 87, 91, 105, 109, 123, 127, 141, 145, 159, 163, 177 or 181.

7. The bispecific single chain antibody molecule according to any one of claims 1 to 6, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region and a VH region selected from the group consisting of:

(a) a VL region as depicted in SEQ ID NO. 17 or 21 and a VH region as depicted in SEQ ID NO. 15 or 19;

(b) a VL region as depicted in SEQ ID NO. 35 or 39 and a VH region as depicted in SEQ ID NO. 33 or 37;

(c) a VL region as depicted in SEQ ID NO. 53 or 57 and a VH region as depicted in SEQ ID NO. 51 or 55;

(d) a VL region as depicted in SEQ ID NO. 71 or 75 and a VH region as depicted in SEQ ID NO. 69 or 73;

(e) a VL region as depicted in SEQ ID NO. 89 or 93 and a VH region as depicted in SEQ ID NO. 87 or 91;

(f) a VL region as depicted in SEQ ID NO. 107 or 111 and a VH region as depicted in SEQ ID NO. 105 or 109;

(g) a VL region as depicted in SEQ ID NO. 125 or 129 and a VH region as depicted in SEQ ID NO. 123 or 127;

(h) a VL region as depicted in SEQ ID NO. 143 or 147 and a VH region as depicted in SEQ ID NO. 141 or 145;

(i) a VL region as depicted in SEQ ID NO. 161 or 165 and a VH region as depicted in SEQ ID NO. 159 or 163; and

(j) a VL region as depicted in SEQ ID NO. 179 or 183 and a VH region as depicted in SEQ ID NO. 177 or 181.

8. The bispecific single chain antibody molecule according to claim 7, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 23, 25, 41, 43, 59, 61, 77, 79, 95, 97, 113, 115, 131, 133, 149, 151, 167, 169, 185 or 187.

9. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human PSMA and/or a non-Chimpanzee primate PSMA.

10. The bispecific single chain antibody molecule according to claim 9, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 394 – 396 and CDR L1-3 of SEQ ID NO: 389 – 391;

b) CDR H1-3 of SEQ ID NO: 408 – 410 and CDR L1-3 of SEQ ID NO: 403 – 405;

c) CDR H1-3 of SEQ ID NO: 422 – 424 and CDR L1-3 of SEQ ID NO: 417 – 419;

d) CDR H1-3 of SEQ ID NO: 436 – 438 and CDR L1-3 of SEQ ID NO: 431 – 433;

e) CDR H1-3 of SEQ ID NO: 445 – 447 and CDR L1-3 of SEQ ID NO: 450 – 452;

f) CDR H1-3 of SEQ ID NO: 464 – 466 and CDR L1-3 of SEQ ID NO: 459 – 461;

g) CDR H1-3 of SEQ ID NO: 478 – 480 and CDR L1-3 of SEQ ID NO: 473 – 475;

h) CDR H1-3 of SEQ ID NO: 492 – 494 and CDR L1-3 of SEQ ID NO: 487 – 489;

i) CDR H1-3 of SEQ ID NO: 506 – 508 and CDR L1-3 of SEQ ID NO: 501 – 503;

j) CDR H1-3 of SEQ ID NO: 520 – 522 and CDR L1-3 of SEQ ID NO: 515 – 517;

k) CDR H1-3 of SEQ ID NO: 534 – 536 and CDR L1-3 of SEQ ID NO: 529 – 531;

l) CDR H1-3 of SEQ ID NO: 548 – 550 and CDR L1-3 of SEQ ID NO: 543 – 545;

m) CDR H1-3 of SEQ ID NO: 562 – 564 and CDR L1-3 of SEQ ID NO: 557 – 559;

n) CDR H1-3 of SEQ ID NO: 576 – 578 and CDR L1-3 of SEQ ID NO: 571 – 573;

o) CDR H1-3 of SEQ ID NO: 590 – 592 and CDR L1-3 of SEQ ID NO: 585 – 587;

p) CDR H1-3 of SEQ ID NO: 604 – 606 and CDR L1-3 of SEQ ID NO: 599 – 601;

q) CDR H1-3 of SEQ ID NO: 618 – 620 and CDR L1-3 of SEQ ID NO: 613 – 615;

r) CDR H1-3 of SEQ ID NO: 632 – 634 and CDR L1-3 of SEQ ID NO: 627 – 629;

s) CDR H1-3 of SEQ ID NO: 646 – 648 and CDR L1-3 of SEQ ID NO: 641 – 643;

t) CDR H1-3 of SEQ ID NO: 660 – 662 and CDR L1-3 of SEQ ID NO: 655 – 657;

u) CDR H1-3 of SEQ ID NO: 674 – 676 and CDR L1-3 of SEQ ID NO: 669 – 671;

v) CDR H1-3 of SEQ ID NO: 688 – 690 and CDR L1-3 of SEQ ID NO: 683 – 685;

w) CDR H1-3 of SEQ ID NO: 702 – 704 and CDR L1-3 of SEQ ID NO: 697 – 699;

x) CDR H1-3 of SEQ ID NO: 716 – 718 and CDR L1-3 of SEQ ID NO: 711 – 713;

y) CDR H1-3 of SEQ ID NO: 729 – 731 and CDR L1-3 of SEQ ID NO: 724 – 726;

z) CDR H1-3 of SEQ ID NO: 788 – 790 and CDR L1-3 of SEQ ID NO: 793 – 795;

aa) CDR H1-3 of SEQ ID NO: 806 – 808 and CDR L1-3 of SEQ ID NO: 811 – 813;

ab) CDR H1-3 of SEQ ID NO: 852 – 854 and CDR L1-3 of SEQ ID NO: 857 – 859;

ac) CDR H1-3 of SEQ ID NO: 838 – 840 and CDR L1-3 of SEQ ID NO: 843 – 845;

ad) CDR H1-3 of SEQ ID NO: 824 – 826 and CDR L1-3 of SEQ ID NO: 829 – 831;

ae) CDR H1-3 of SEQ ID NO: 774 – 776 and CDR L1-3 of SEQ ID NO: 779 – 781;

af) CDR H1-3 of SEQ ID NO: 688 – 690 and CDR L1-3 of SEQ ID NO: 683 – 685;

ag) CDR H1-3 of SEQ ID NO: 870 – 872 and CDR L1-3 of SEQ ID NO: 875 – 877;

ah) CDR H1-3 of SEQ ID NO: 888 – 890 and CDR L1-3 of SEQ ID NO: 893 – 895;

ai) CDR H1-3 of SEQ ID NO: 924 – 926 and CDR L1-3 of SEQ ID NO: 929 – 931;

aj) CDR H1-3 of SEQ ID NO: 1019 – 1021 and CDR L1-3 of SEQ ID NO: 1025 – 1027;

ak) CDR H1-3 of SEQ ID NO: 1006 – 1008 and CDR L1-3 of SEQ ID NO: 1011 – 1013;

al) CDR H1-3 of SEQ ID NO: 906 – 908 and CDR L1-3 of SEQ ID NO: 911 – 913;

am) CDR H1-3 of SEQ ID NO: 992 – 994 and CDR L1-3 of SEQ ID NO: 997 – 999;

an) CDR H1-3 of SEQ ID NO: 942 – 944 and CDR L1-3 of SEQ ID NO: 947 – 949;

ao) CDR H1-3 of SEQ ID NO: 960 – 962 and CDR L1-3 of SEQ ID NO: 965 – 967; and

ap) CDR H1-3 of SEQ ID NO:978 – 980 and CDR L1-3 of SEQ ID NO: 983 – 985.

11. The bispecific single chain antibody molecule of claim 10, wherein the binding domains are arranged in the order VH PSMA-VL PSMA-VH CD3-VL CD3 or VL PSMA-VH PSMA-VH CD3-VL CD3.

12. The bispecific single chain antibody molecule according to claim 11, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 399, 413, 427, 441, 455, 469, 483, 497, 511, 525, 539, 553, 567, 581, 595, 609, 623, 637, 651, 665, 679, 693, 707, 721, 734, 799, 817, 863, 849, 835, 785, 899, 935, 1017, 1031, 917, 1003, 953, 971 or 989;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 400, 414, 428, 442, 456, 470, 484, 498, 512, 526, 540, 554, 568, 582, 596, 610, 624, 638, 652, 666, 680, 694, 708, 736 735, 800, 818, 864, 850, 836, 786, 882, 900, 936, 1018, 1032, 918, 1004, 954, 972, 990, 804, 822, 868, 886, 904, 940, 922, 958 or 976; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

13. A nucleic acid sequence encoding a bispecific single chain antibody molecule as defined in any of claims 1 to 12.

14. A vector, which comprises a nucleic acid sequence as defined in claim 13.

15. The vector of claim 14, wherein said vector further comprises a regulatory sequence, which is operably linked to said nucleic acid sequence defined in claim 13.

16. The vector of claim 15, wherein said vector is an expression vector.

17. A host transformed or transfected with a vector defined in any of claims 14 to 16.

18. A process for the production of a bispecific single chain antibody molecule according to any of claims 1 to 12, said process comprising culturing a host defined in claim 17 under conditions allowing the expression of the bispecific single chain antibody molecule as defined in any of claims 1 to 12 and recovering the produced polypeptide from the culture.

19. A pharmaceutical composition comprising a bispecific single chain antibody molecule according to any one of claims 1 to 12, or produced according to the process of claim 18.

20. The pharmaceutical composition of claim 19 for use in the prevention, treatment or amelioration of cancer.

21. A bispecific single chain antibody molecule according to any one of claims 1 to 12, or produced according to the process of claim 18, for use in the prevention, treatment or amelioration of cancer.

22. The pharmaceutical composition of claim 20 or the bispecific single chain antibody molecule of claim 21, wherein said cancer is a solid tumor, preferably a carcinoma or prostate cancer.

23. The pharmaceutical composition of claim 19, 20 or 22 or the bispecific single chain antibody molecule of claim 21 or 22 which, optionally further comprises suitable formulations of carriers, stabilizers and/or excipients.

24. The pharmaceutical composition of claim 19, 20, 22 or 23 or the bispecific single chain antibody molecule of claim 21, 22 or 23, wherein said bispecific single chain antibody molecule or pharmaceutical composition is suitable to be administered in combination with an additional drug.

25. The pharmaceutical composition or bispecific single chain antibody molecule of claim 24, wherein said drug is a non-proteinaceous compound or a proteinaceous compound.

26. The pharmaceutical composition or the bispecific single chain antibody molecule of claim 25, wherein said proteinaceous compound or non-proteinaceous compound is administered simultaneously or non-simultaneously with the bispecific single chain antibody molecule of claim 21, 22, or 23, or the pharmaceutical composition according to claim 19 or 20.

27. Use of a bispecific single chain antibody molecule as defined in any of claims 1 to 12, or produced according to claim 18, for the preparation of a pharmaceutical composition for the prevention, treatment or amelioration of a disease.

28. A method for the prevention, treatment or amelioration of a disease in a subject in the need thereof, said method comprising the step of administration of an effective amount of a pharmaceutical composition of claim 19 or 20.

29. The method of claim 28 or the use of claim 27, wherein said disease is cancer.

30. The method or use of claim 29, wherein said cancer is a solid tumor, preferably a carcinoma or prostate cancer.

31. The method of any of claims 28 to 30 or the use of claim 27, 29 or 30, wherein said pharmaceutical composition is administered in combination with an additional drug.

32. The method or use of claim 31, wherein said drug is a non-proteinaceous compound or a proteinaceous compound.

33. The method or use of claim 32, wherein said proteinaceous compound or non-proteinaceous compound is administered simultaneously or non-simultaneously with a pharmaceutical composition according to claim 19 or 20.

34. The method of any one of claims 28 to 33 or the use of claim 27, or 29 to 33, wherein said subject is a human.

35. A kit comprising a bispecific single chain antibody molecule as defined in any of claims 1 to 12, a nucleic acid molecule as defined in claim 13, a vector as defined in any of claims 14 to 16, or a host as defined in claim 17.

Figure 1

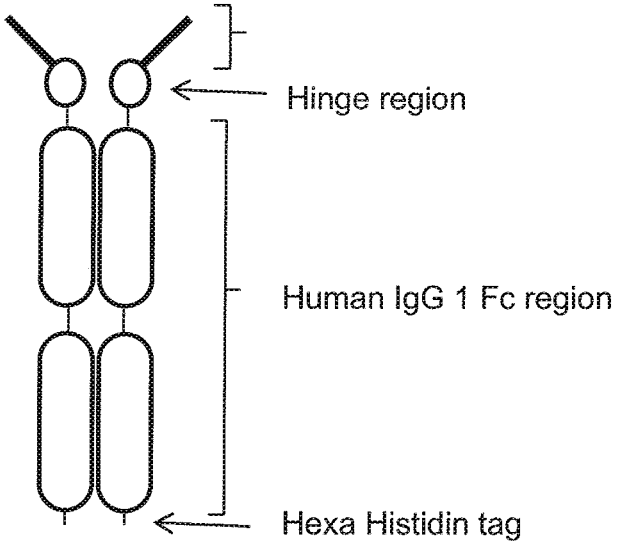
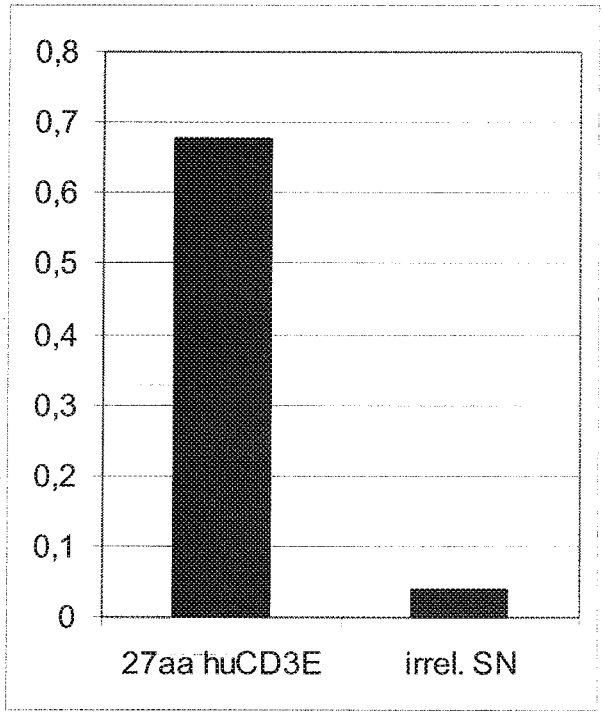


Figure 2



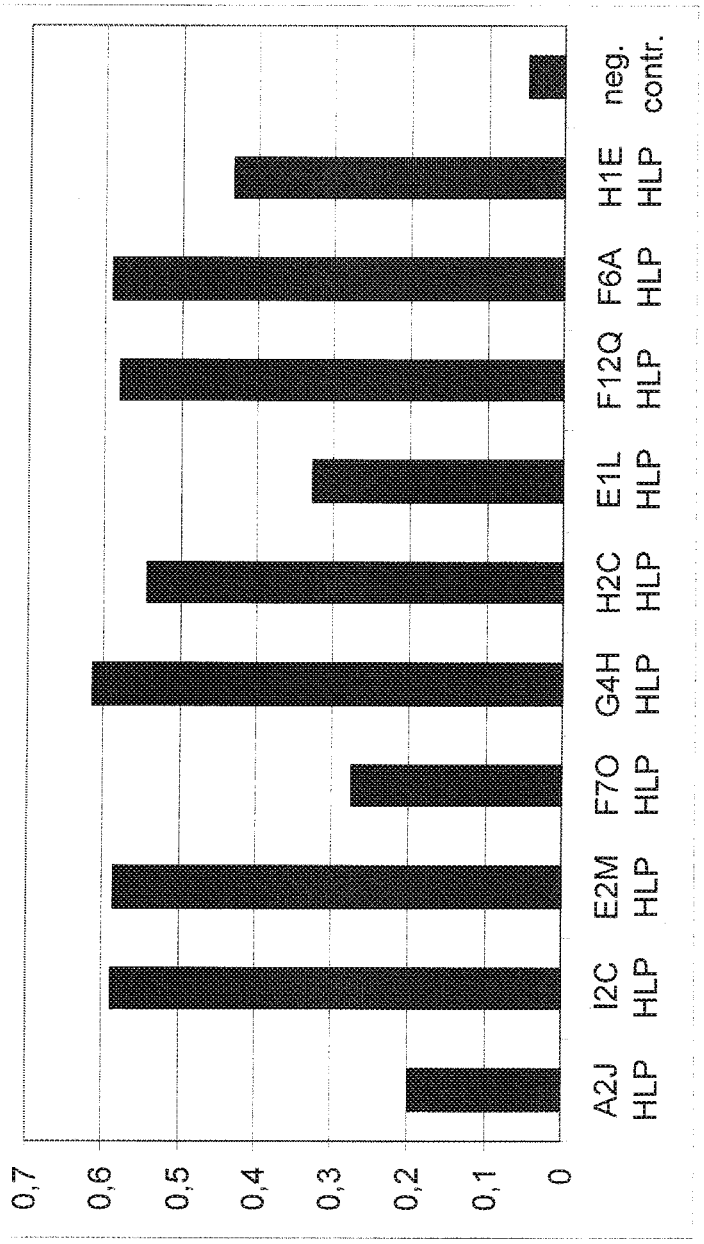
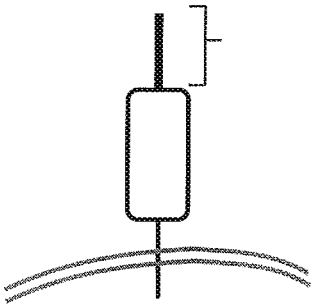
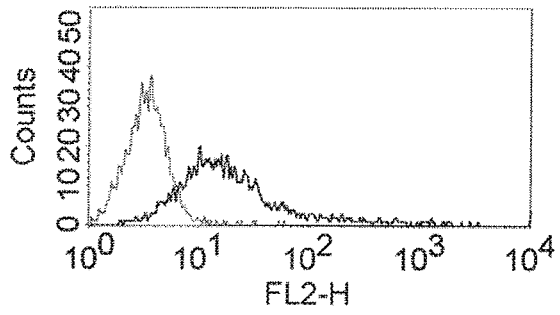

0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
A2J HLP
I2C HLP
E2M HLP
F7O HLP
G4H HLP
H2C HLP
E1L HLP
F12Q HLP
F6A HLP
H1E HLP
neg. contr.

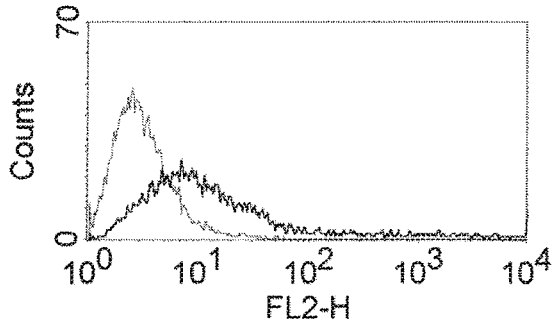
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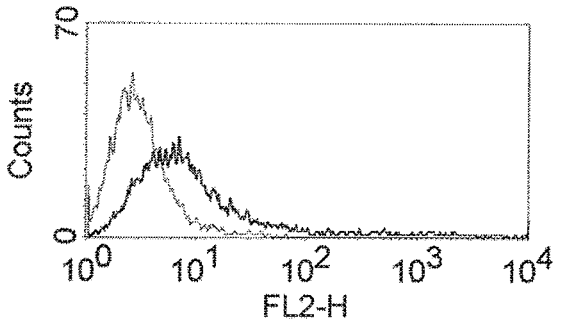
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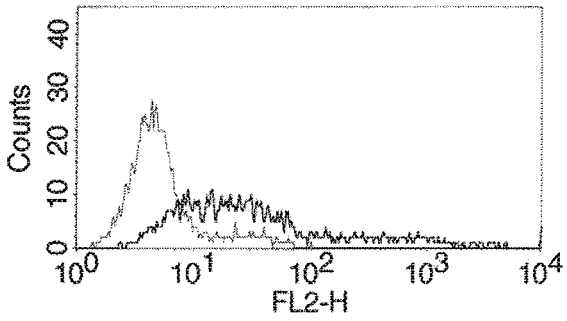


5


Counts
0 10 20 30 40 50
10^0 10^1 10^2 10^3 10^4
FL2-H


Counts
0 70
10^0 10^1 10^2 10^3 10^4
FL2-H


Counts
0 70
10^0 10^1 10^2 10^3 10^4
FL2-H


Counts
0 10 20 30 40
10^0 10^1 10^2 10^3 10^4
FL2-H

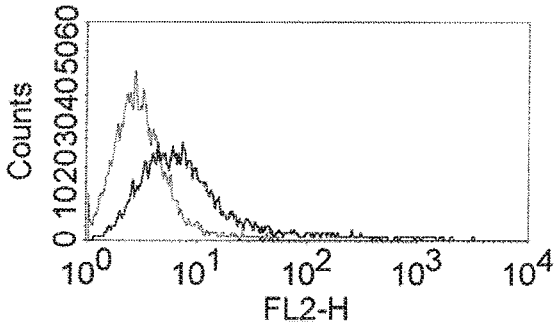
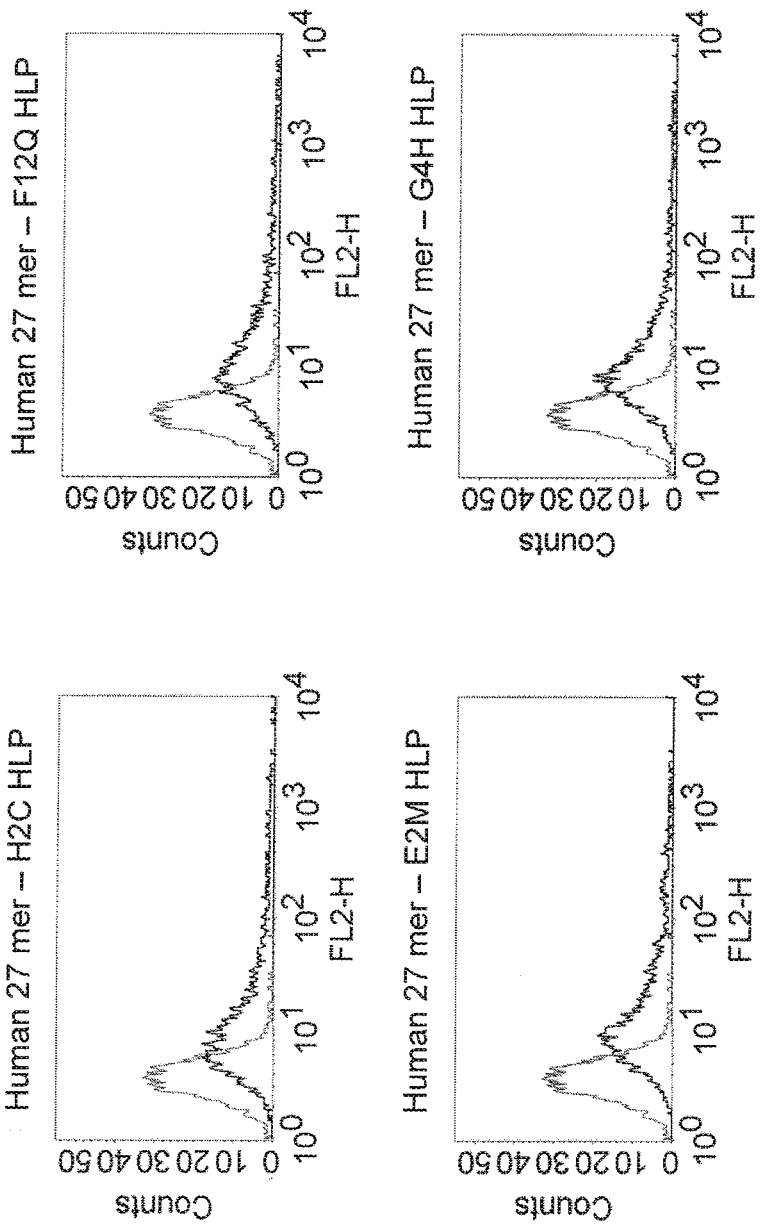

Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 6A


Human 27 mer – F12Q HLP
Human 27 mer – G4H HLP
Human 27 mer – H2C HLP
Human 27 mer – E2M HLP
Counts
FL2-H
0 10 20 30 40 50
10^0 10^1 10^2 10^3 10^4

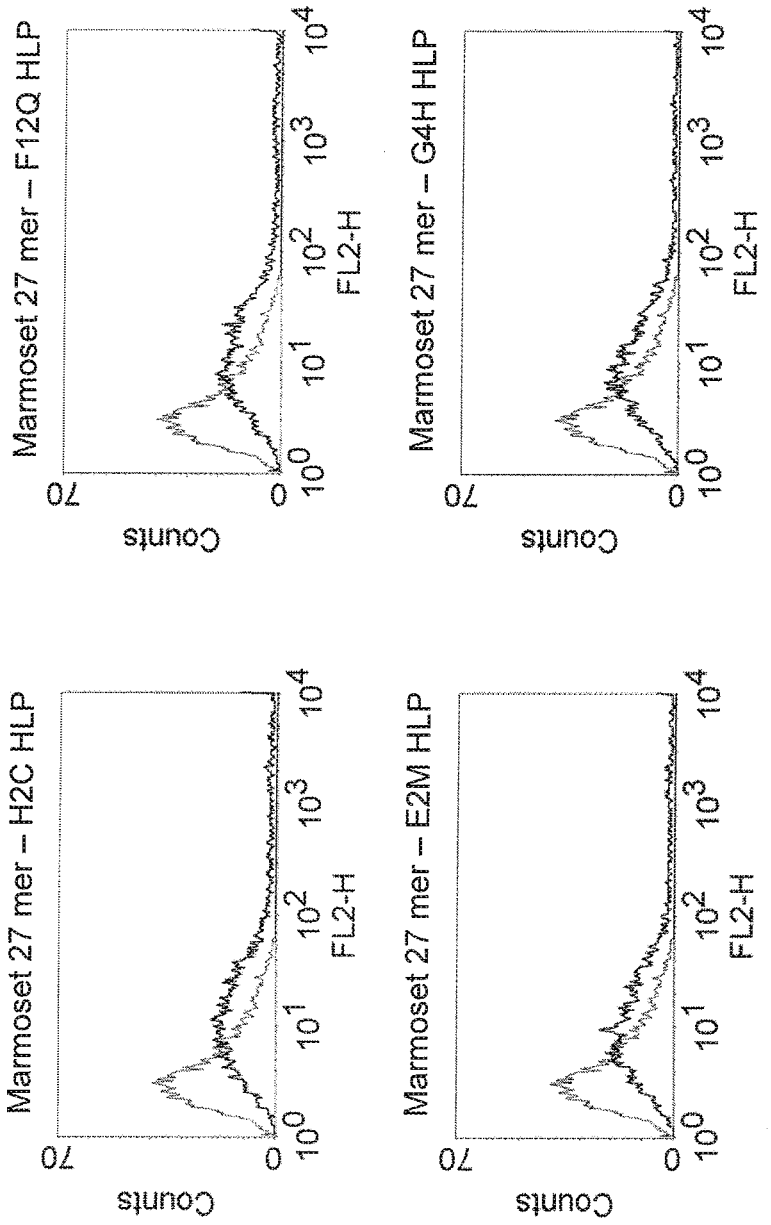

Marmoset 27 mer – F12Q HLP
Marmoset 27 mer – G4H HLP
Marmoset 27 mer – H2C HLP
Marmoset 27 mer – E2M HLP
Counts
FL2-H
0
70
10^0
10^1
10^2
10^3
10^4

Figure 6B

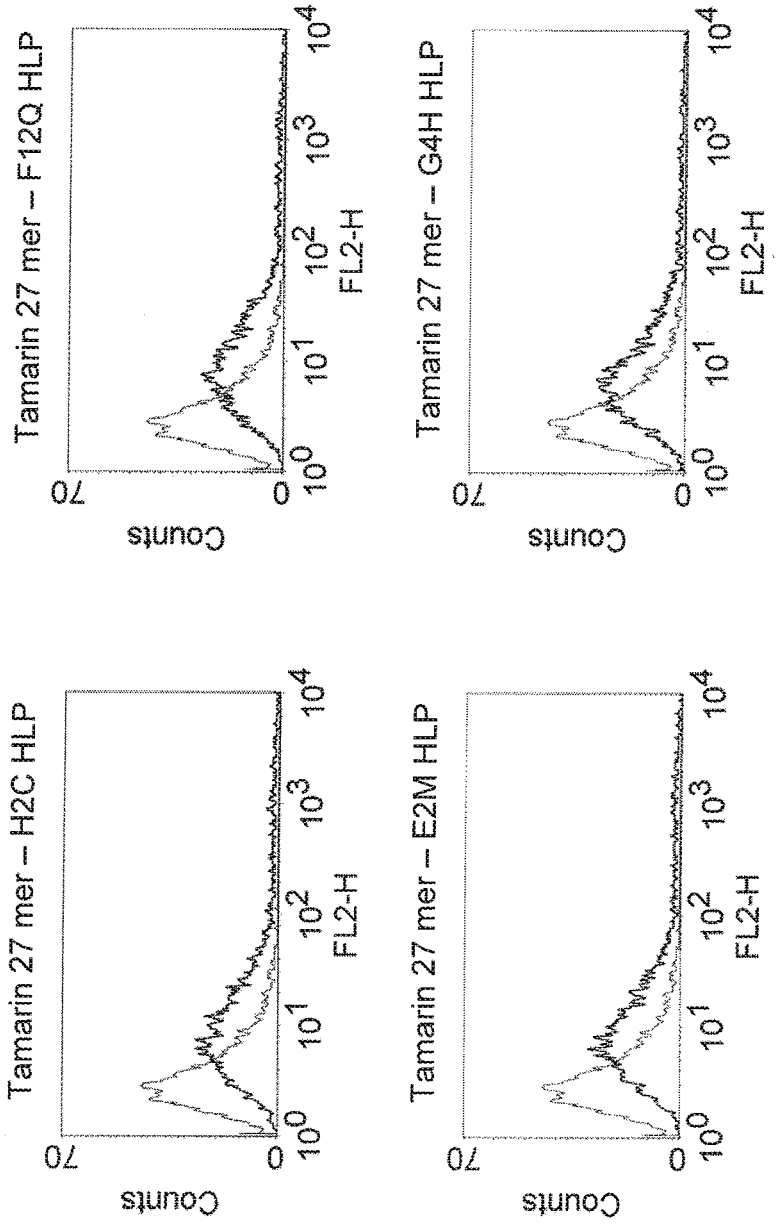

Tamarin 27 mer – F12Q HLP
Tamarin 27 mer – G4H HLP
Tamarin 27 mer – H2C HLP
Tamarin 27 mer – E2M HLP
Counts
FL2-H
0
70
10^0
10^1
10^2
10^3
10^4

Figure 6C

Figure 6D

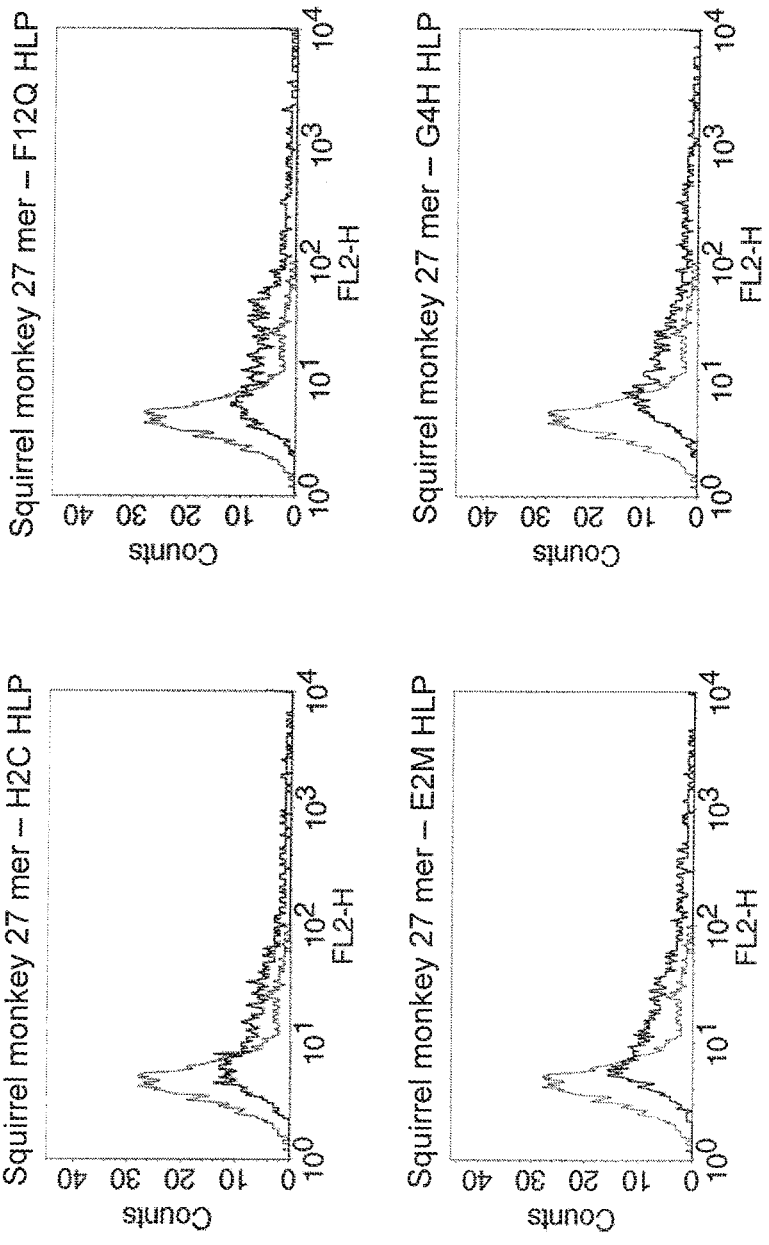
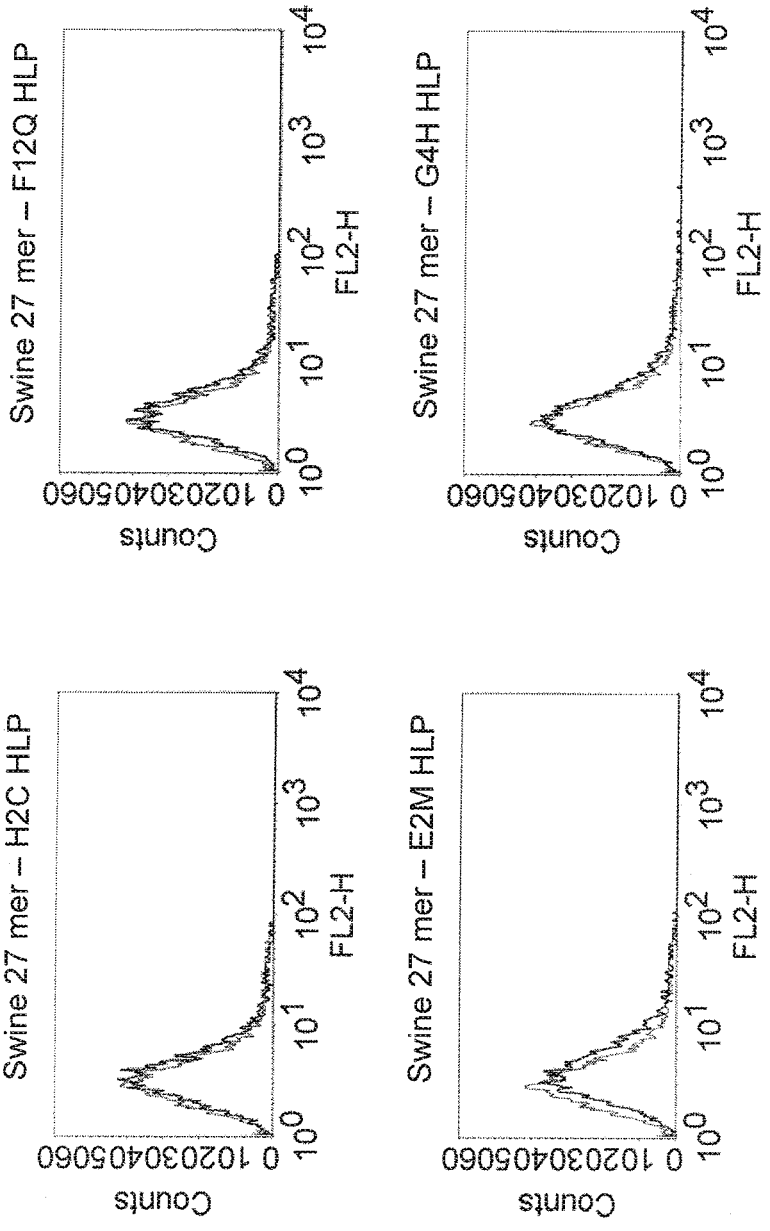
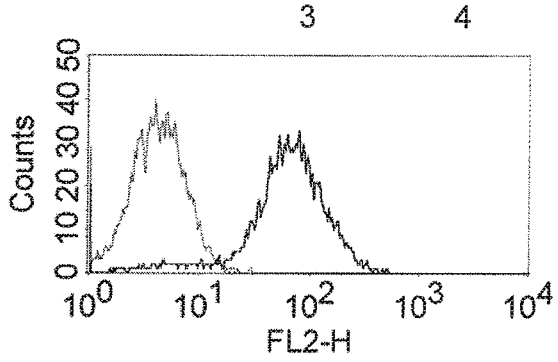

Squirrel monkey 27 mer – F12Q HLP
Squirrel monkey 27 mer – G4H HLP
Squirrel monkey 27 mer – H2C HLP
Squirrel monkey 27 mer – E2M HLP
Counts
FL2-H
0
10
20
30
40
10^0
10^1
10^2
10^3
10^4

Figure 6E


Swine 27 mer – F12Q HLP
Swine 27 mer – G4H HLP
Swine 27 mer – H2C HLP
Swine 27 mer – E2M HLP
Counts
FL2-H
0
10
20
30
40
50
60
10^0
10^1
10^2
10^3
10^4


3
4
Counts
0 10 20 30 40 50
10^0
10^1
10^2
10^3
10^4
FL2-H

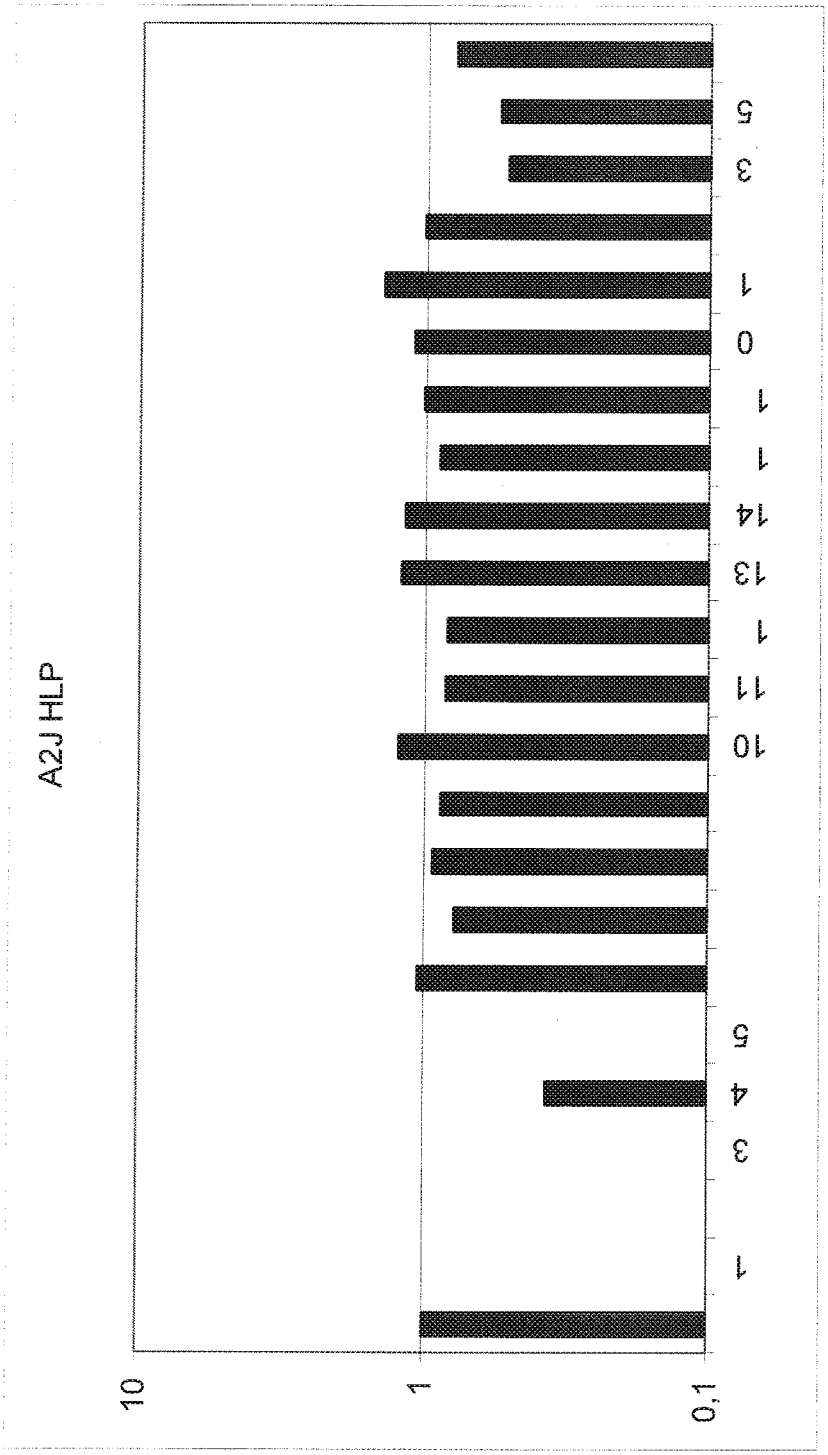


Figure 8A

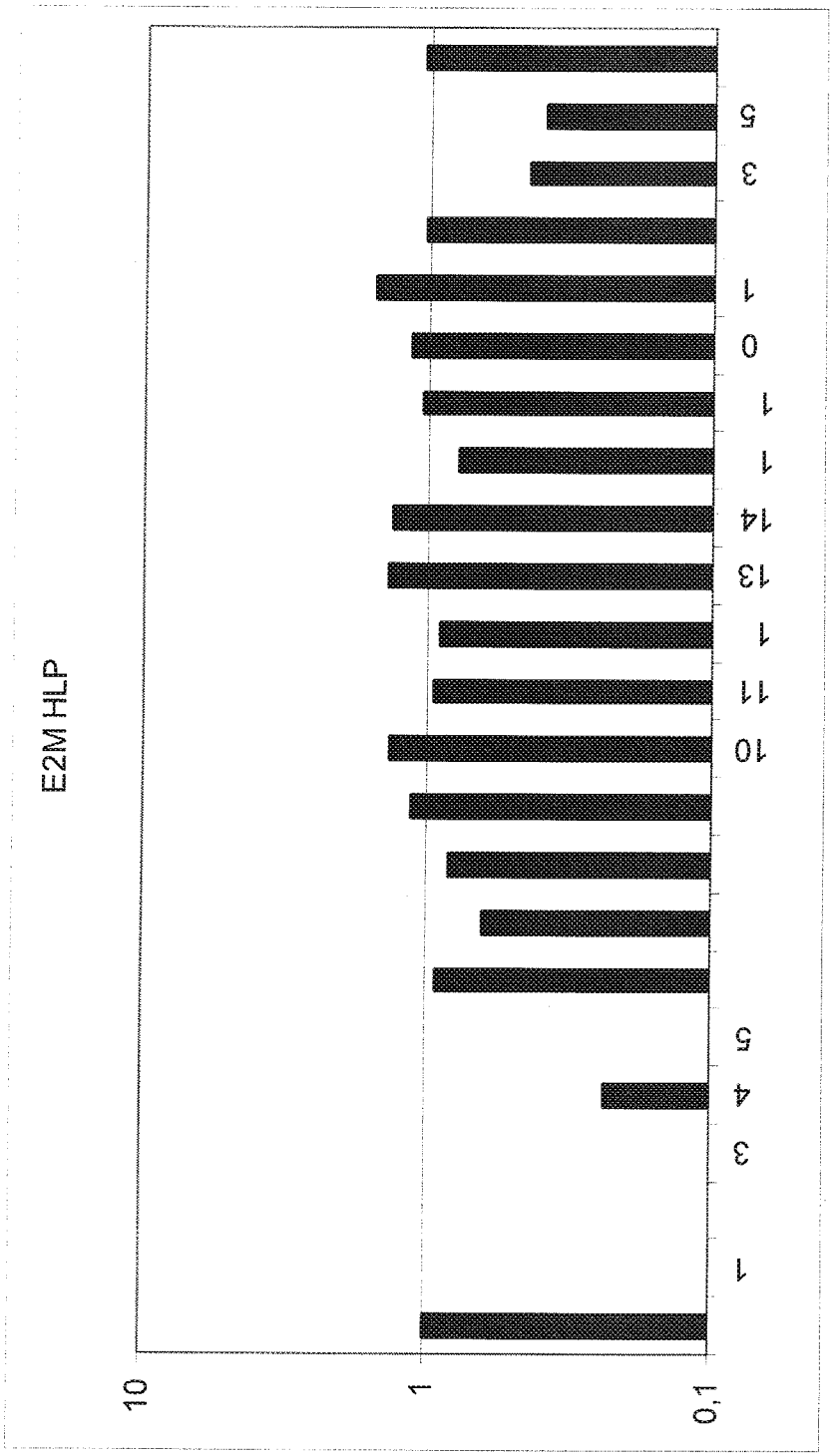


Figure 8B

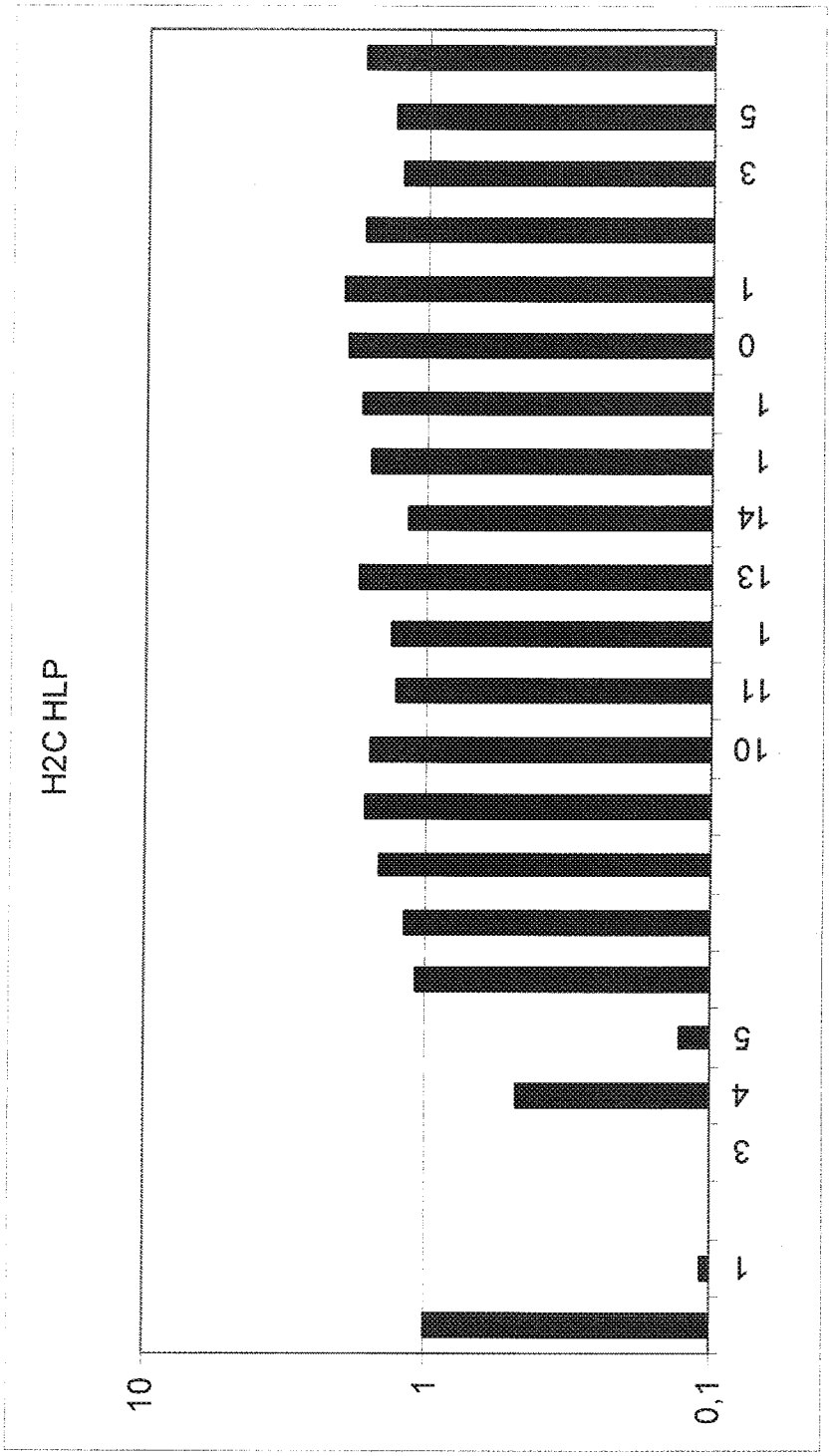


Figure 8C

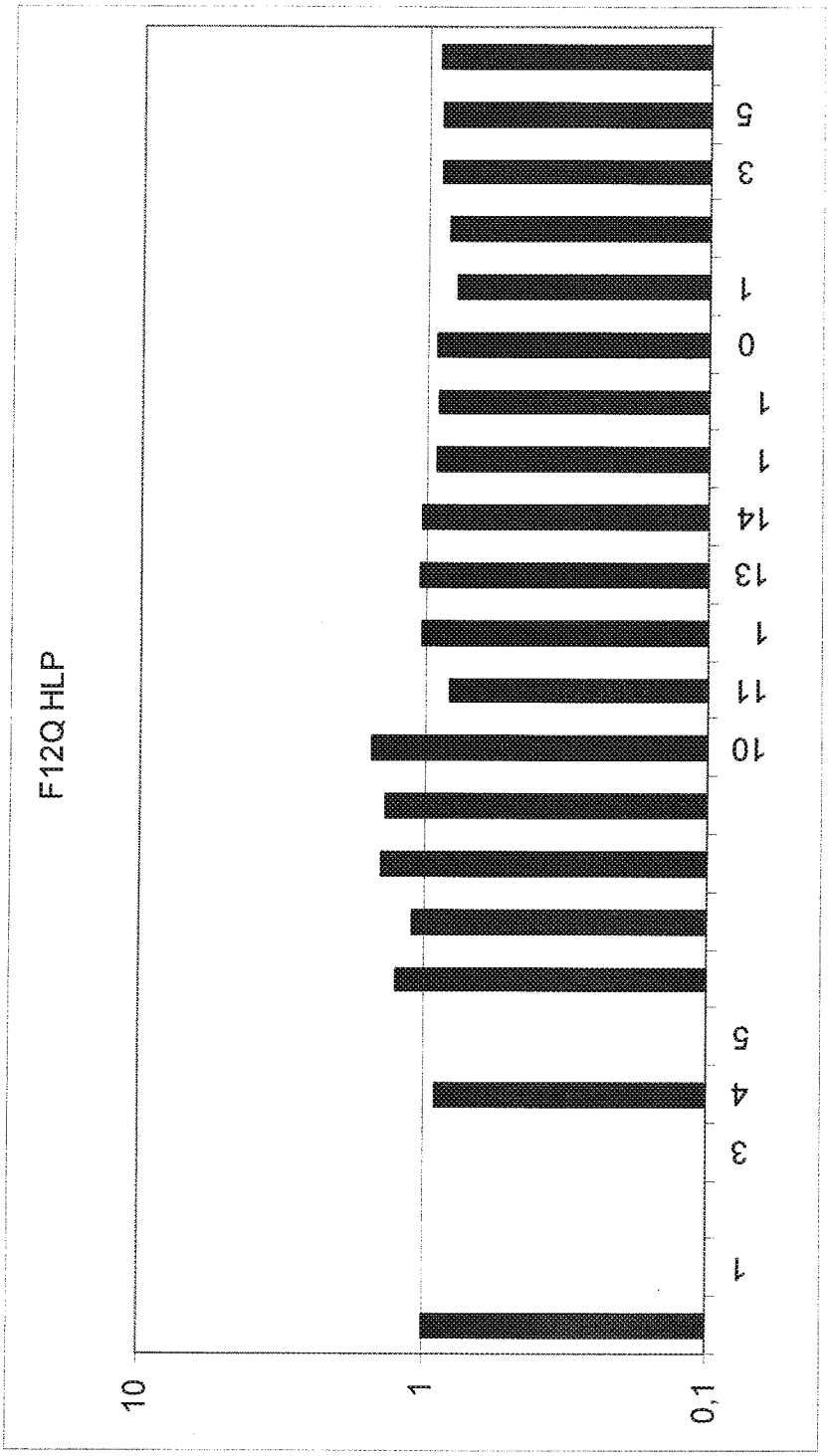
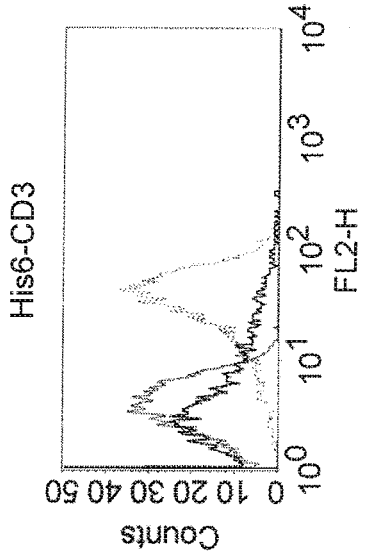


Figure 8D


His6-CD3
Counts
0 10 20 30 40 50
FL2-H
10^0 10^1 10^2 10^3 10^4

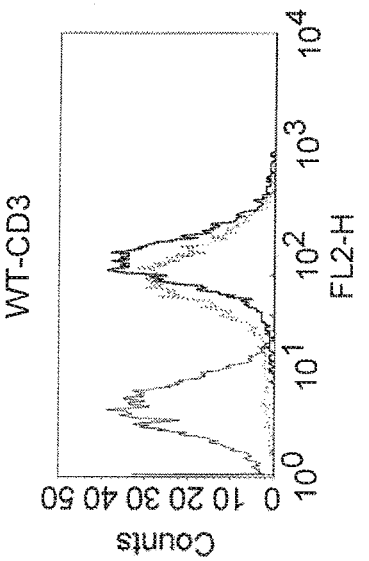

WT-CD3
Counts
0 10 20 30 40 50
FL2-H
10^0 10^1 10^2 10^3 10^4

Figure 9

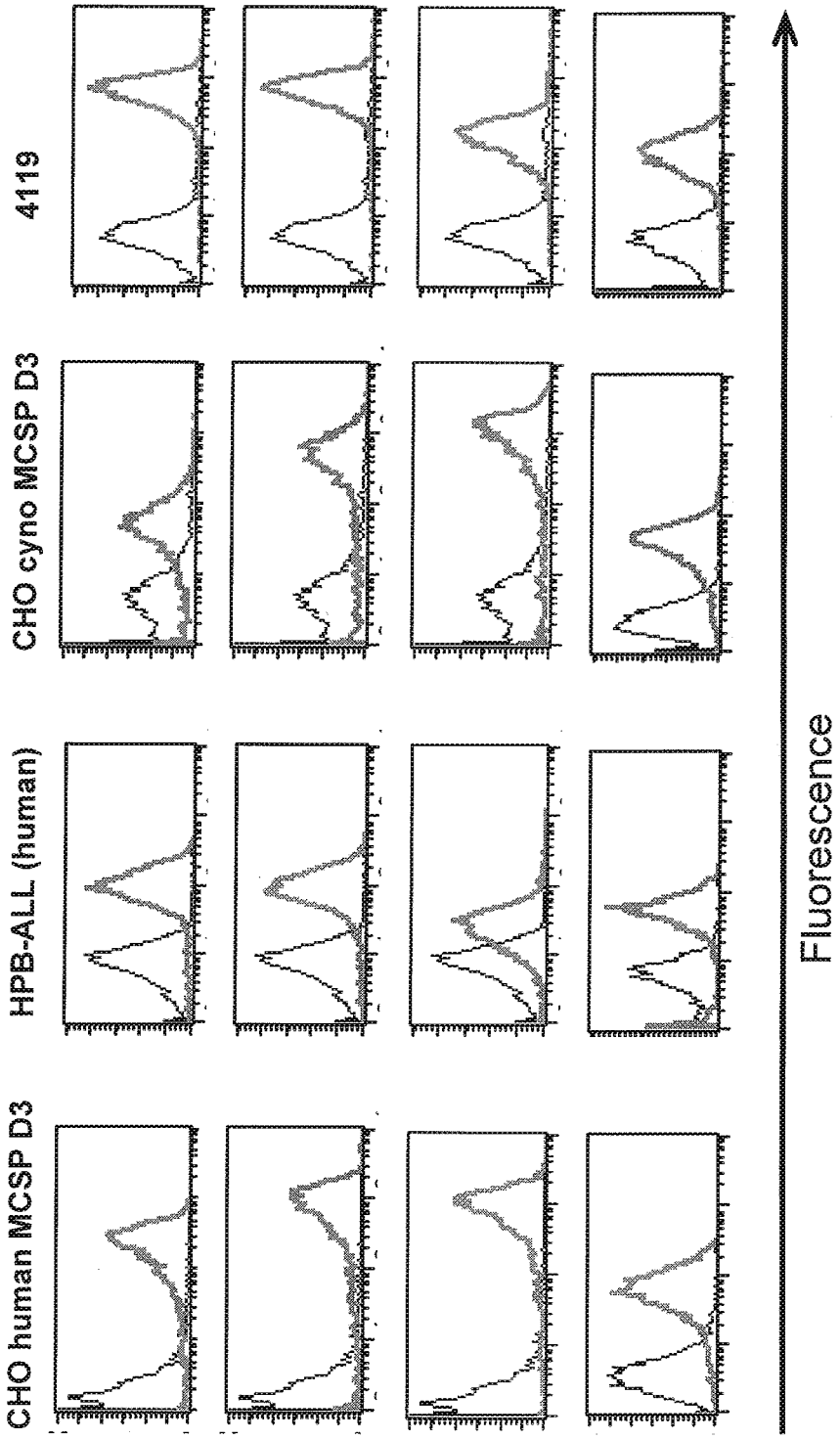

CHO human MCSP D3
HPB-ALL (human)
CHO cyno MCSP D3
4119
MCSP-D2 HLP x H2C HLP
MCSP-F9 HLP x H2C HLP
MCSP-F9 HLP x G4H HLP
MCSP-G4 HLP x I2C HL
Count
Fluorescence

Figure 10

Figure 11

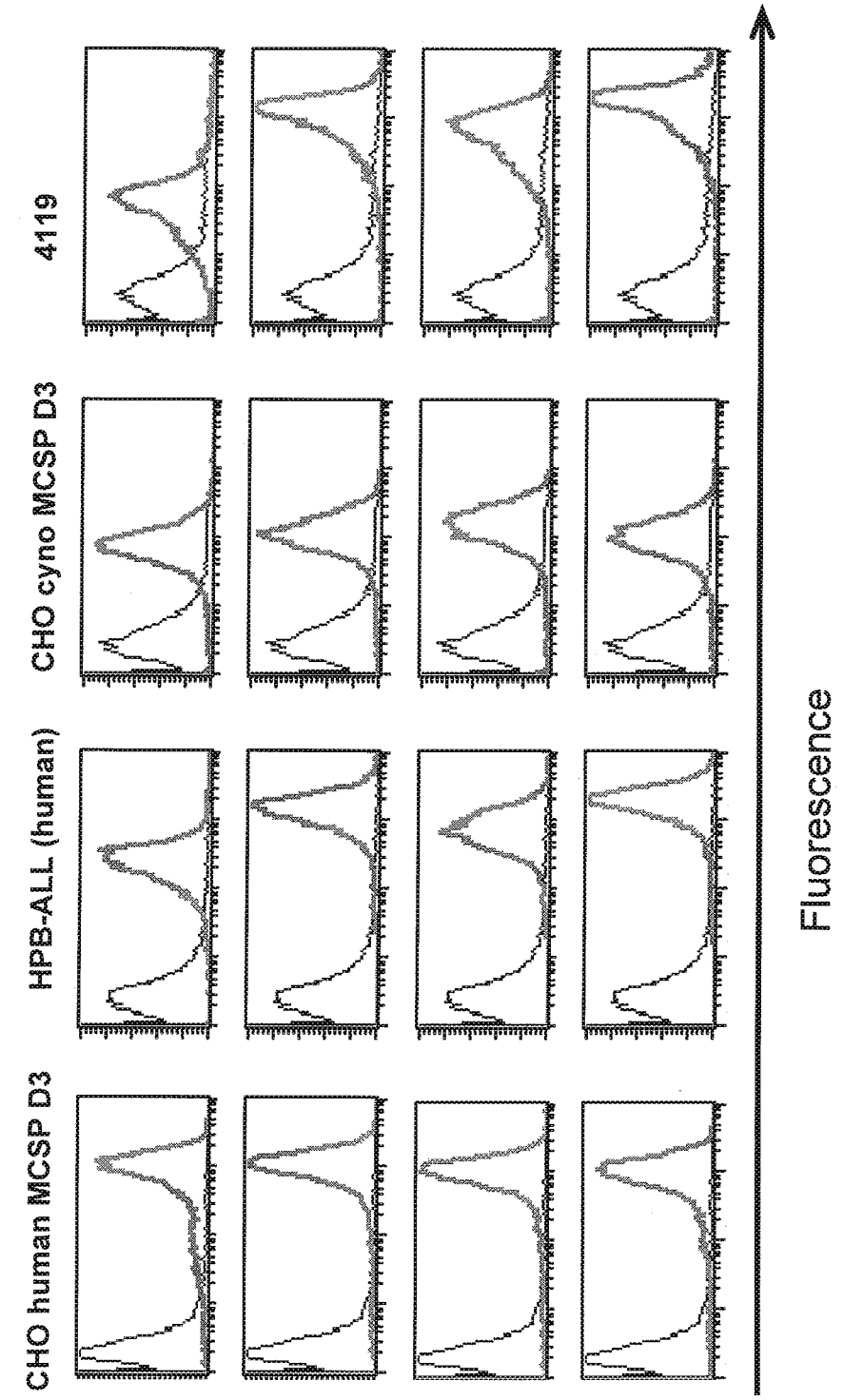

CHO human MCSP D3
HPB-ALL (human)
CHO cyno MCSP D3
4119
MCSP-G4 HLP x F6A HLP
MCSP-G4 HLP x H2C HLP
MCSP-G4 HLP x G4H HLP
MCSP-G4 HLP x F12Q HL
Count
Fluorescence

Figure 12

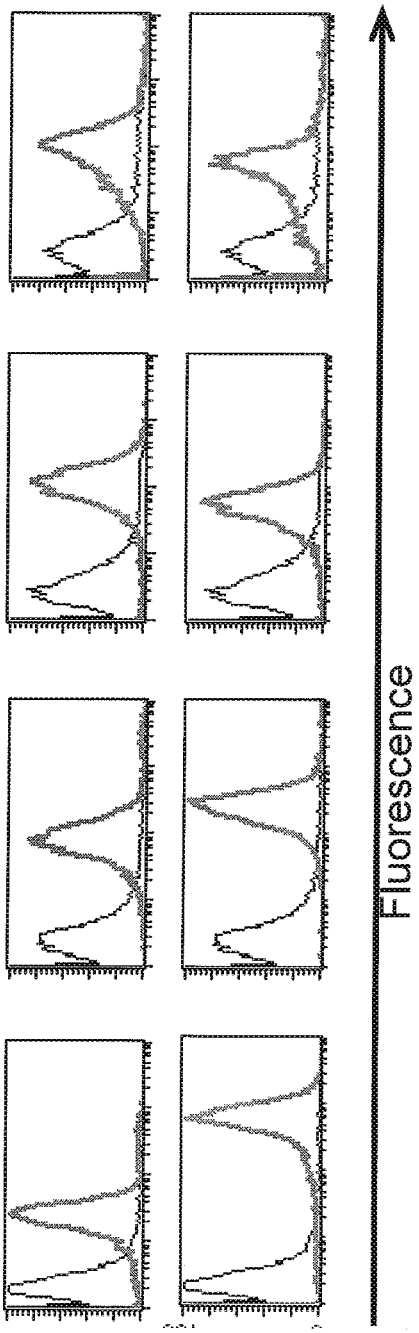
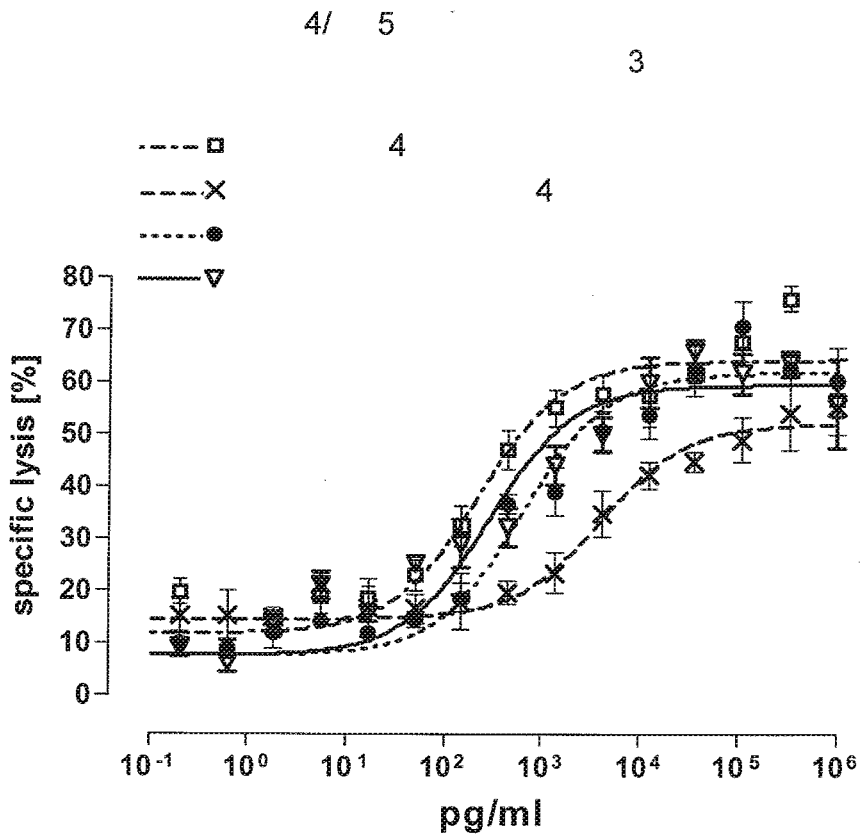
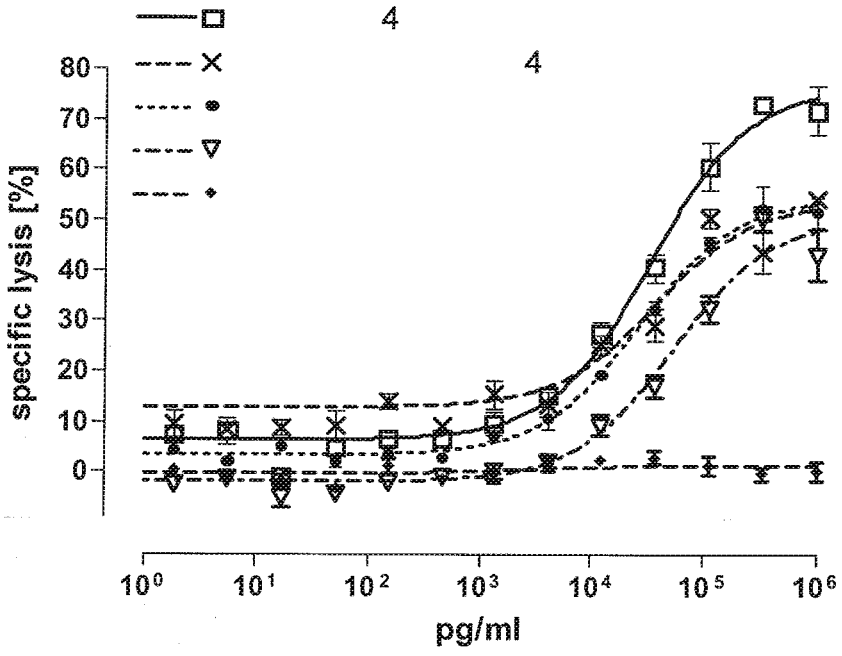

CHO human MCSP D3
HPB-ALL (human)
CHO cyno MCSP D3
4119
MCSP-G4 HLP x E1L HLP
MCSP-G4 HLP x E2M HLP
Count
Fluorescence

Figure 13

A)



B)

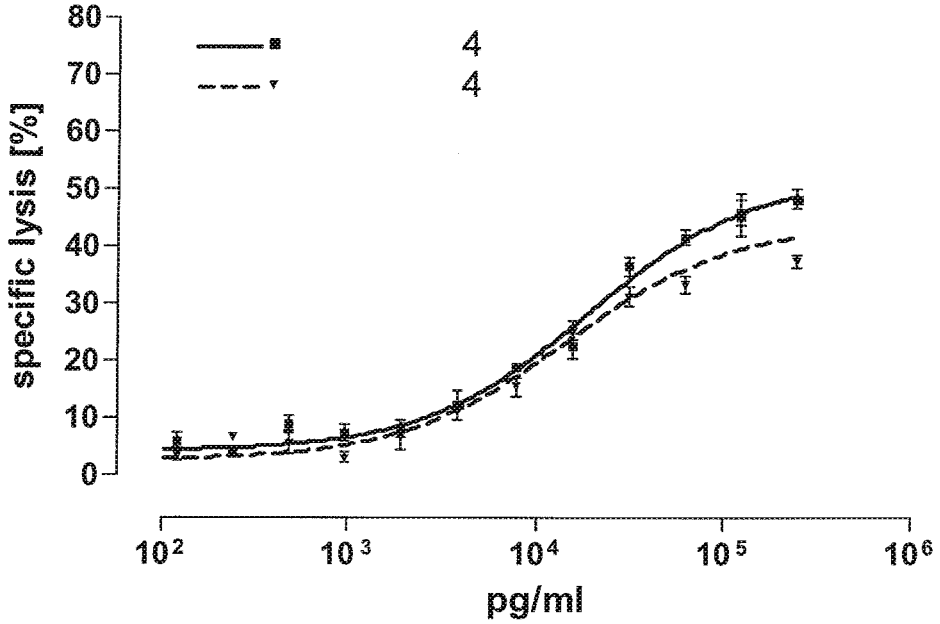


14

A)

4119

3



B)

4119

3

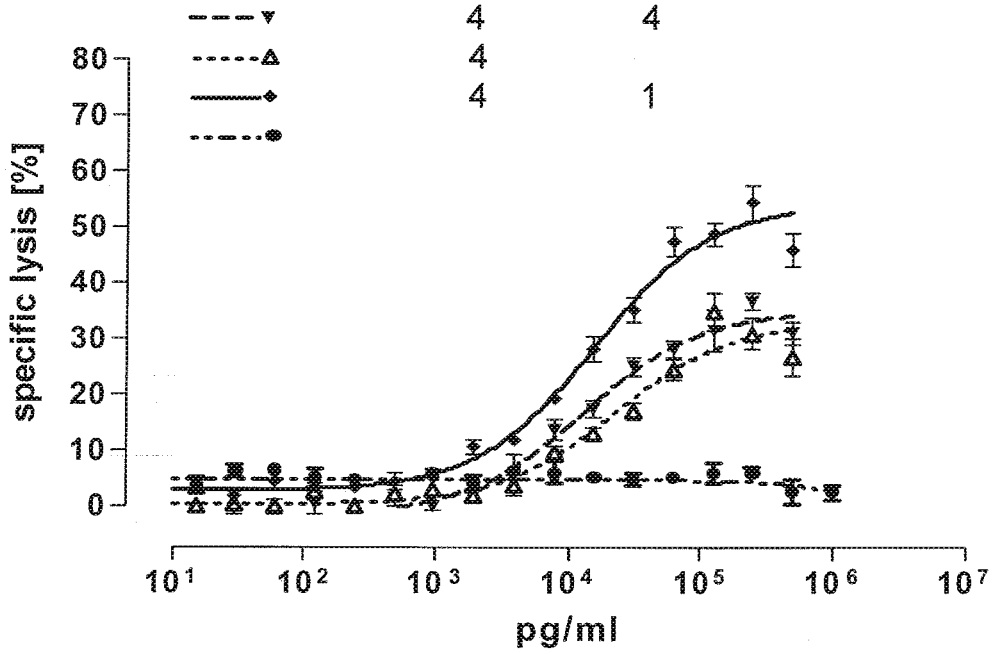
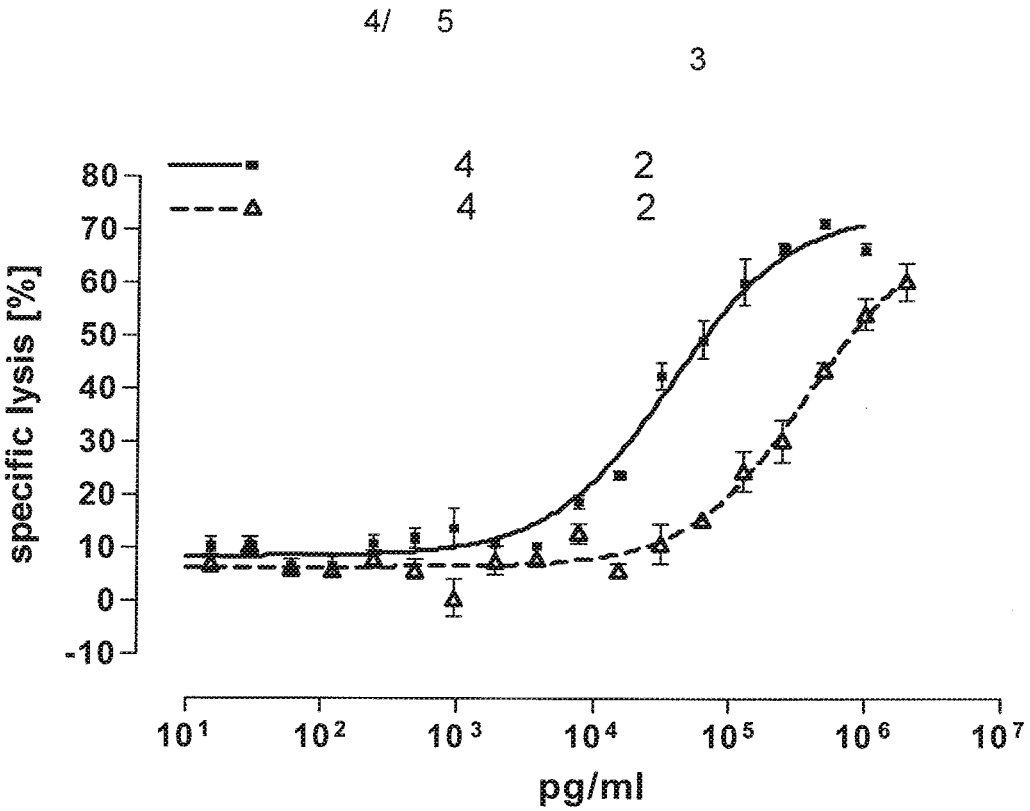


Figure 15

A)


4/ 5
3
4 2
4 2
specific lysis [%]
80
70
60
50
40
30
20
10
0
-10
10¹ 10² 10³ 10⁴ 10⁵ 10⁶ 10⁷
pg/ml

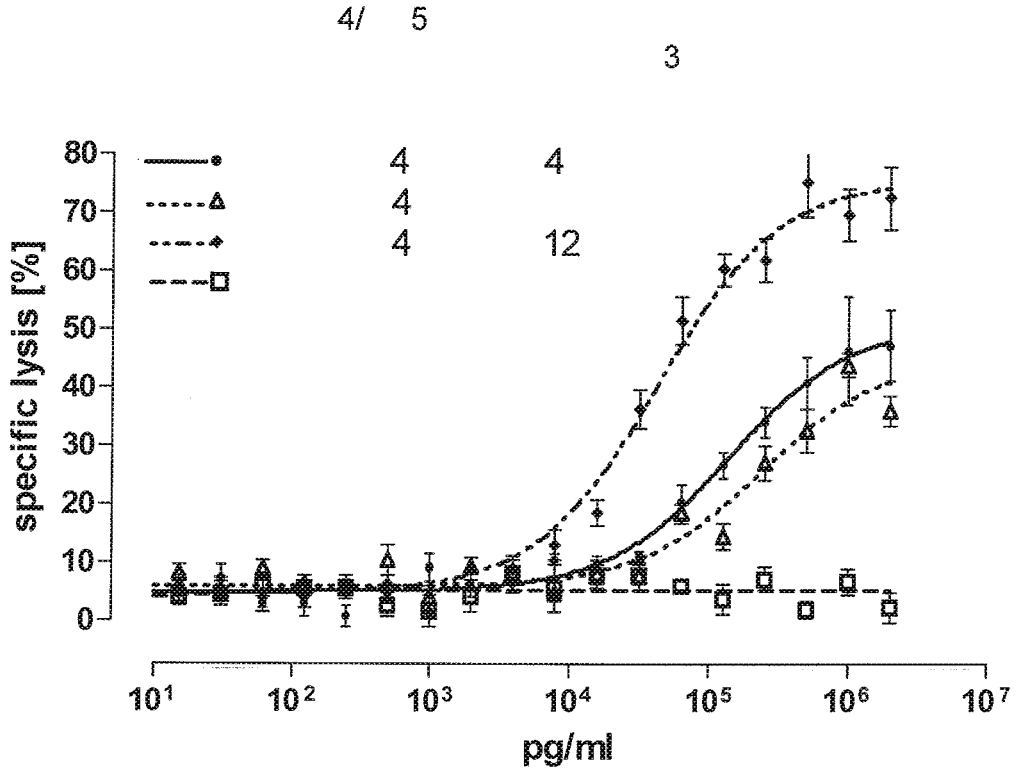
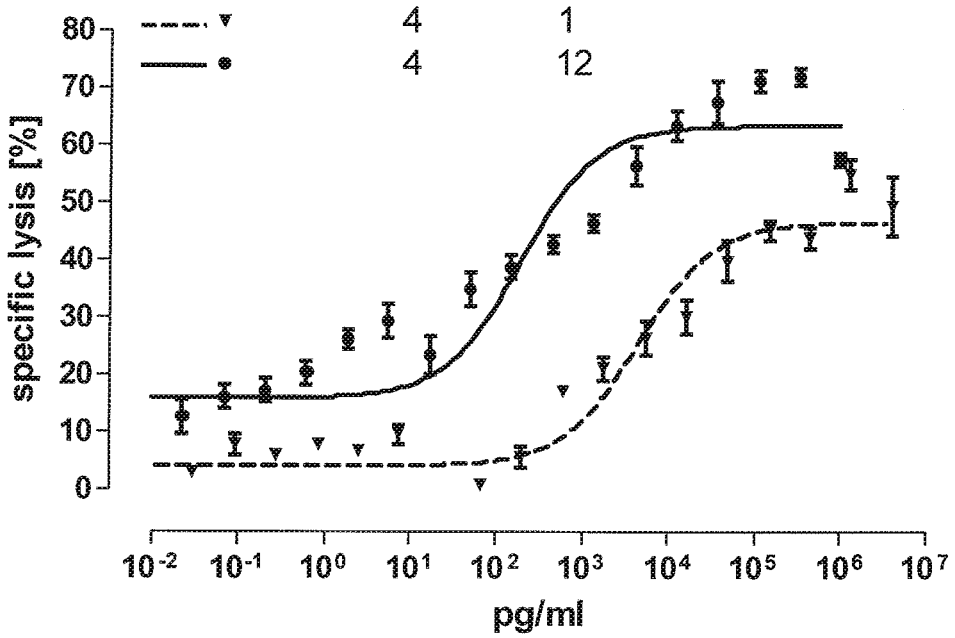

4/ 5
3
4 4
4
4 12
specific lysis [%]
80
70
60
50
40
30
20
10
0
10¹ 10² 10³ 10⁴ 10⁵ 10⁶ 10⁷
pg/ml

Figure 16

A)

Effector cells: stimulated CD4/CD56 depleted human PBMC
Target cells: CHO transfected with human MCSP D3



B)

Effector cells: macaque T cell line 4119 LnPx
Target cells: CHO transfected with cynomolgus MCSP D

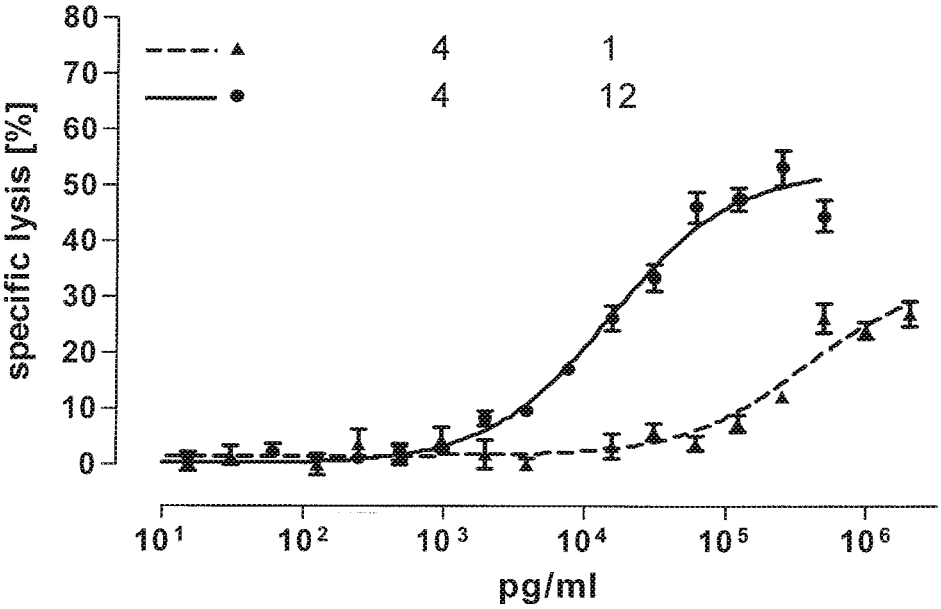
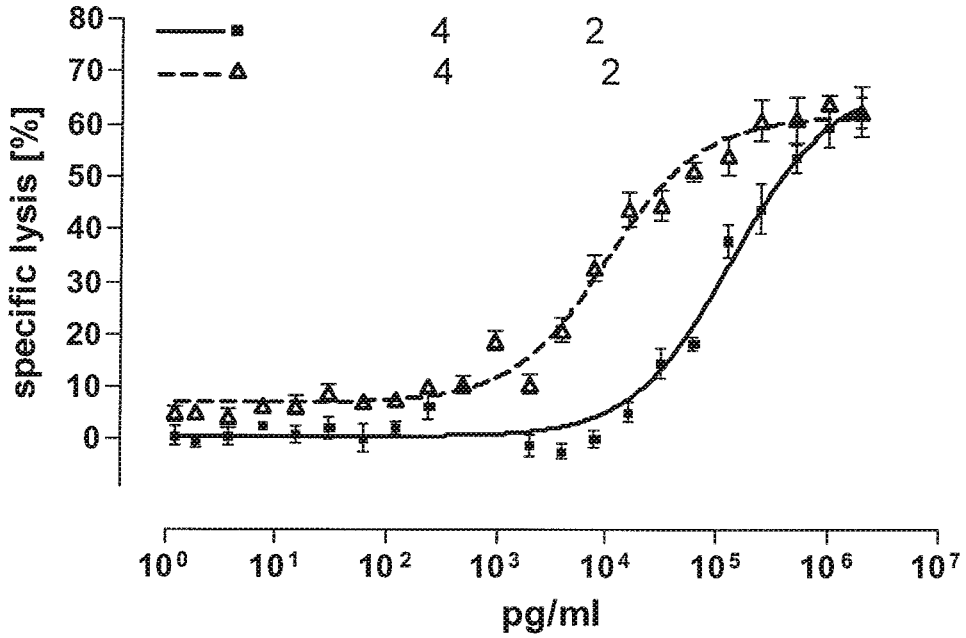


Figure 17

A)
Effector cells: stimulated CD4/CD56 depleted human PBMC
Target cells: CHO transfected with human MCSP D3



B)

Effector cells: macaque T cell line 4119 LnPx
Target cells: CHO transfected with cynomolgus MCSP D3

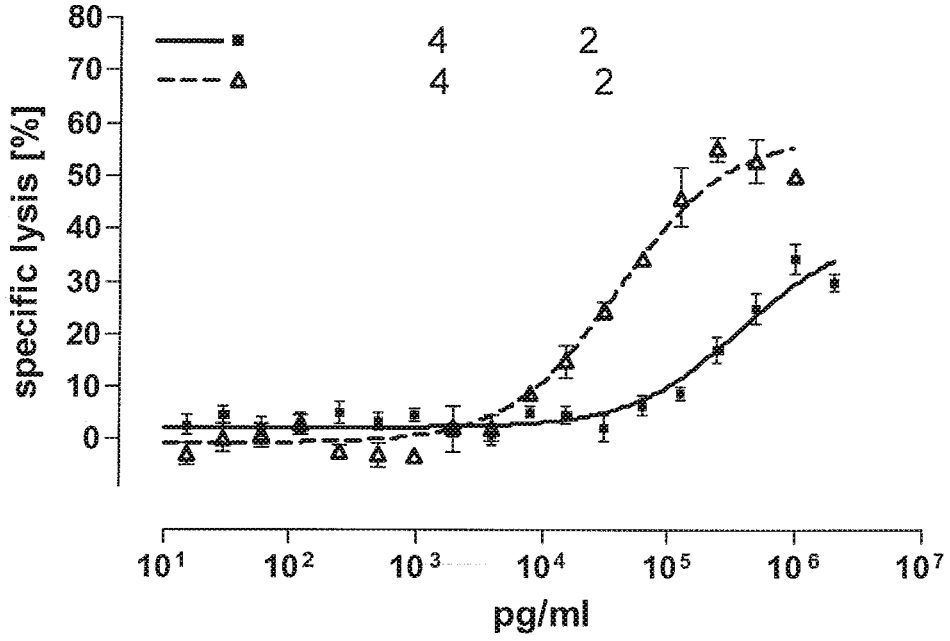


Figure 18 (1)

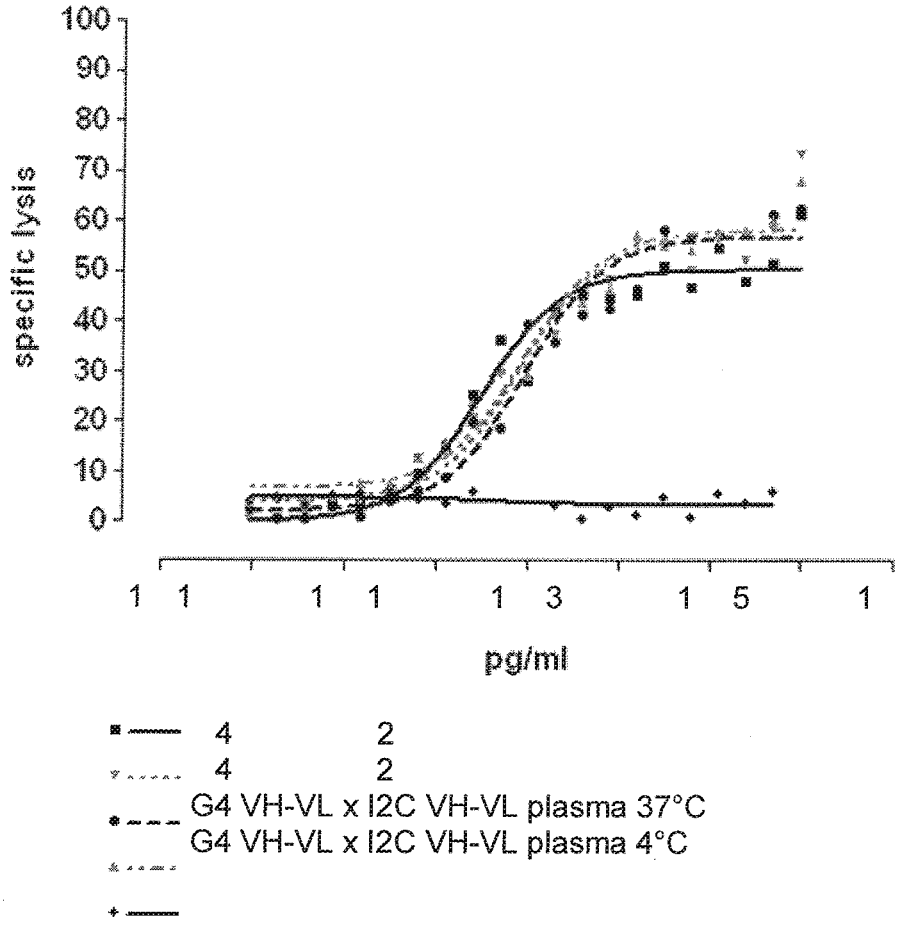

100
90
80
70
60
50
40
30
20
10
0
specific lysis
1 1 1 1 1 3 1 5 1
pg/ml
4 2
4 2
G4 VH-VL x I2C VH-VL plasma 37°C
G4 VH-VL x I2C VH-VL plasma 4°C

Figure 18 (2)

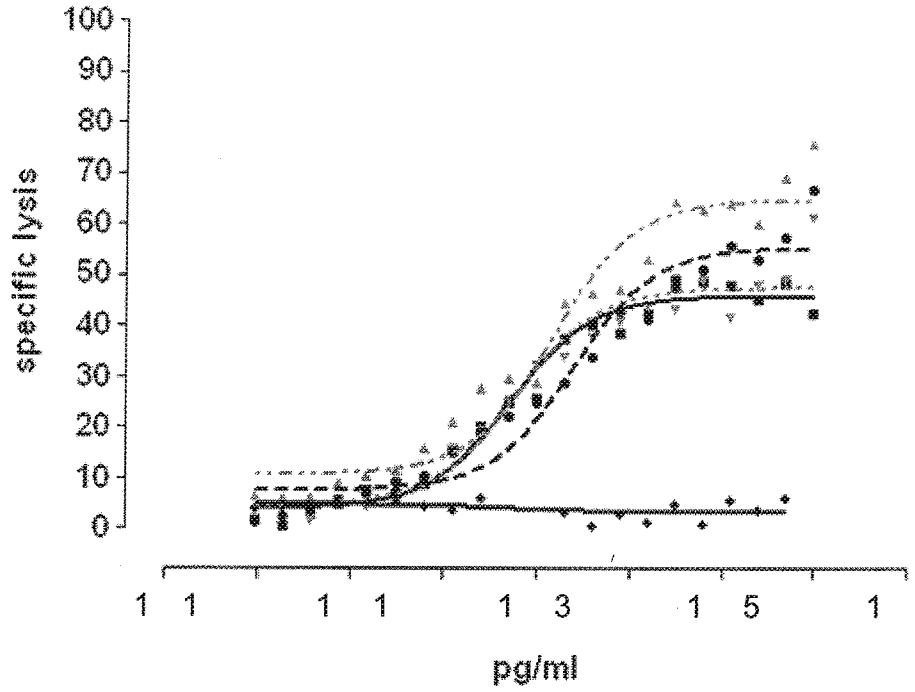

100
90
80
70
60
50
40
30
20
10
0
specific lysis
1 1
1 1
1 3
1 5
1
pg/ml
4 2
4 2
G4 VH-VL x H2C VH-VL plasma 37°C
G4 VH-VL x H2C VH-VL plasma 4°C

Figure 18 (3)

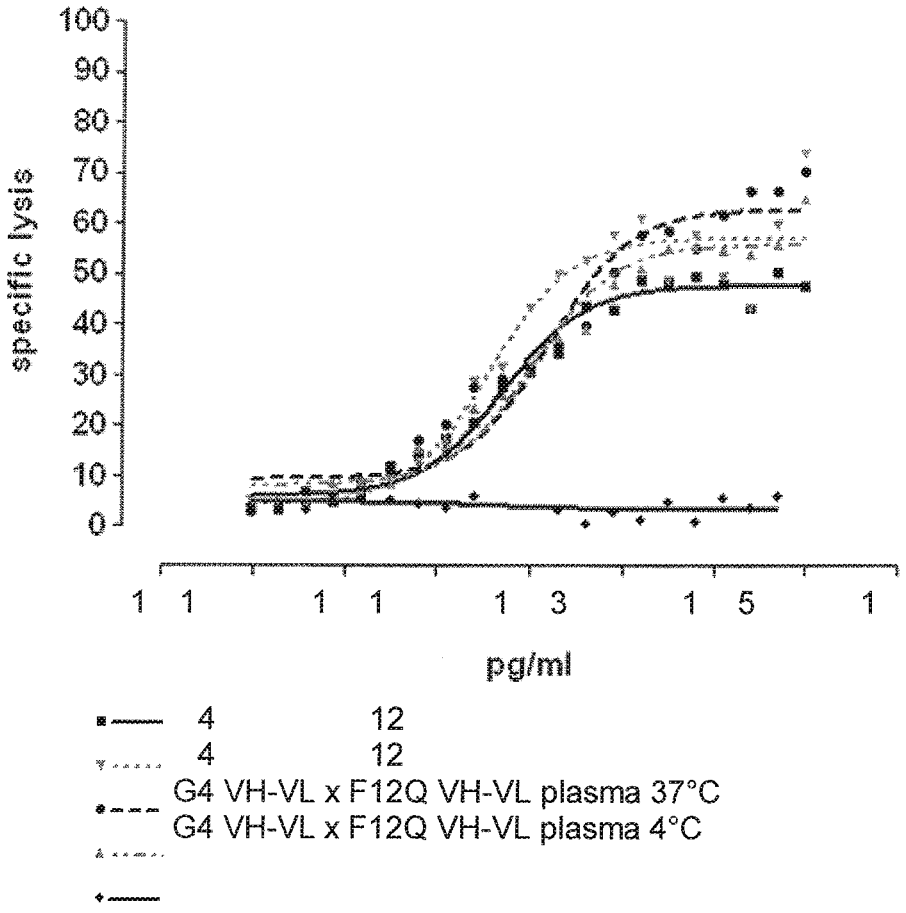

100
90
80
70
60
50
40
30
20
10
0
specific lysis
1 1 1 1 1 3 1 5 1
pg/ml
4 12
4 12
G4 VH-VL x F12Q VH-VL plasma 37°C
G4 VH-VL x F12Q VH-VL plasma 4°C

Figure 19a

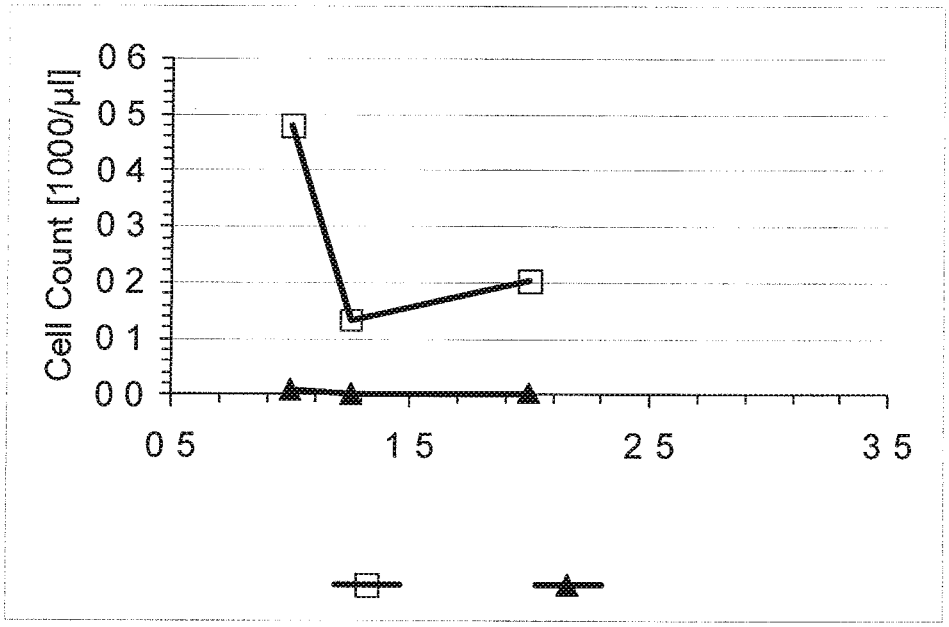


Figure 19b

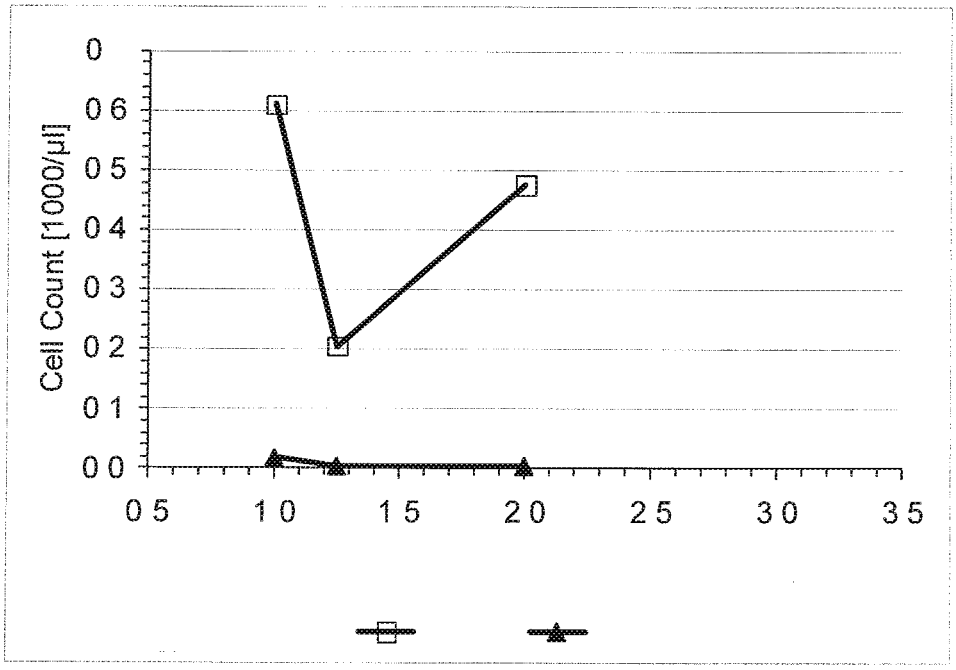


Figure 19c

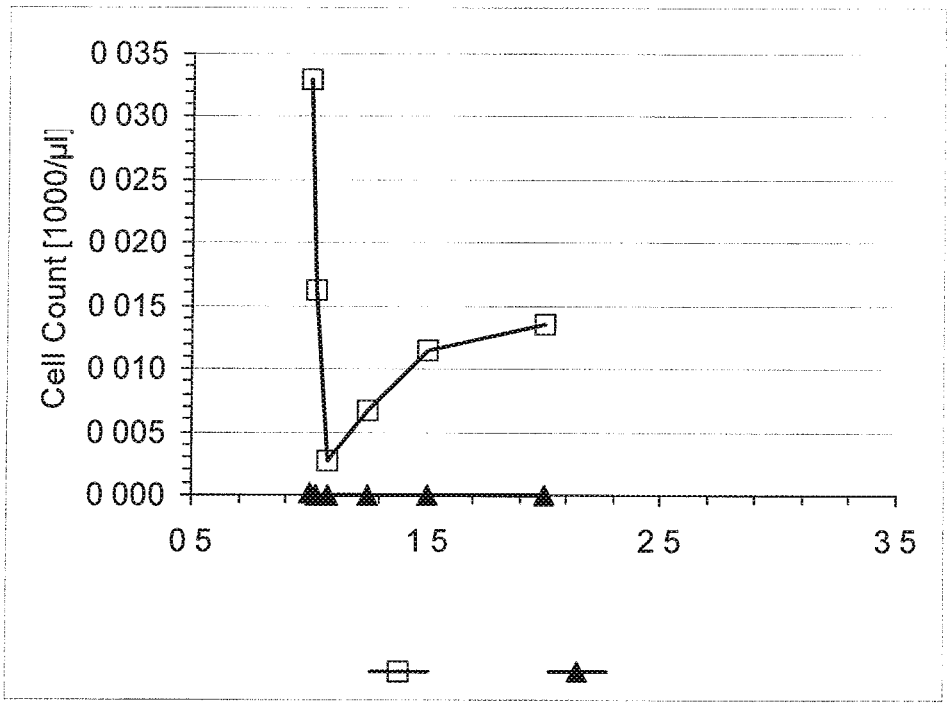


Figure 19d

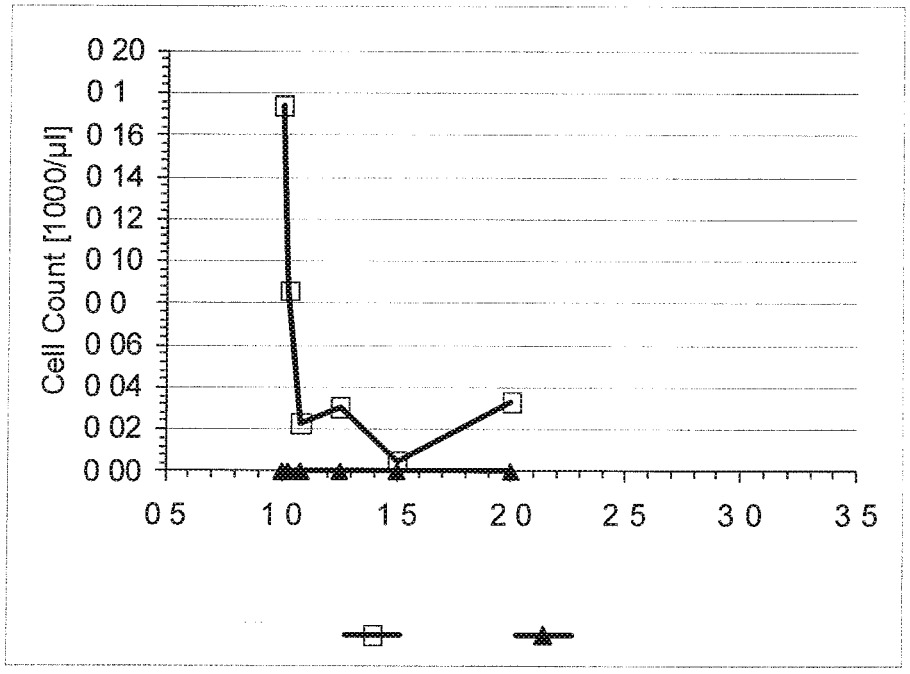


Figure 19e

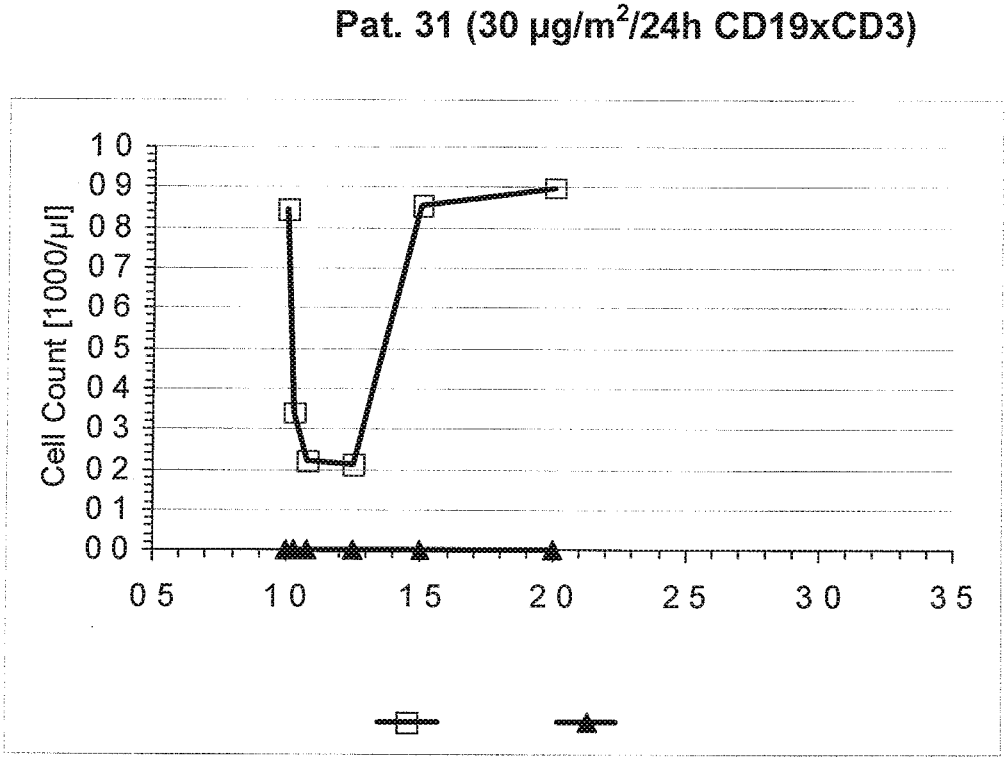


Figure 19f

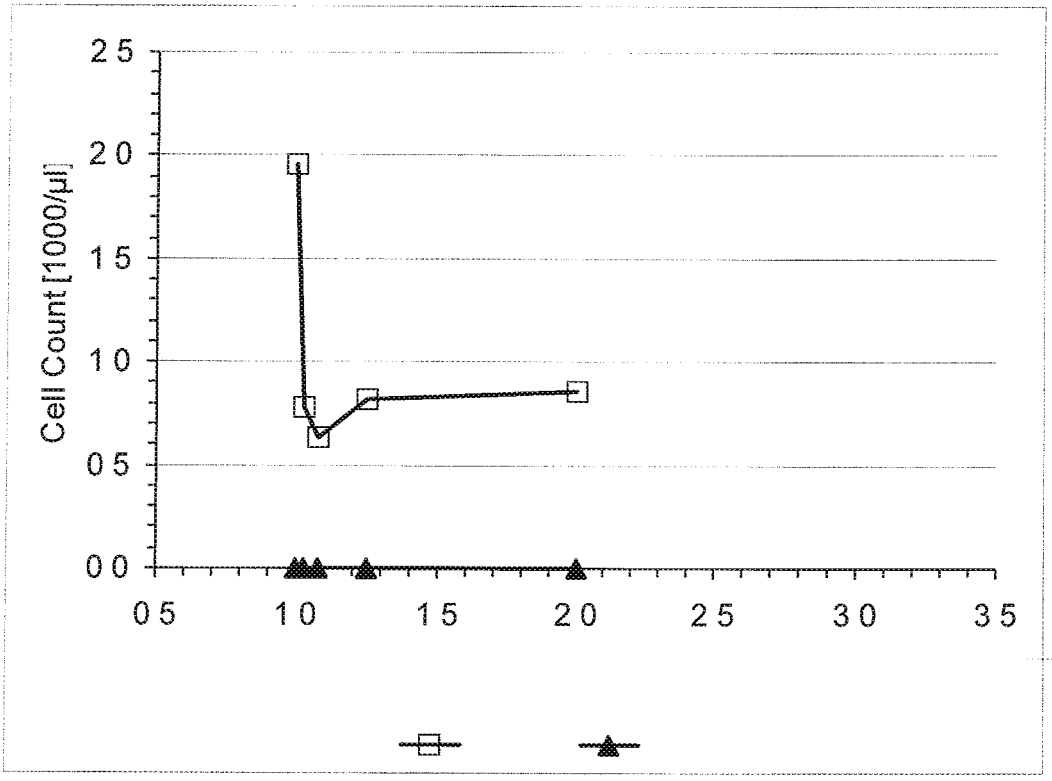
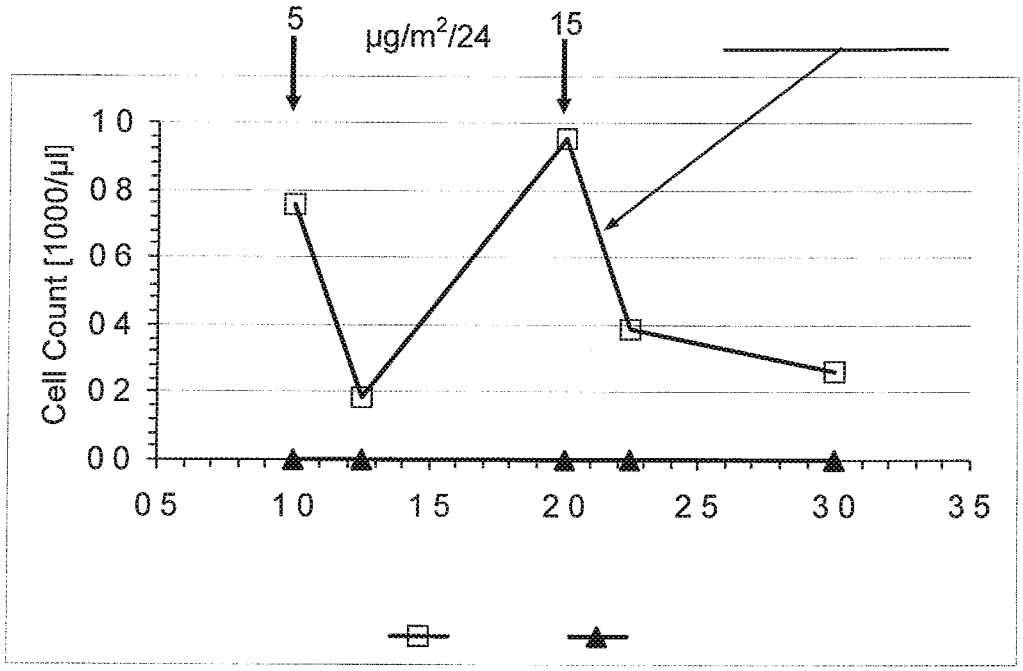
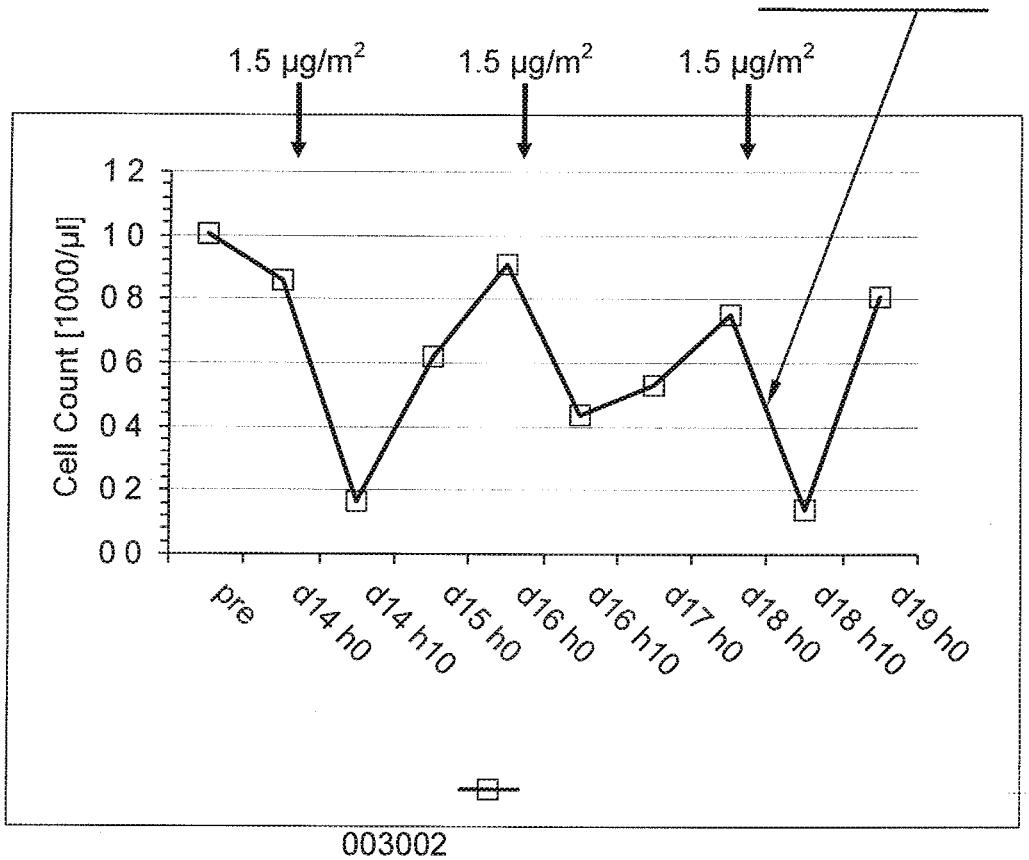


Figure 20



Pat. 19 (continuous infusion: 5 µg/m²/24 1 15
µg/m²/24 19 3



003002

Figure 21

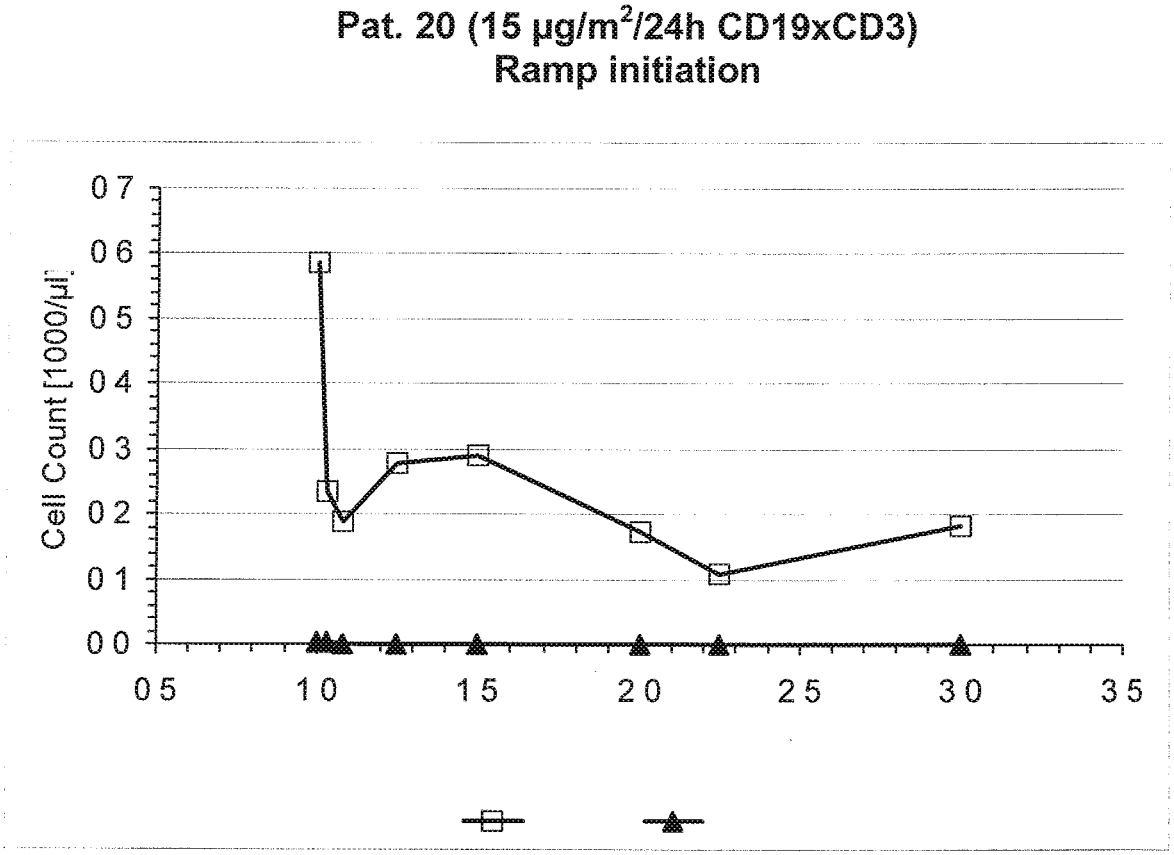

Pat. 20 (15 µg/m²/24h CD19xCD3)
Ramp initiation
Cell Count [1000/µl]
0 7
0 6
0 5
0 4
0 3
0 2
0 1
0 0
05
10
15
20
25
30
35

Figure 22

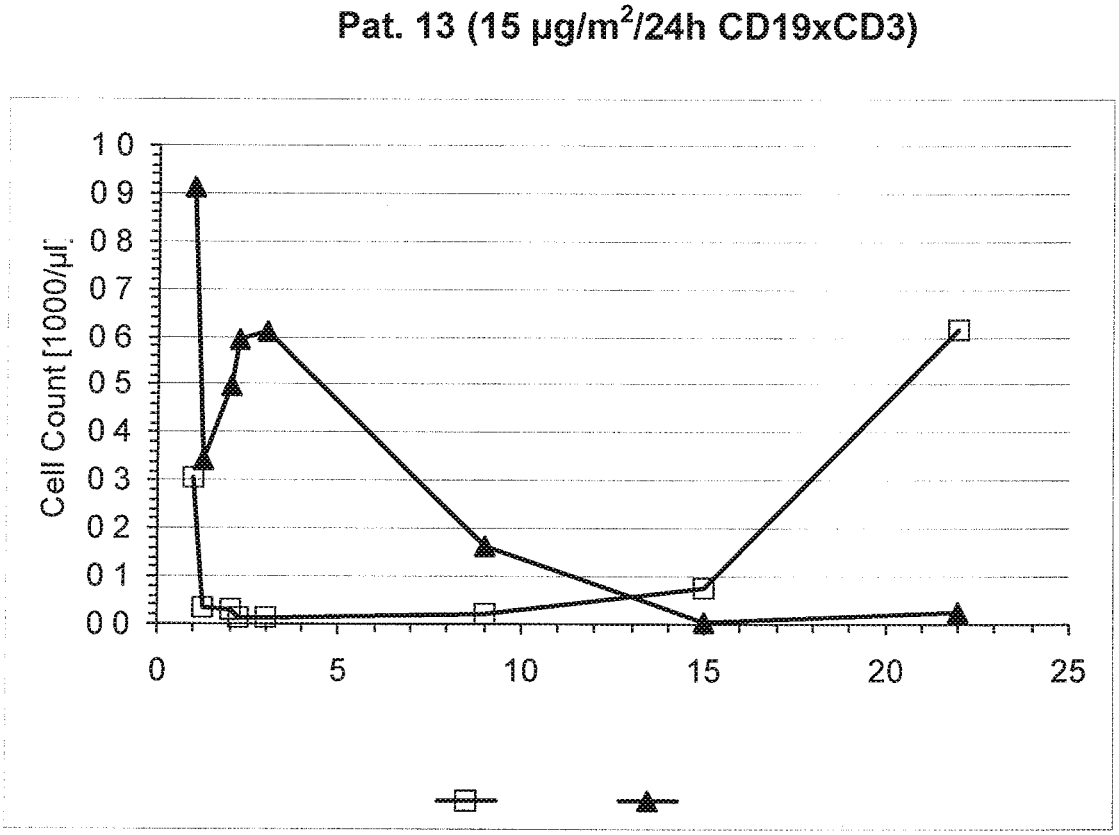
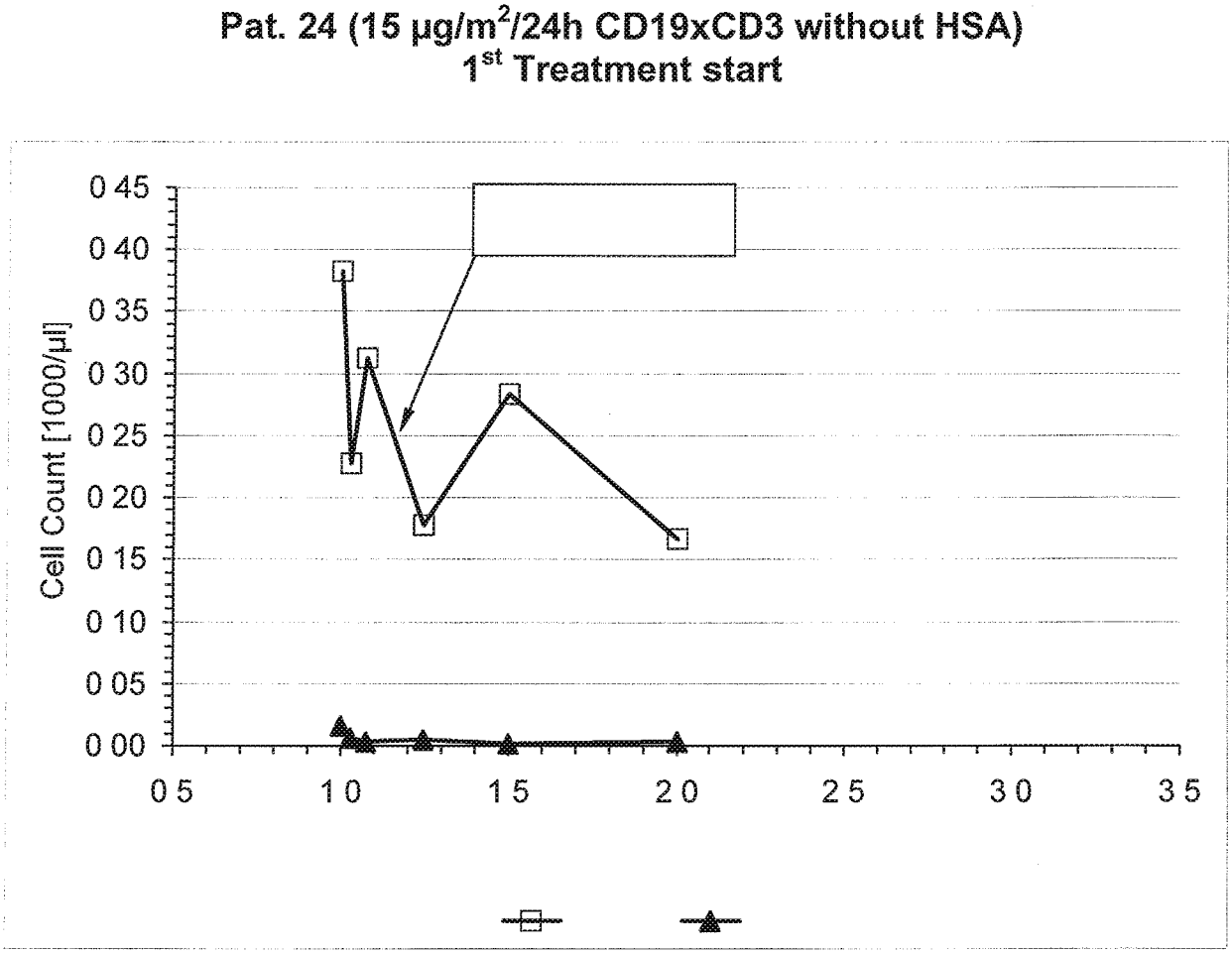
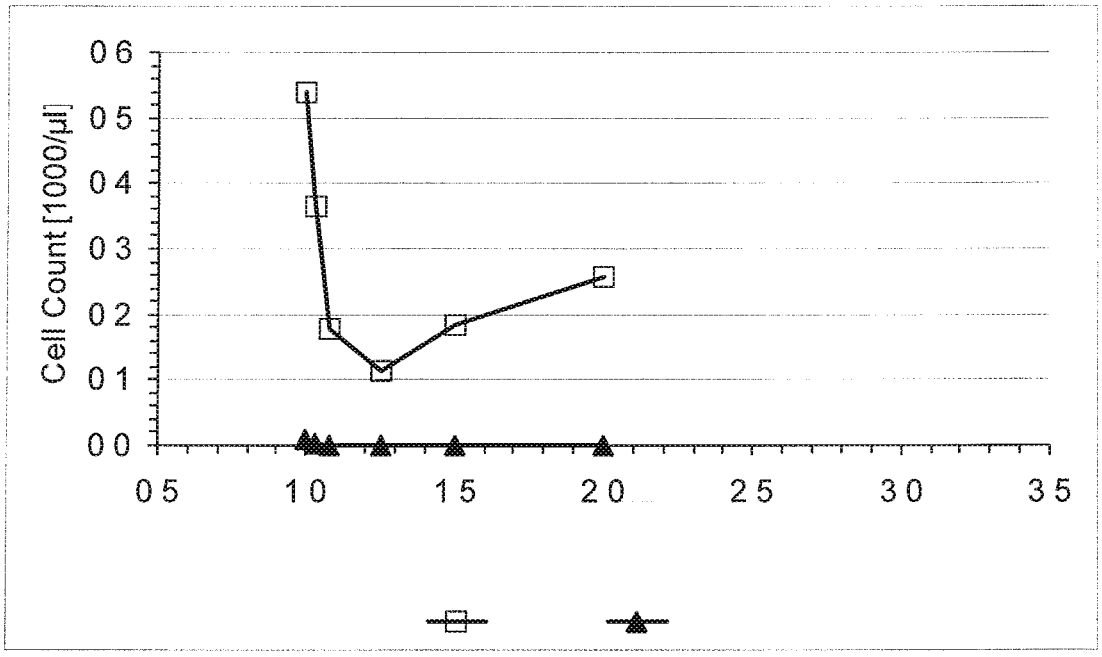

Pat. 13 (15 µg/m²/24h CD19xCD3)
Cell Count [1000/µl]
10
09
08
07
06
05
04
03
02
01
00
0
5
10
15
20
25

Figure 23


Pat. 24 (15 µg/m²/24h CD19xCD3 without HSA)
1st Treatment start
Cell Count [1000/µl]
0 45
0 40
0 35
0 30
0 25
0 20
0 15
0 10
0 05
0 00
05
10
15
20
25
30
35


Pat. 24 (15 µg/m²/24h CD19xCD3 with HSA)
2nd Treatment start
Cell Count [1000/µl]
0 6
0 5
0 4
0 3
0 2
0 1
0 0
05
10
15
20
25
30
35

Model of T cell adhesion to endothelial cells induced by monovalent binding to context dependent CD3 epitopes

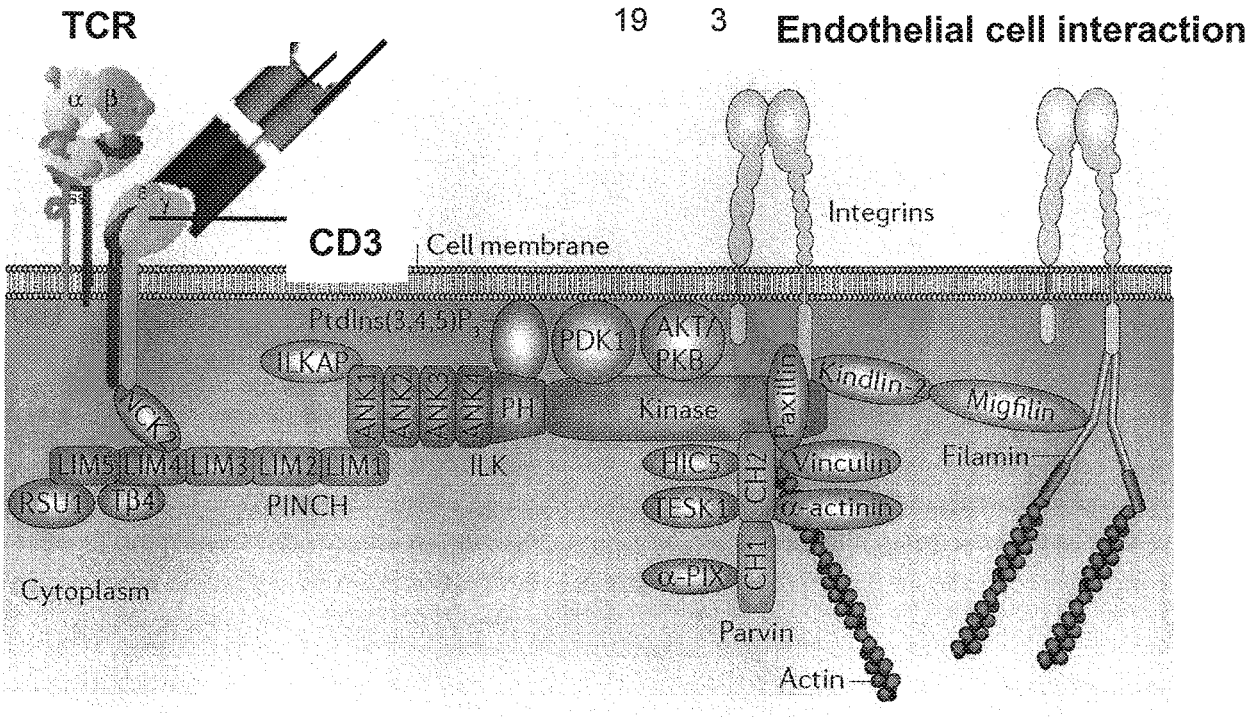


Figure 24

Figure 25

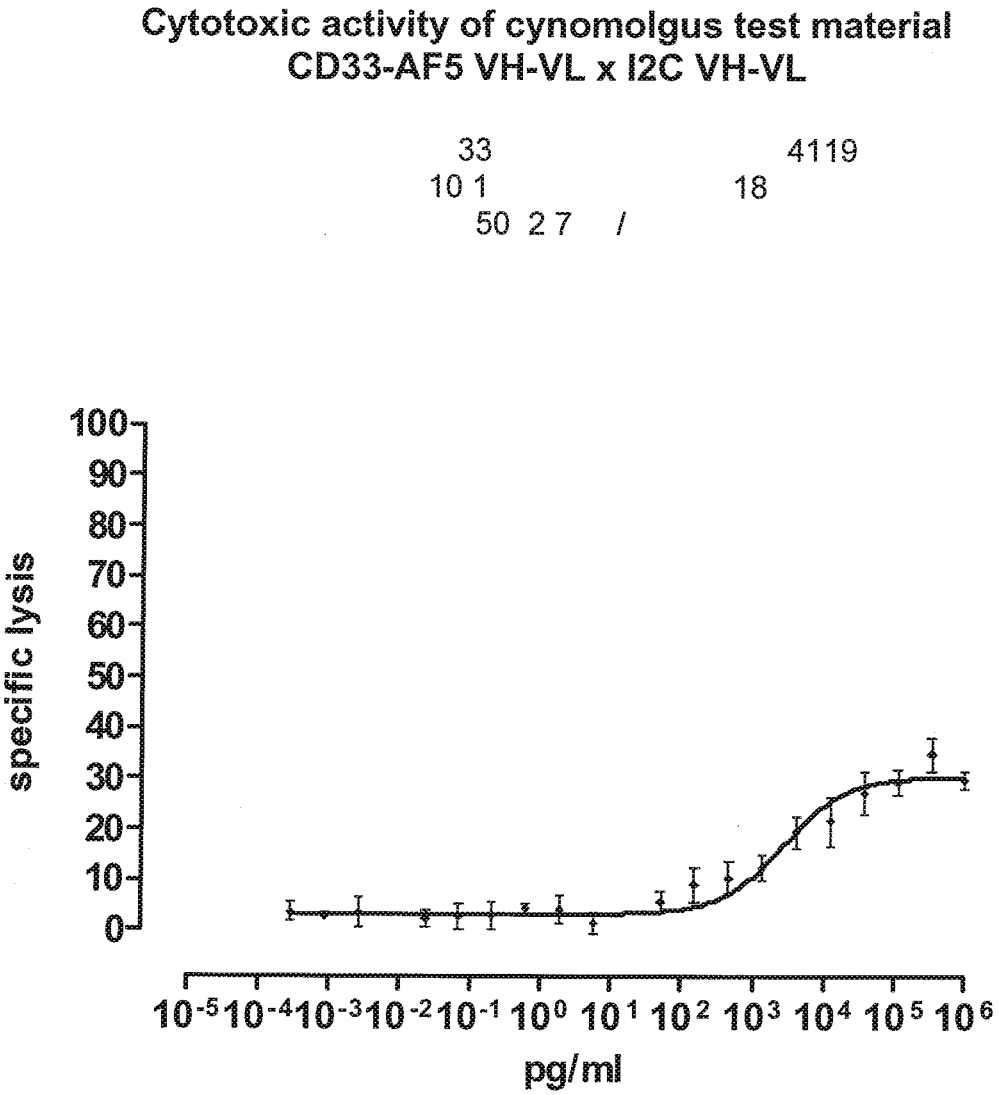

Cytotoxic activity of cynomolgus test material
CD33-AF5 VH-VL x I2C VH-VL
33
4119
10 1
18
50 2 7 /
specific lysis
100
90
80
70
60
50
40
30
20
10
0
10-5 10-4 10-3 10-2 10-1 100 101 102 103 104 105 106
pg/ml

Figure 26 A

Dose- and time-dependent depletion of blood CD33-monocytes through CD33-AF5 VH-VL x I2C VH-VL

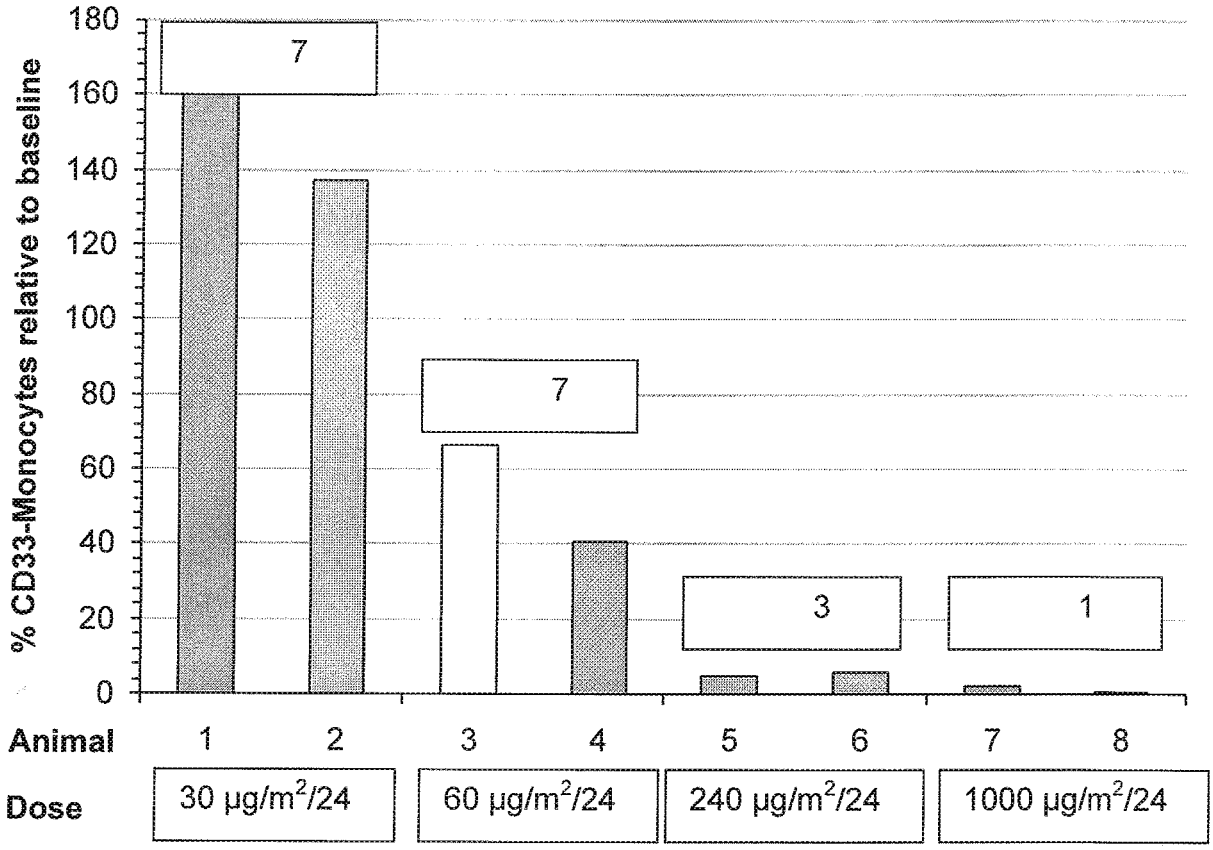


Figure 26 B (1)

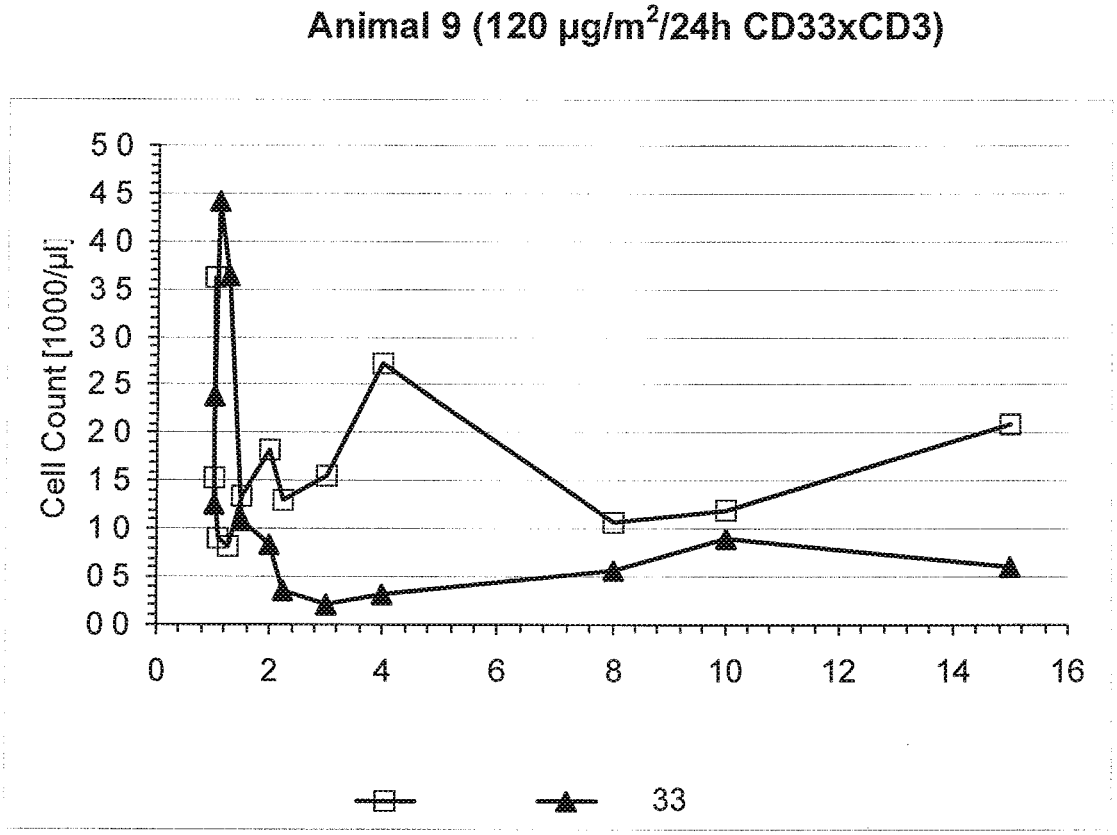


Figure 26 B (2)

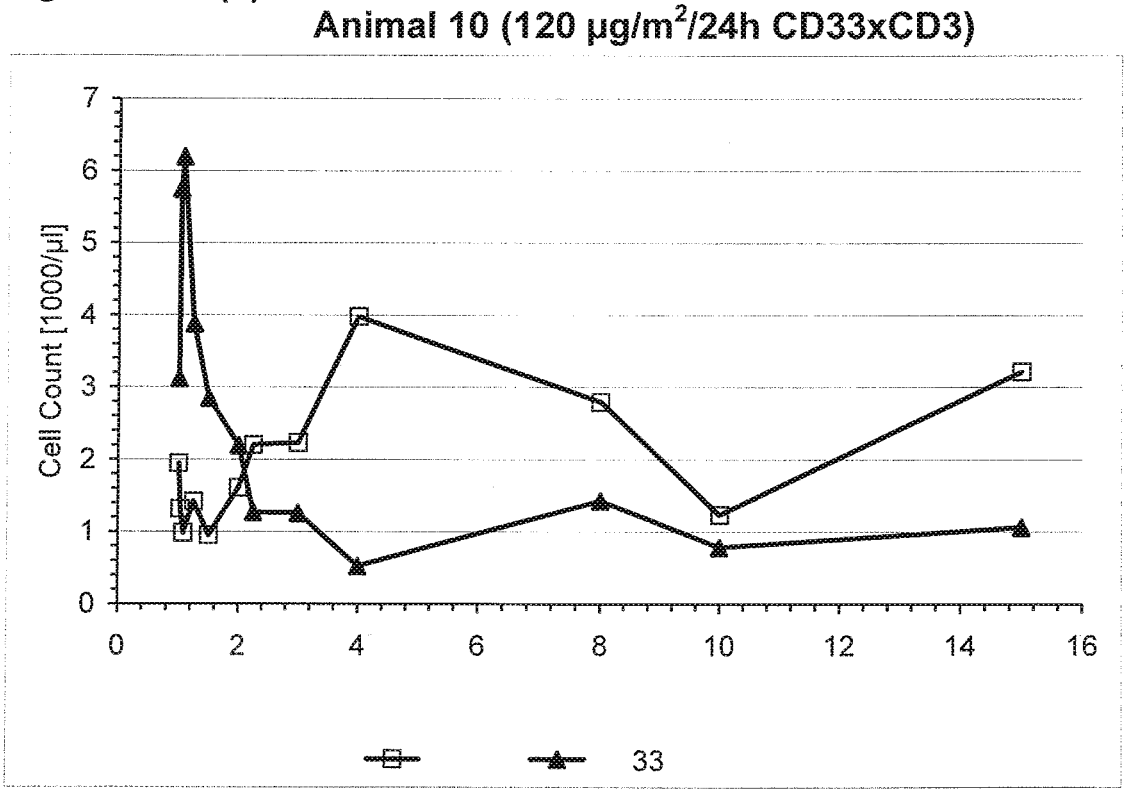


Figure 27

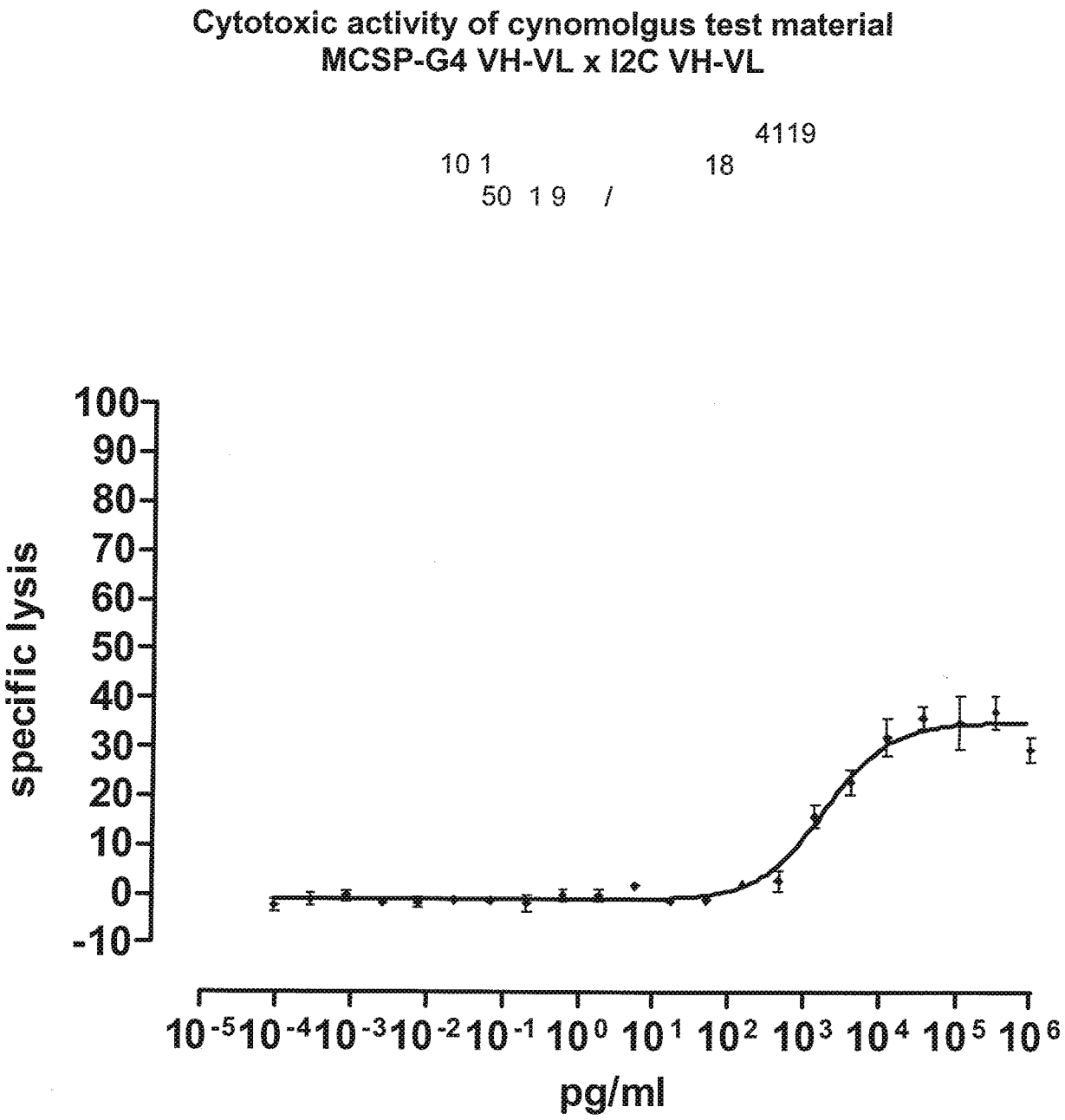
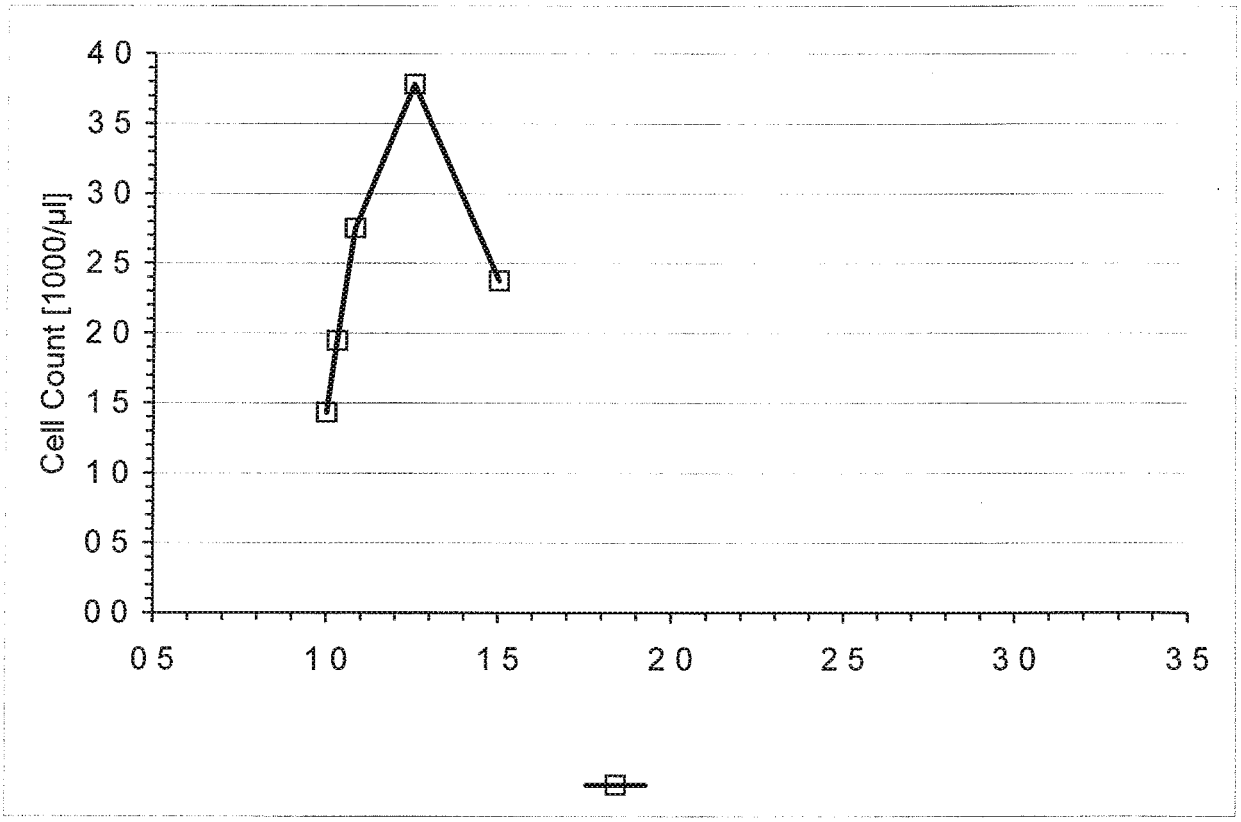

Cytotoxic activity of cynomolgus test material
MCSP-G4 VH-VL x I2C VH-VL
4119
10 1
18
50 1 9 /
specific lysis
100
90
80
70
60
50
40
30
20
10
0
-10
10-5 10-4 10-3 10-2 10-1 100 101 102 103 104 105 106
pg/ml

Figure 28 (1)

Animal 1 (60 µg/m^2/24h MCSP-G4 VH-VL x I2C VH-VL)



Animal 2 (240 µg/m^2/24h MCSP-G4 VH-VL x I2C VH-VL)

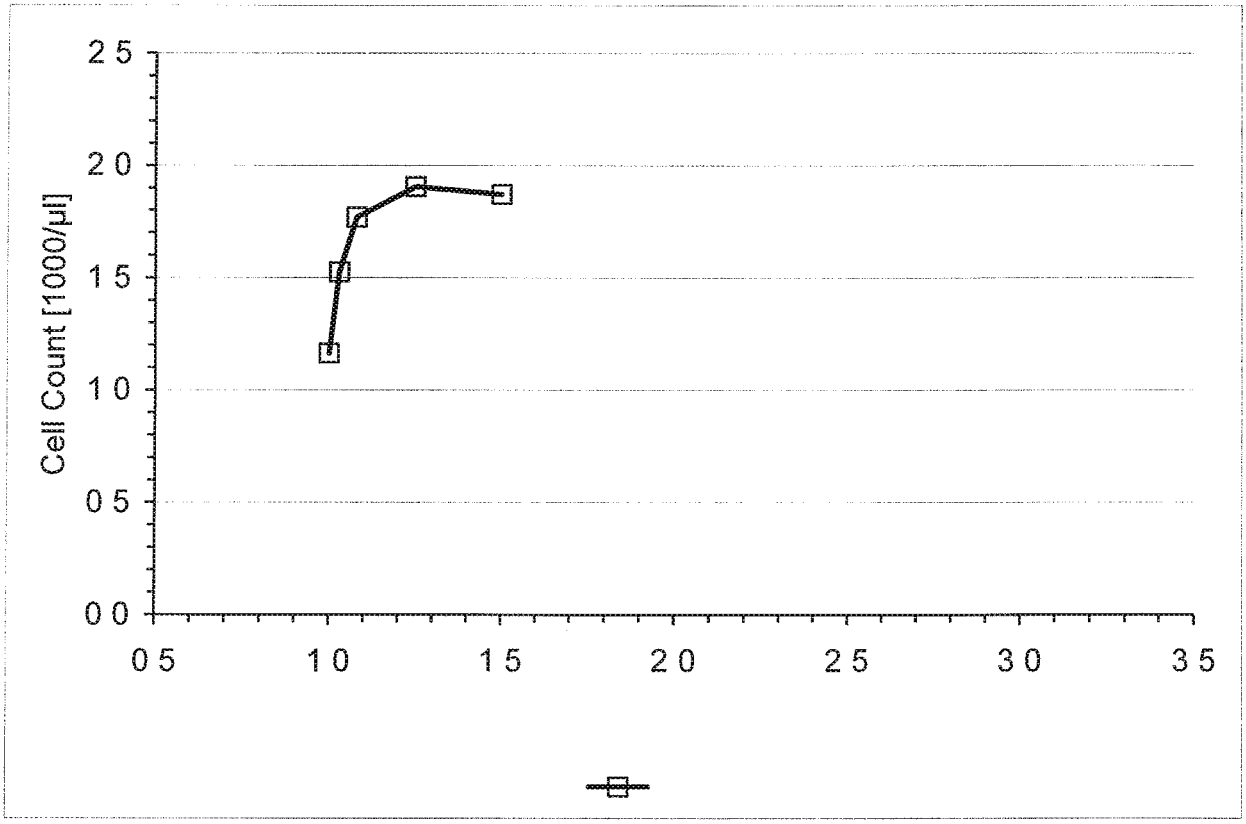
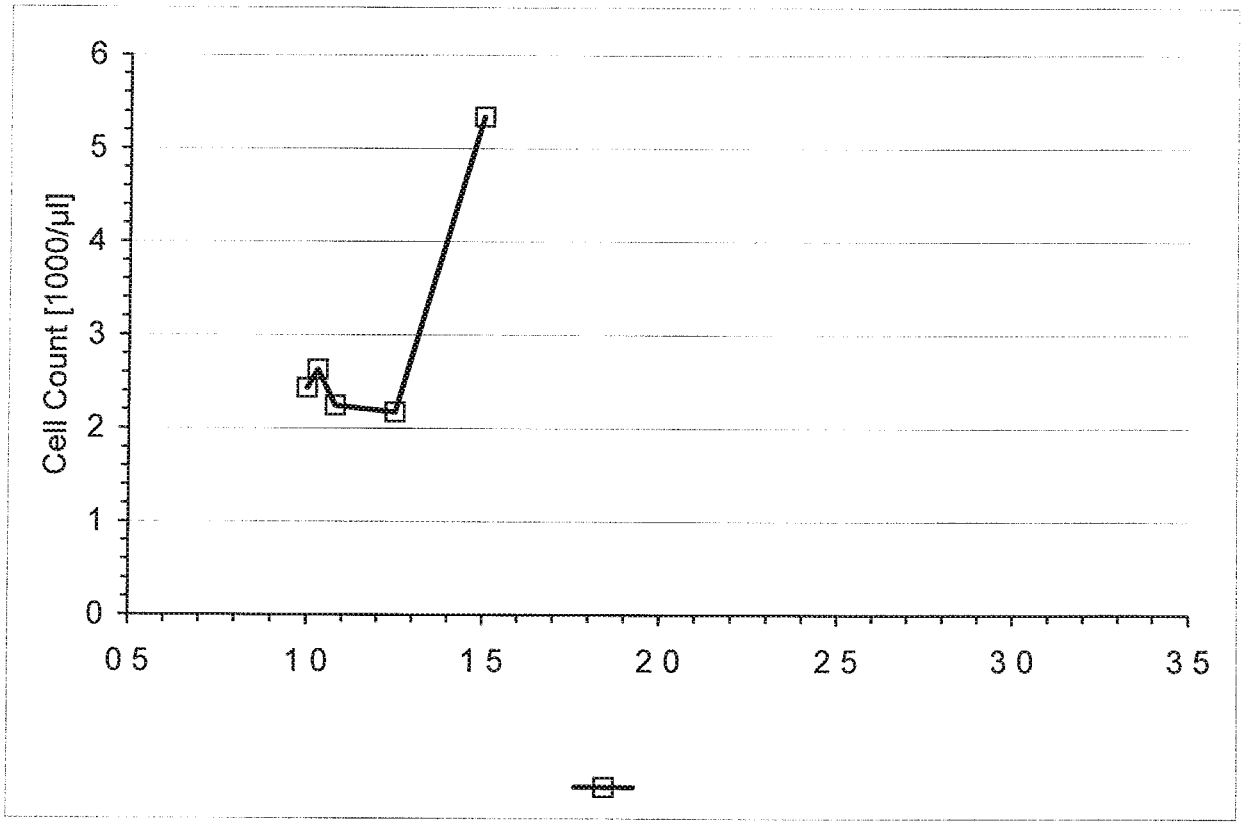
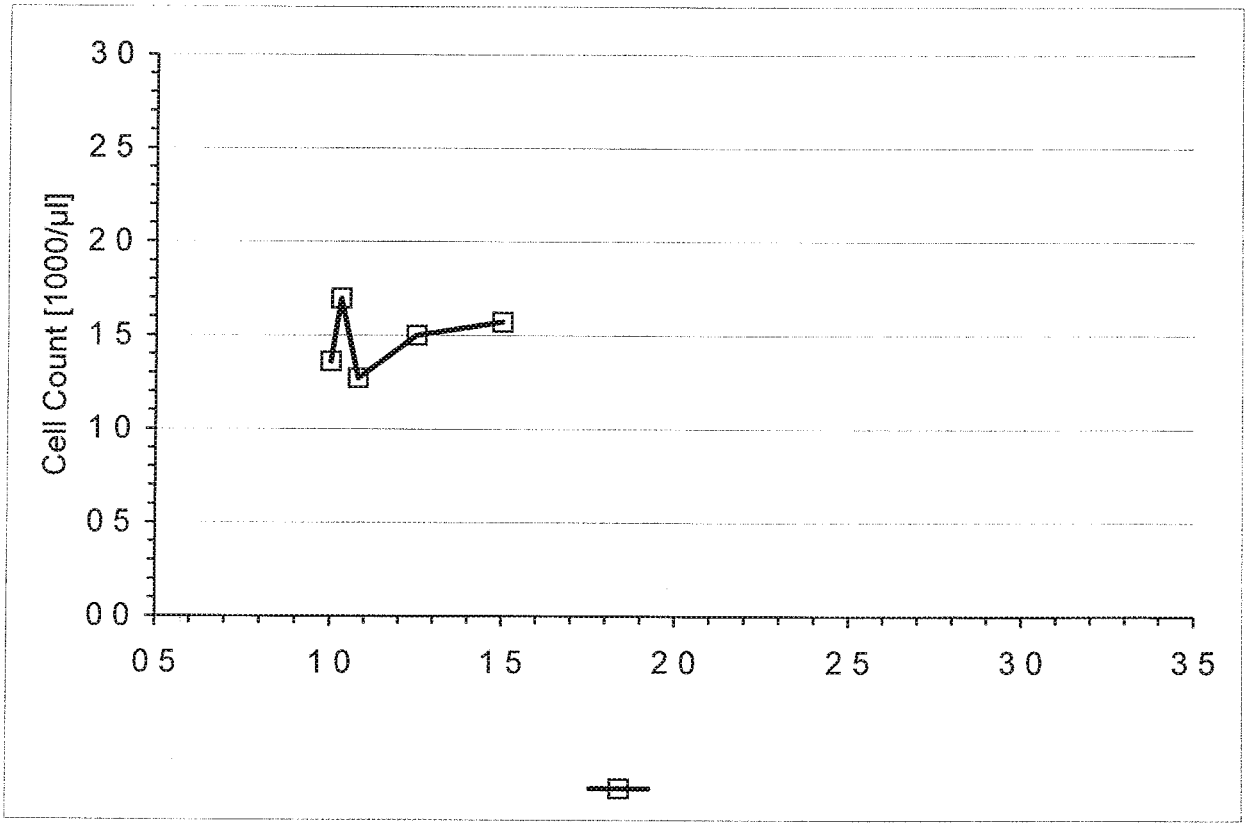


Figure 28 (2)

Animal 3 (240 µg/m^2/24h MCSP-G4 VH-VL x I2C VH-VL)



Animal 4 (1000 µg/m^2/24h MCSP-G4 VH-VL x I2C VH-VL)



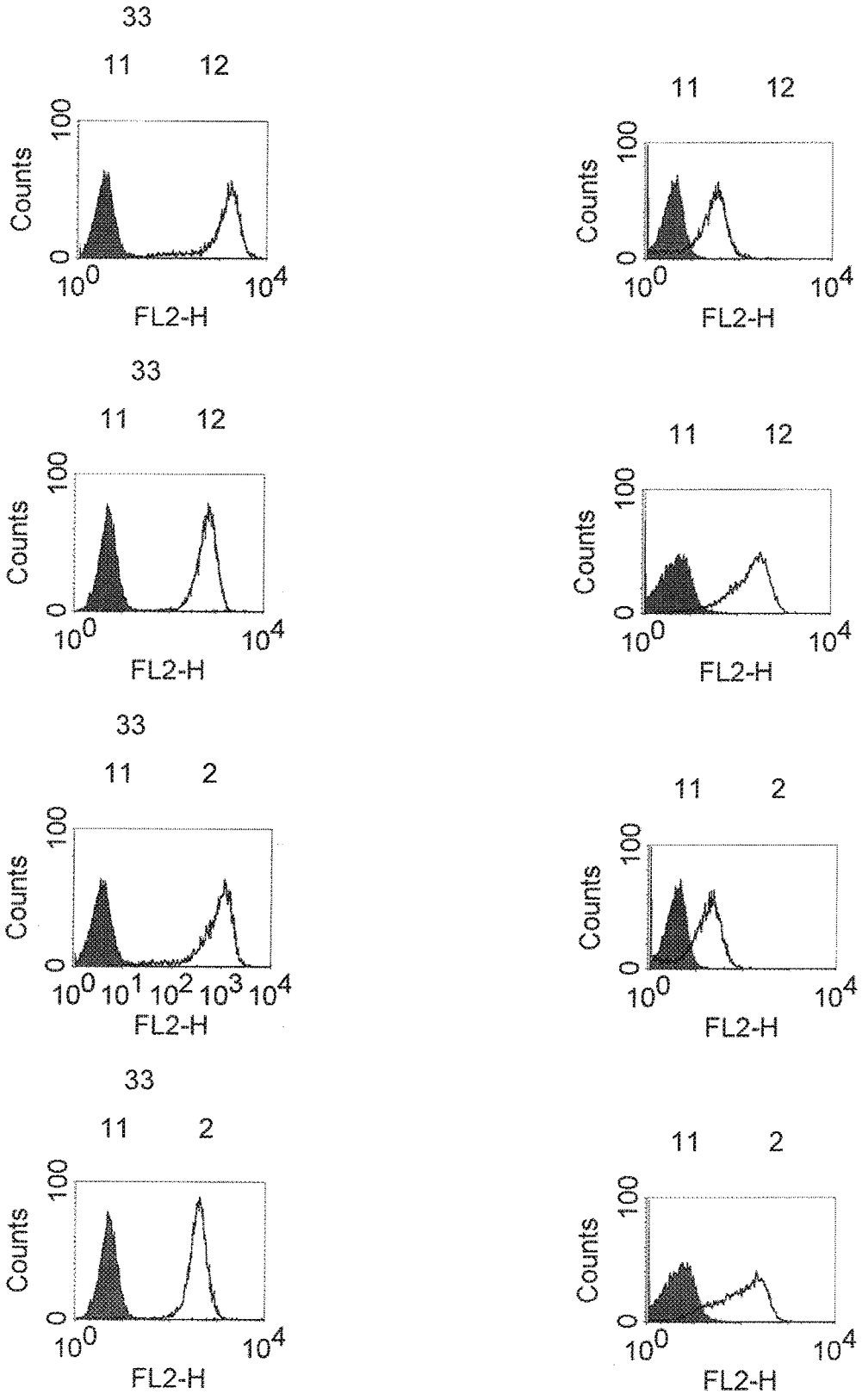

33
11
12
Counts
100
0
10^0
10^4
FL2-H
33
11
12
Counts
100
0
10^0
10^4
FL2-H
33
11
2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
33
11
2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(1)

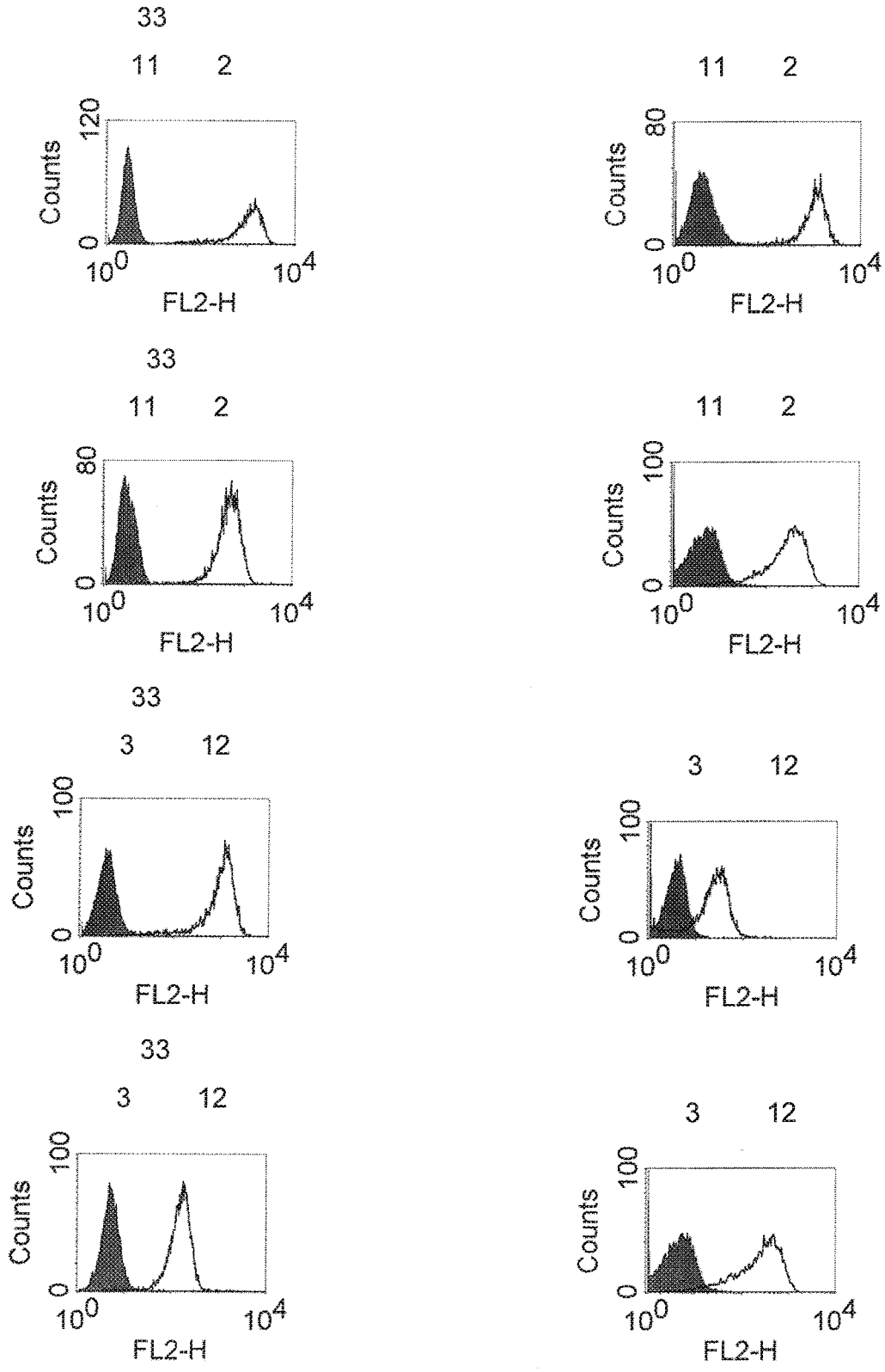

33
11
2
Counts
120
0
10^0
10^4
FL2-H
11
2
Counts
80
0
10^0
10^4
FL2-H
33
11
2
Counts
80
0
10^0
10^4
FL2-H
11
2
Counts
100
0
10^0
10^4
FL2-H
33
3
12
Counts
100
0
10^0
10^4
FL2-H
3
12
Counts
100
0
10^0
10^4
FL2-H
33
3
12
Counts
100
0
10^0
10^4
FL2-H
3
12
Counts
100
0
10^0
10^4
FL2-H

Figure 29(2)

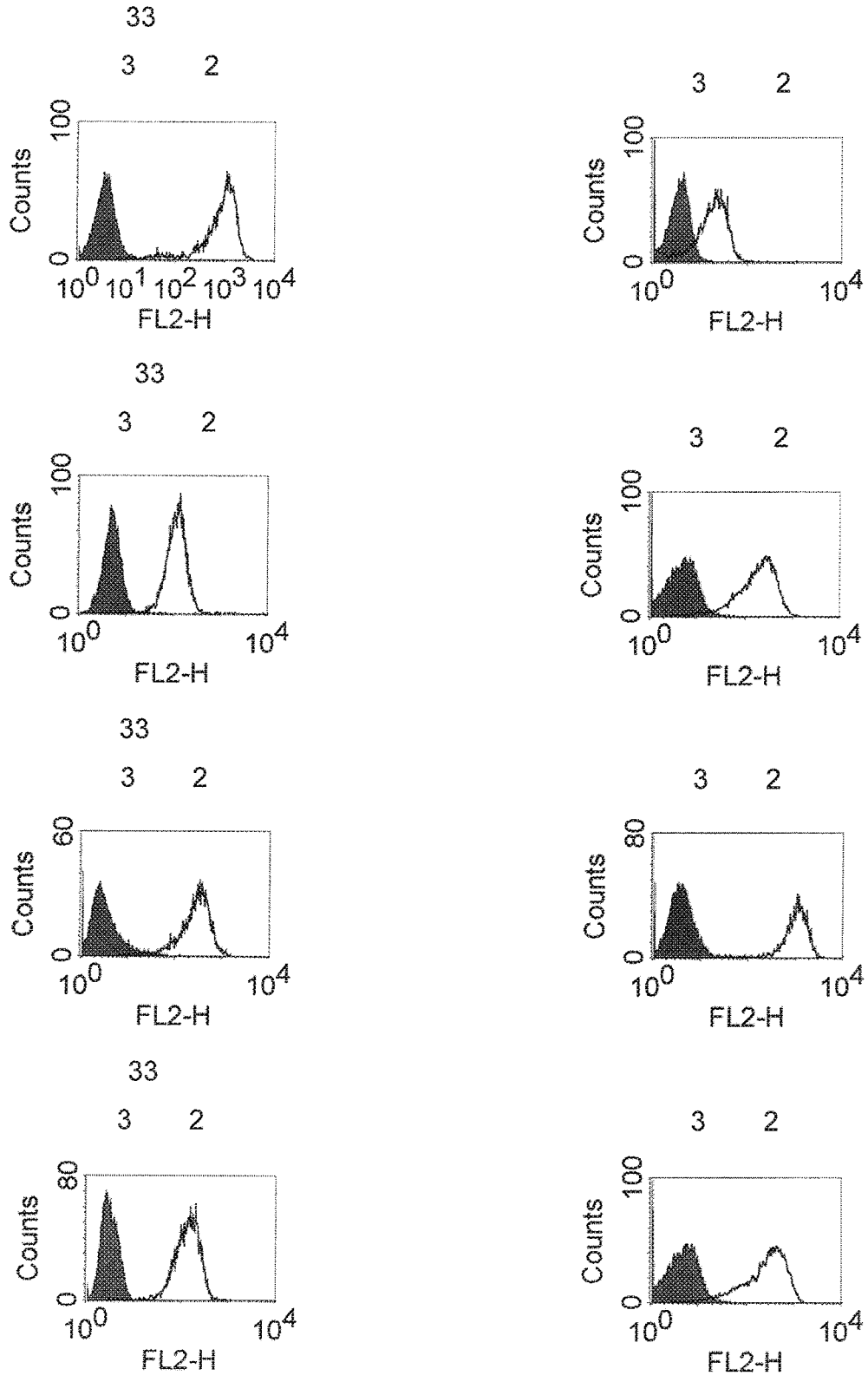

33
3 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3 2
Counts
100
0
10^0 10^4
FL2-H
33
3 2
Counts
100
0
10^0 10^4
FL2-H
3 2
Counts
100
0
10^0 10^4
FL2-H
33
3 2
Counts
60
0
10^0 10^4
FL2-H
3 2
Counts
80
0
10^0 10^4
FL2-H
33
3 2
Counts
80
0
10^0 10^4
FL2-H
3 2
Counts
100
0
10^0 10^4
FL2-H

Figure 29(3)

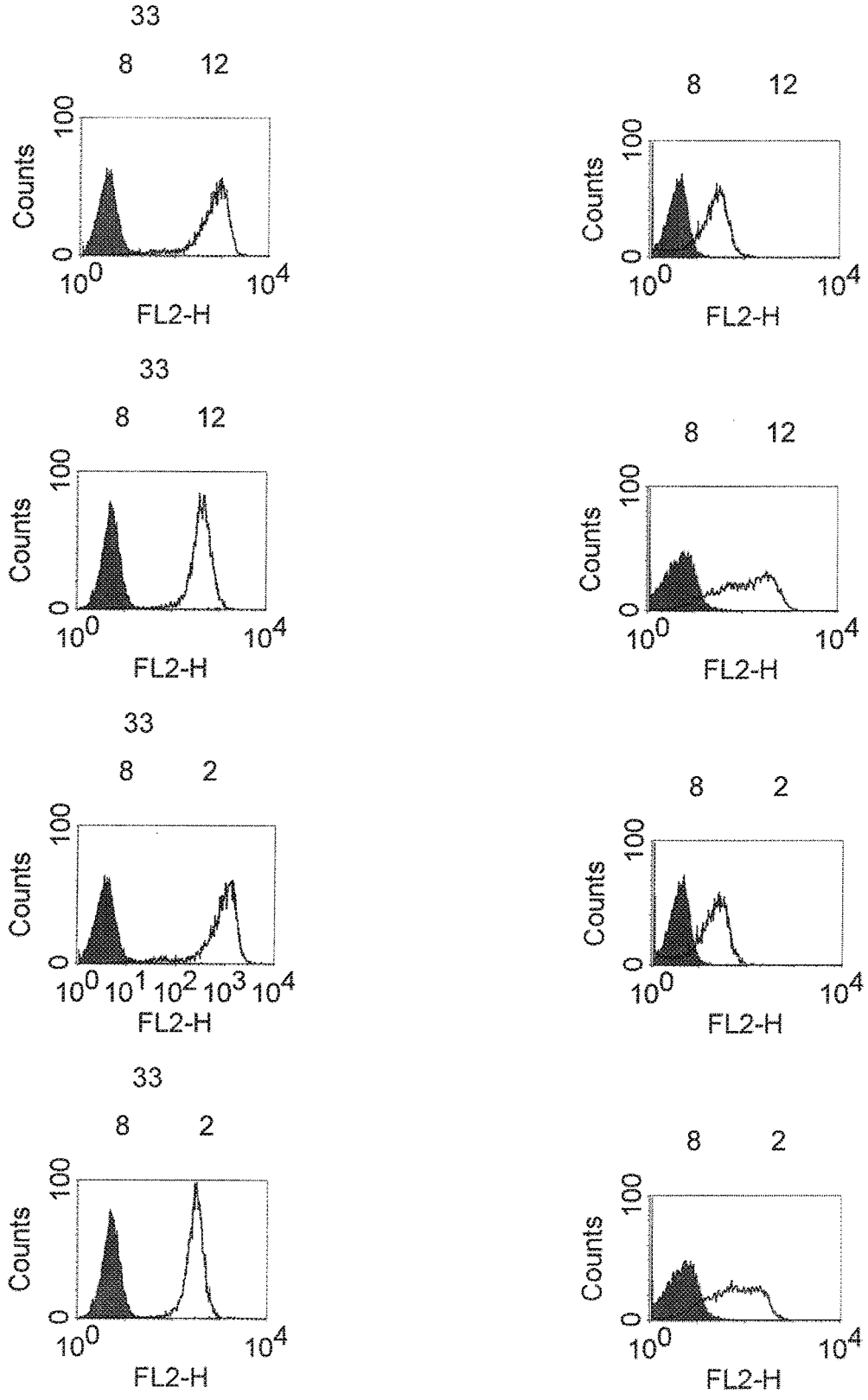

33
8
12
Counts
100
0
10^0
10^4
FL2-H
33
8
12
Counts
100
0
10^0
10^4
FL2-H
8
12
Counts
100
0
10^0
10^4
FL2-H
8
12
Counts
100
0
10^0
10^4
FL2-H
33
8
2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
33
8
2
Counts
100
0
10^0
10^4
FL2-H
8
2
Counts
100
0
10^0
10^4
FL2-H
8
2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(4)

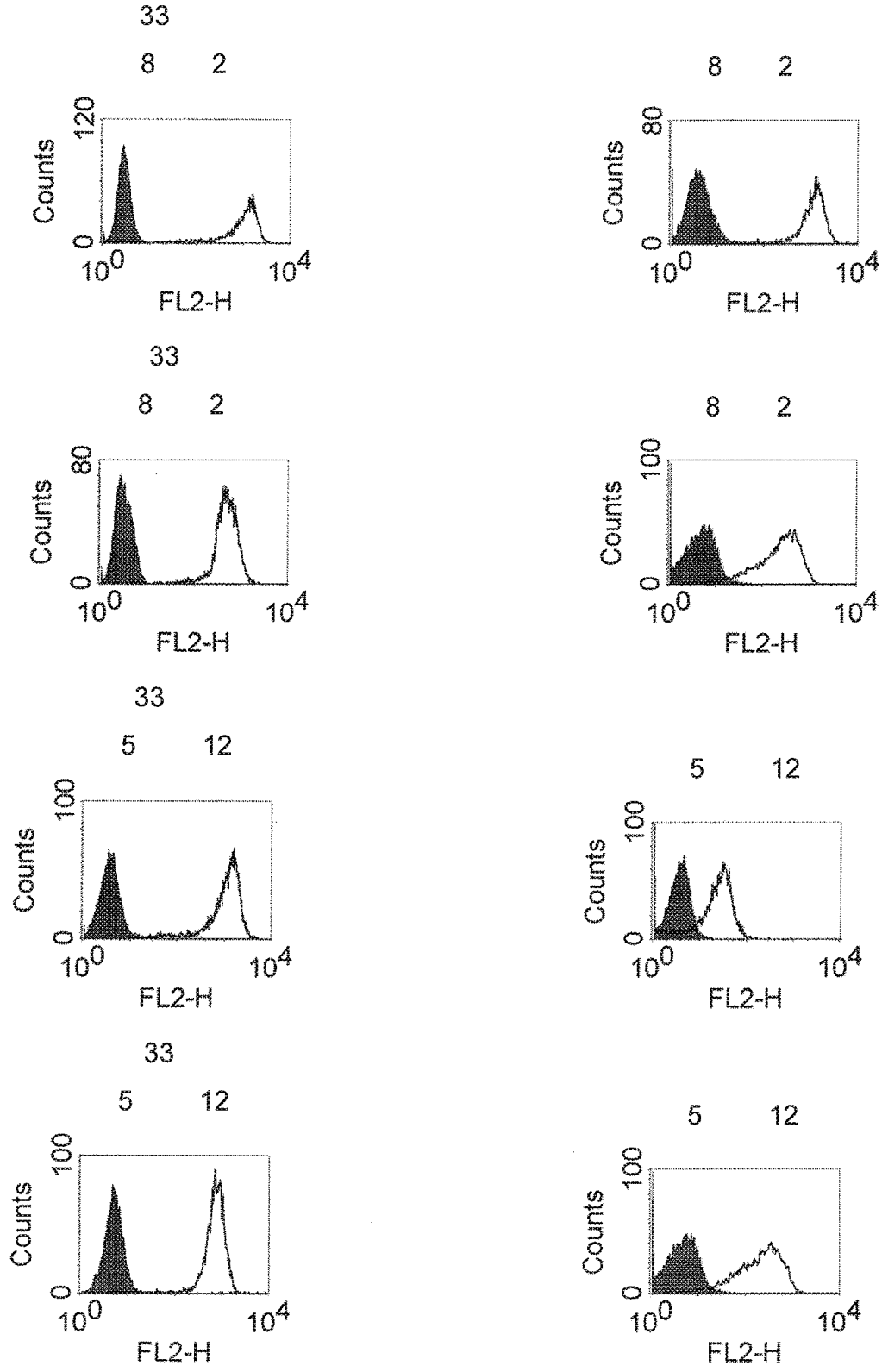

33
8 2
Counts
120
0
10^0
10^4
FL2-H
8 2
Counts
80
0
10^0
10^4
FL2-H
33
8 2
Counts
80
0
10^0
10^4
FL2-H
8 2
Counts
100
0
10^0
10^4
FL2-H
33
5 12
Counts
100
0
10^0
10^4
FL2-H
5 12
Counts
100
0
10^0
10^4
FL2-H
33
5 12
Counts
100
0
10^0
10^4
FL2-H
5 12
Counts
100
0
10^0
10^4
FL2-H

Figure 29(5)

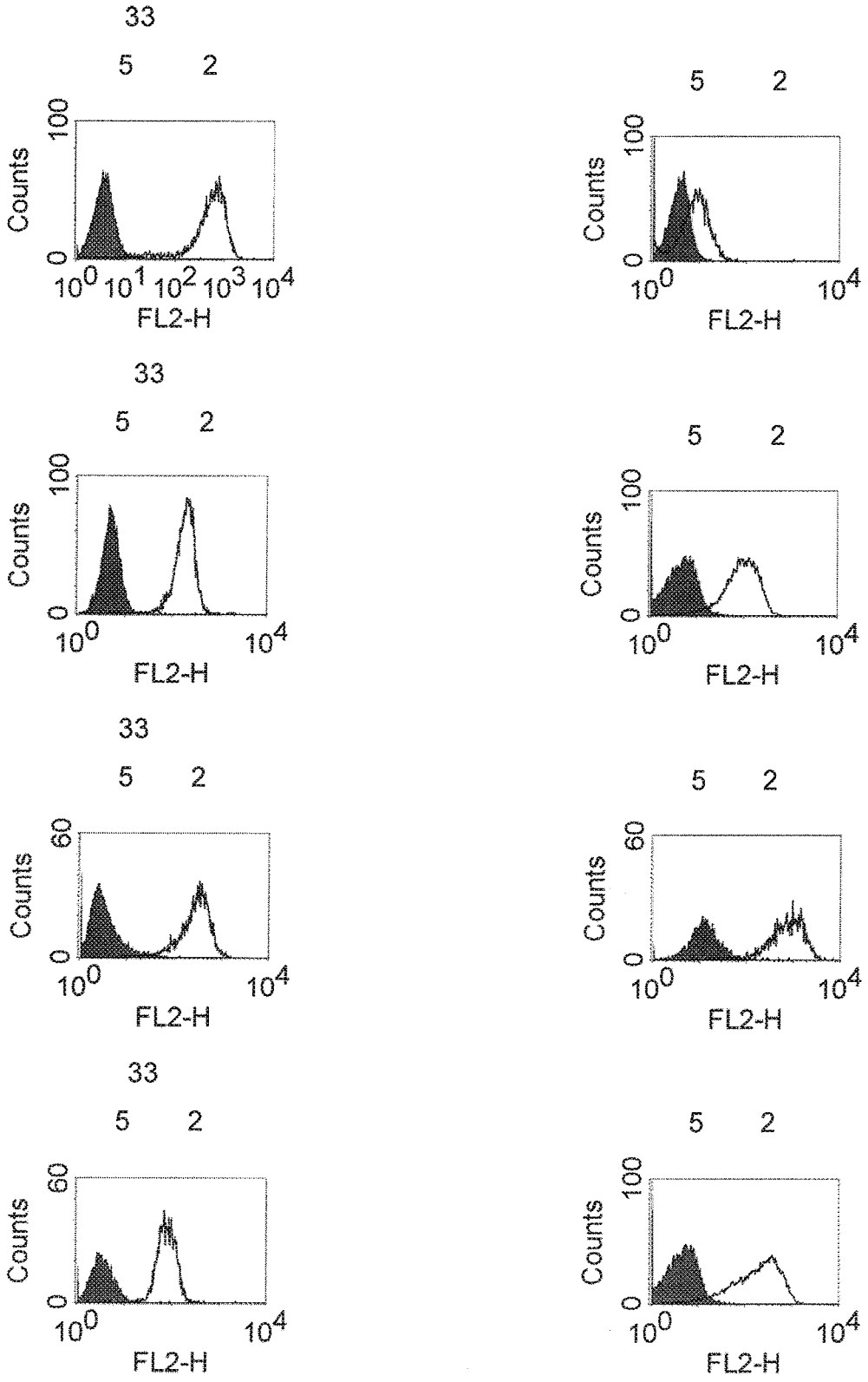

33
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
5 2
Counts
100
0
10^0 10^4
FL2-H
33
5 2
Counts
100
0
10^0 10^4
FL2-H
5 2
Counts
100
0
10^0 10^4
FL2-H
33
5 2
Counts
60
0
10^0 10^4
FL2-H
5 2
Counts
60
0
10^0 10^4
FL2-H
33
5 2
Counts
60
0
10^0 10^4
FL2-H
5 2
Counts
100
0
10^0 10^4
FL2-H

Figure 29(6)

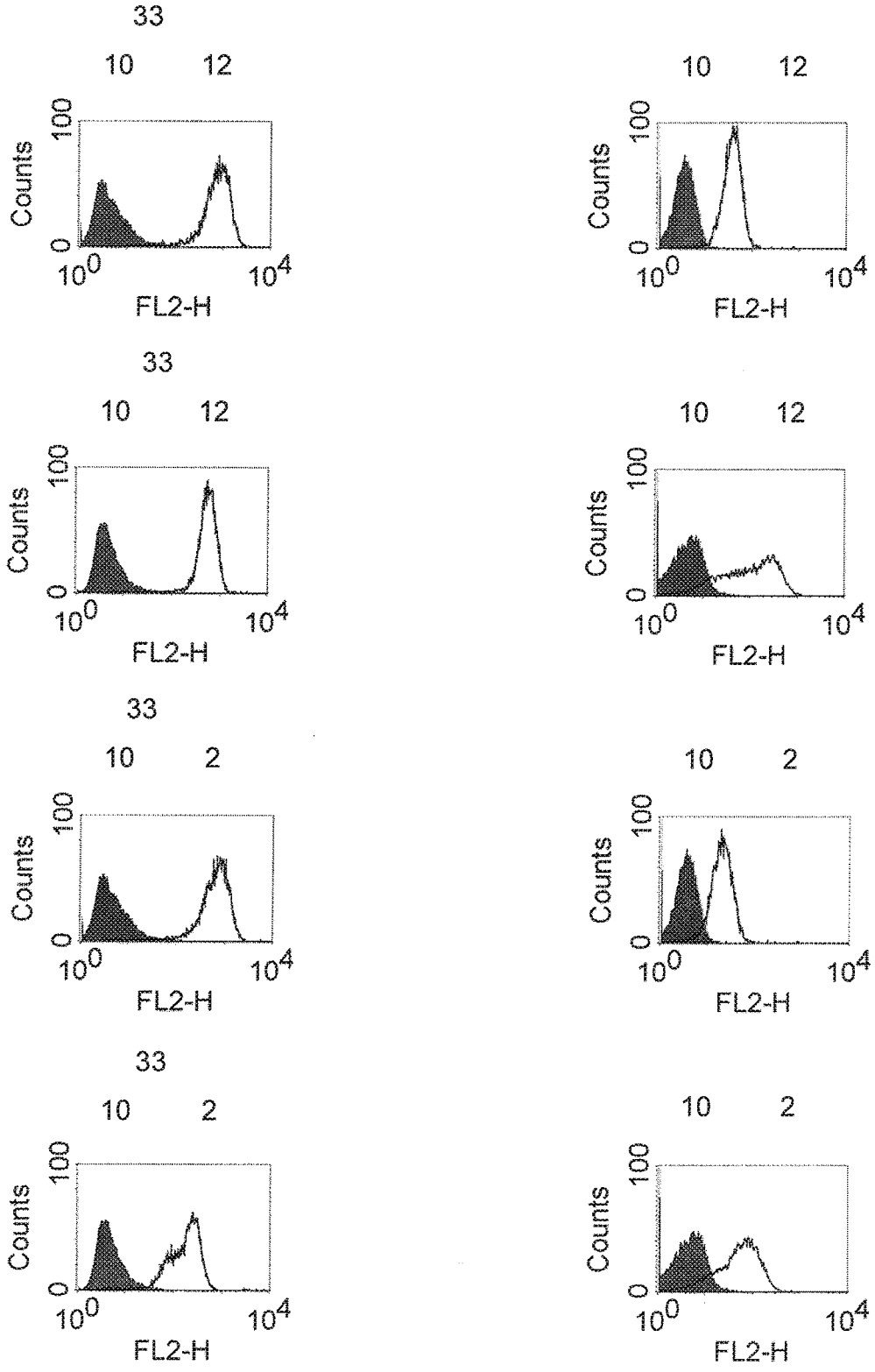

33
10
12
Counts
100
0
10^0
10^4
FL2-H
33
10
12
Counts
100
0
10^0
10^4
FL2-H
33
10
2
Counts
100
0
10^0
10^4
FL2-H
33
10
2
Counts
100
0
10^0
10^4
FL2-H
10
12
Counts
100
0
10^0
10^4
FL2-H
10
12
Counts
100
0
10^0
10^4
FL2-H
10
2
Counts
100
0
10^0
10^4
FL2-H
10
2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(7)

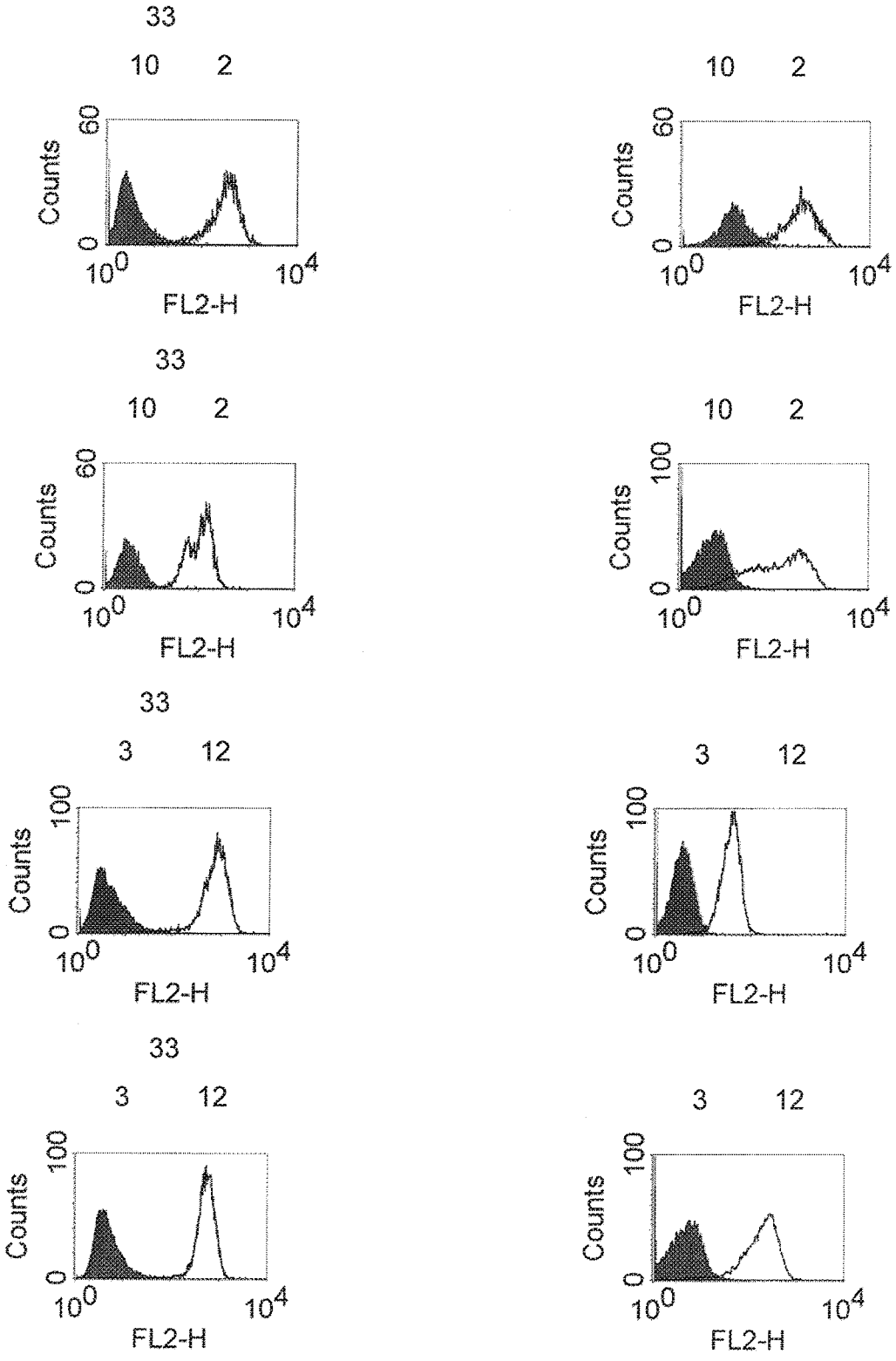

33
10 2
Counts
60
0
10^0
10^4
FL2-H
10 2
Counts
60
0
10^0
10^4
FL2-H
33
10 2
Counts
60
0
10^0
10^4
FL2-H
10 2
Counts
100
0
10^0
10^4
FL2-H
33
3 12
Counts
100
0
10^0
10^4
FL2-H
3 12
Counts
100
0
10^0
10^4
FL2-H
33
3 12
Counts
100
0
10^0
10^4
FL2-H
3 12
Counts
100
0
10^0
10^4
FL2-H

Figure 29(8)

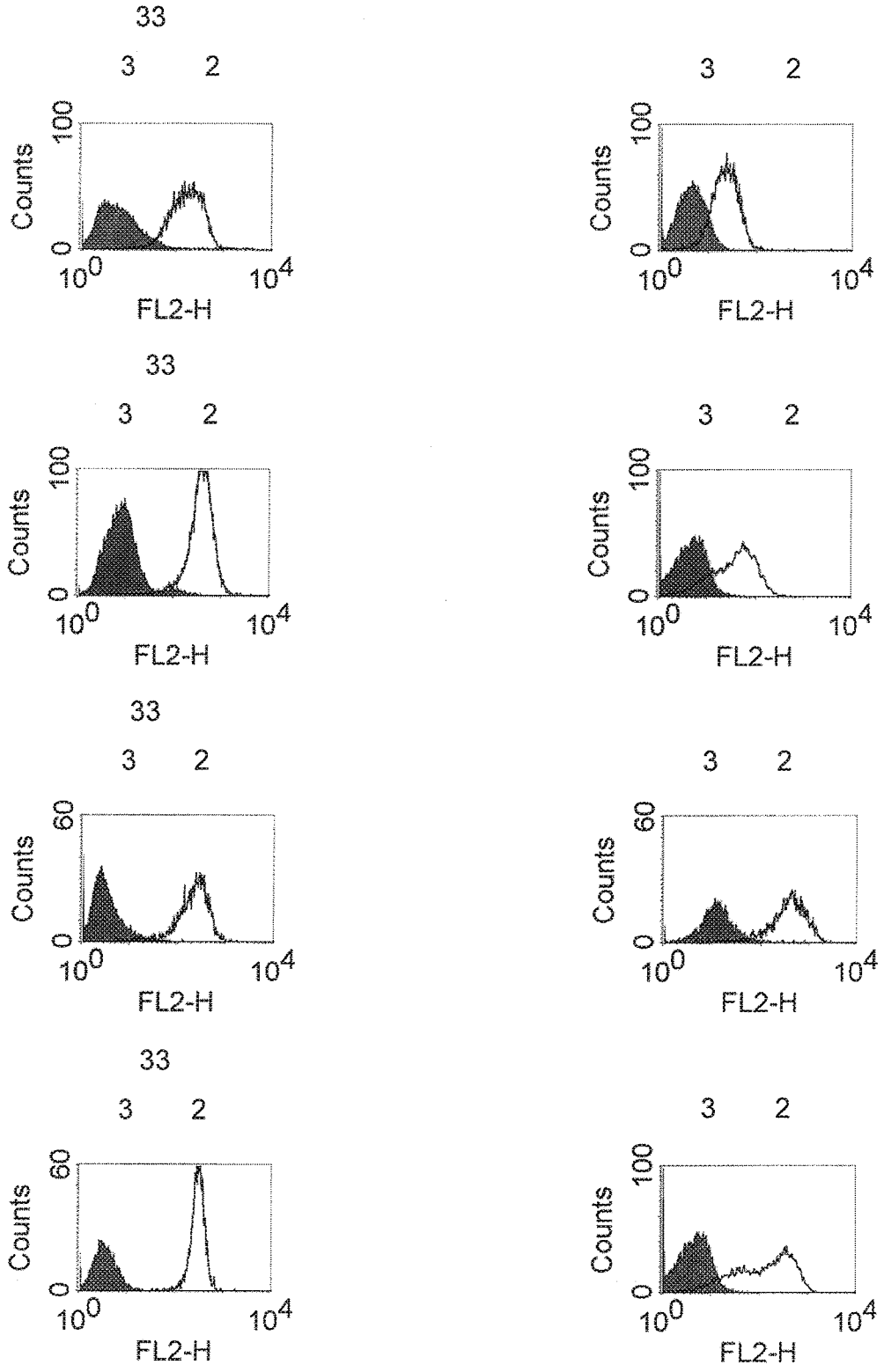

33
3 2
Counts
100
0
10^0
10^4
FL2-H
33
3 2
Counts
100
0
10^0
10^4
FL2-H
33
3 2
Counts
60
0
10^0
10^4
FL2-H
33
3 2
Counts
60
0
10^0
10^4
FL2-H
3 2
Counts
100
0
10^0
10^4
FL2-H
3 2
Counts
100
0
10^0
10^4
FL2-H
3 2
Counts
60
0
10^0
10^4
FL2-H
3 2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(9)

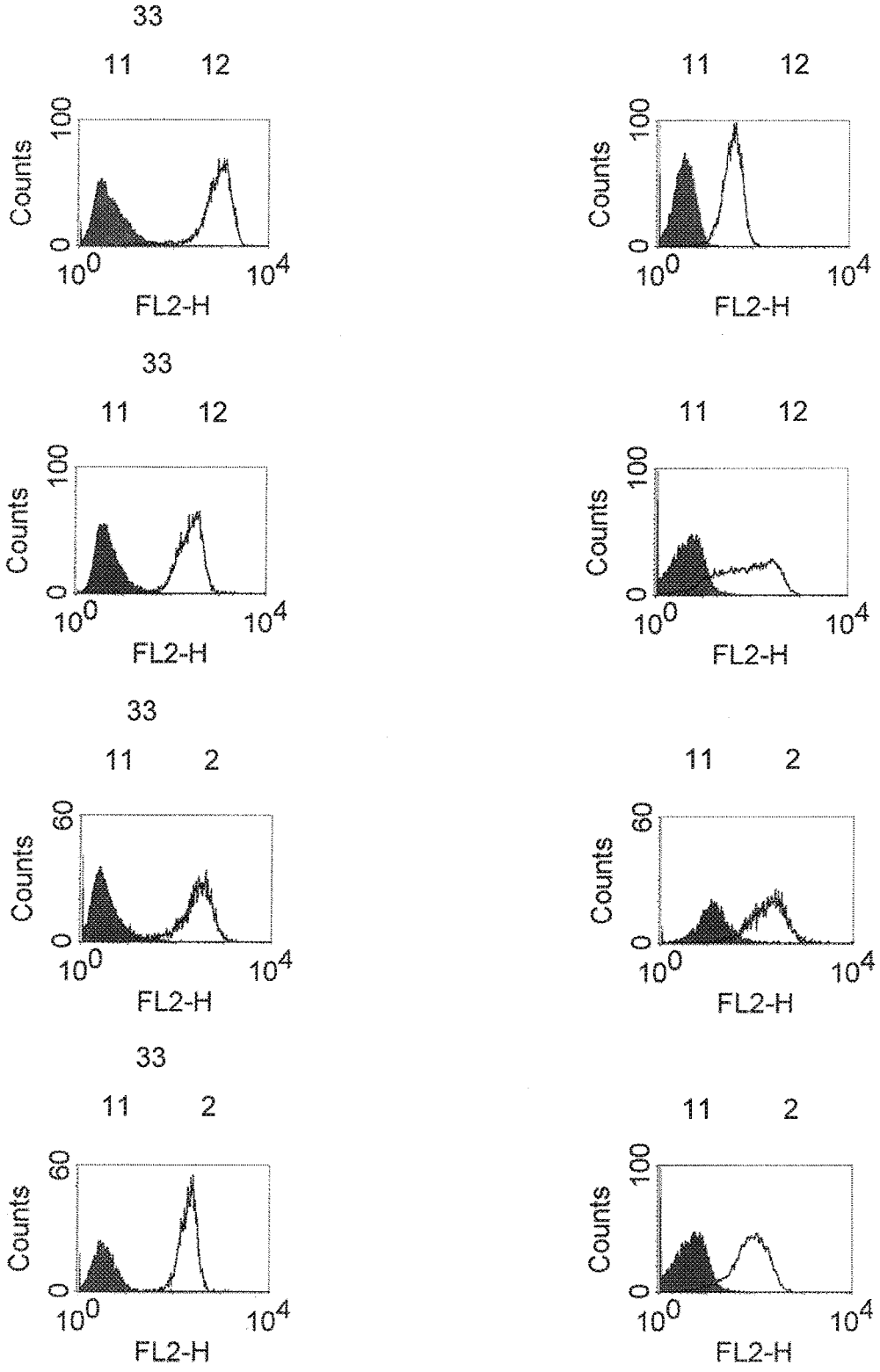

33
11
12
Counts
100
0
10^0
10^4
FL2-H
33
11
12
Counts
100
0
10^0
10^4
FL2-H
33
11
2
Counts
60
0
10^0
10^4
FL2-H
33
11
2
Counts
60
0
10^0
10^4
FL2-H
11
12
Counts
100
0
10^0
10^4
FL2-H
11
12
Counts
100
0
10^0
10^4
FL2-H
11
2
Counts
60
0
10^0
10^4
FL2-H
11
2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(10)

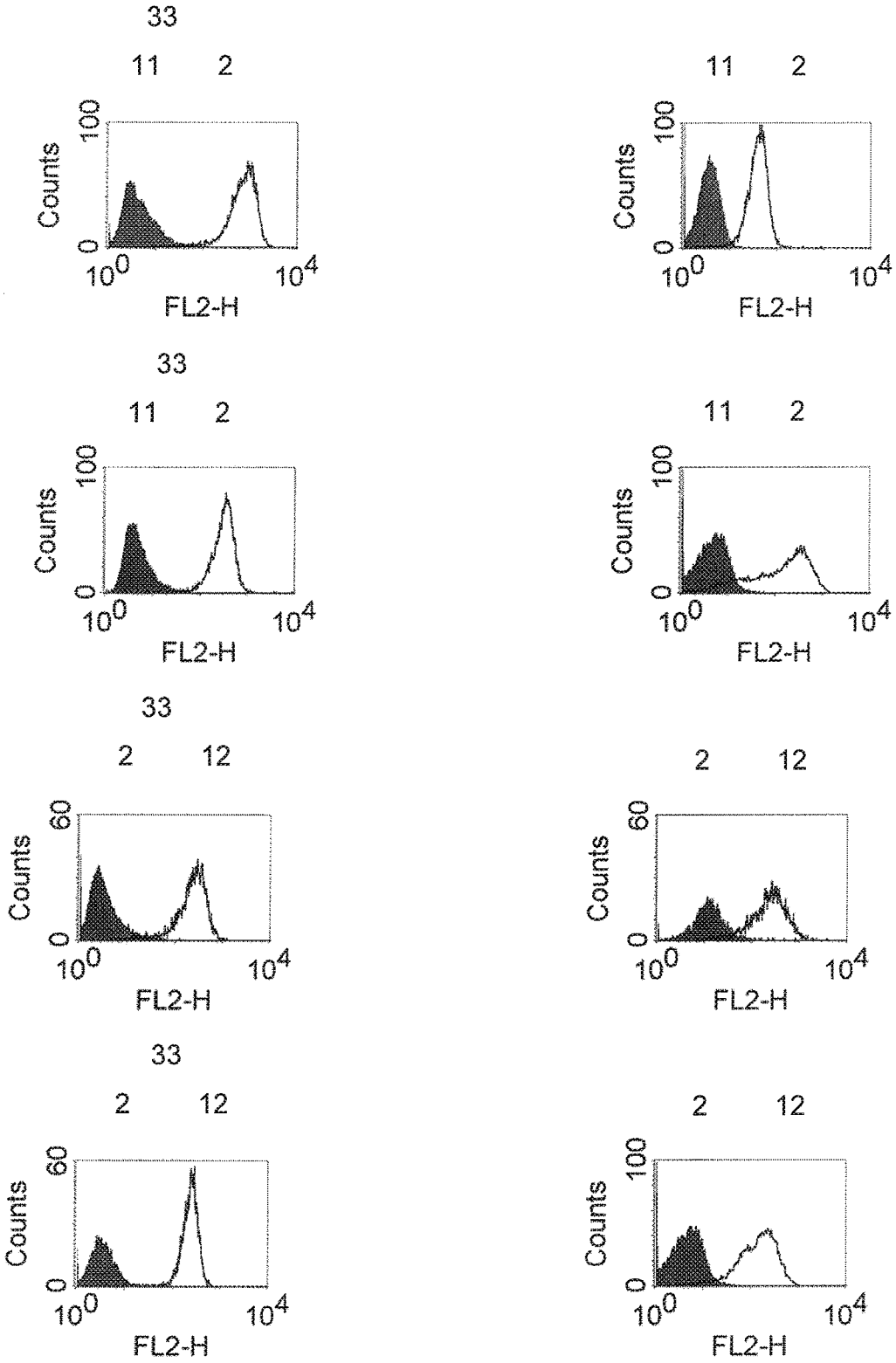

33
11
2
Counts
100
0
10^0
10^4
FL2-H
11
2
Counts
100
0
10^0
10^4
FL2-H
33
11
2
Counts
100
0
10^0
10^4
FL2-H
11
2
Counts
100
0
10^0
10^4
FL2-H
33
2
12
Counts
60
0
10^0
10^4
FL2-H
2
12
Counts
60
0
10^0
10^4
FL2-H
33
2
12
Counts
60
0
10^0
10^4
FL2-H
2
12
Counts
100
0
10^0
10^4
FL2-H

Figure 29(11)

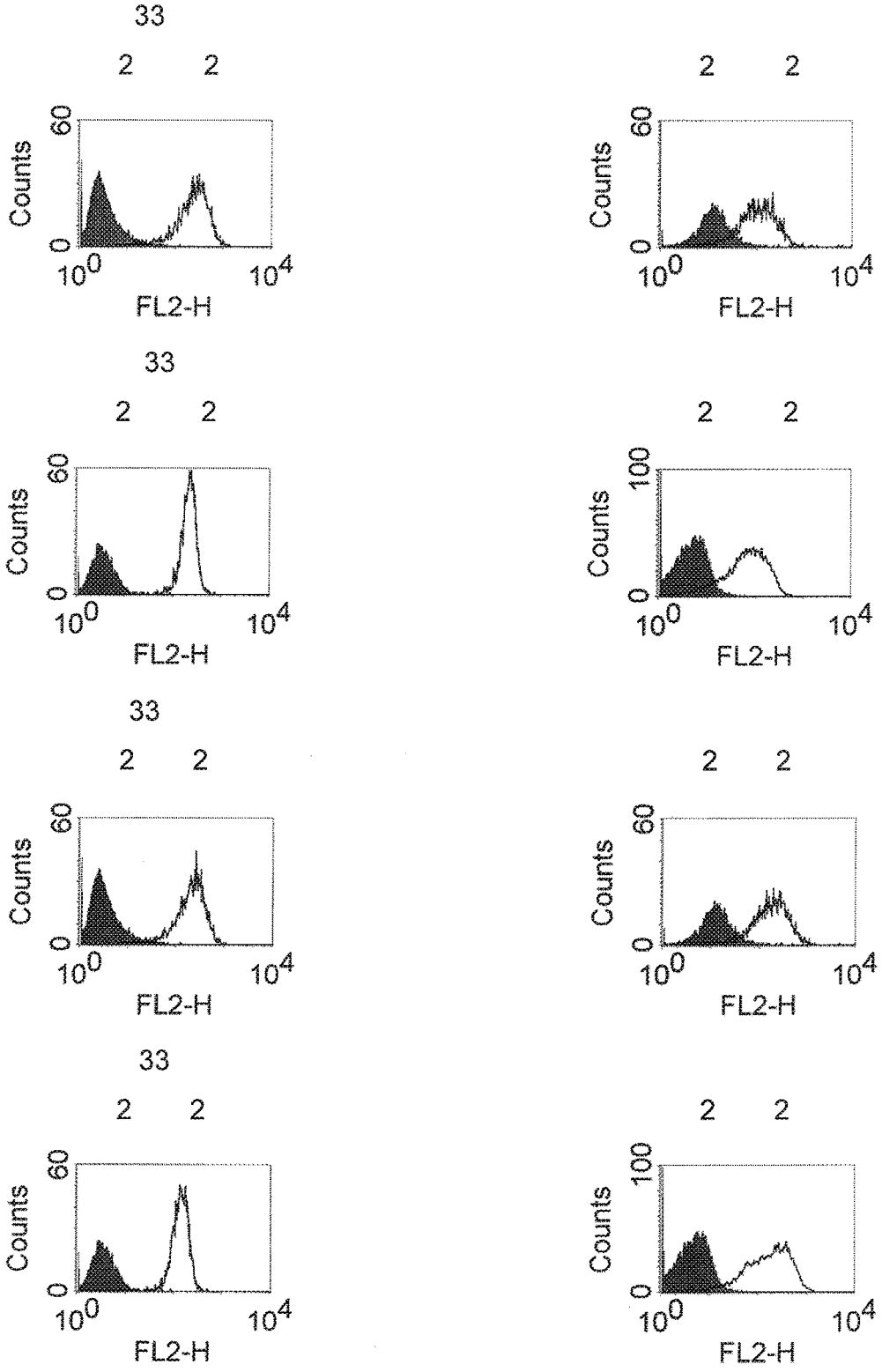
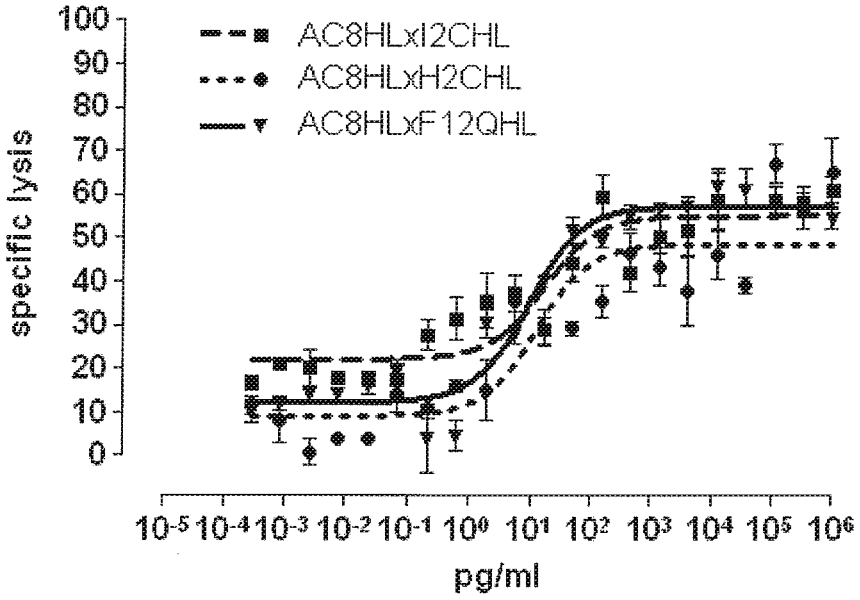

33
2 2
Counts
60
0
10^0
10^4
FL2-H
33
2 2
Counts
60
0
10^0
10^4
FL2-H
2 2
Counts
60
0
10^0
10^4
FL2-H
2 2
Counts
100
0
10^0
10^4
FL2-H
33
2 2
Counts
60
0
10^0
10^4
FL2-H
33
2 2
Counts
60
0
10^0
10^4
FL2-H
2 2
Counts
60
0
10^0
10^4
FL2-H
2 2
Counts
100
0
10^0
10^4
FL2-H

Figure 29(12)

33



4119

33

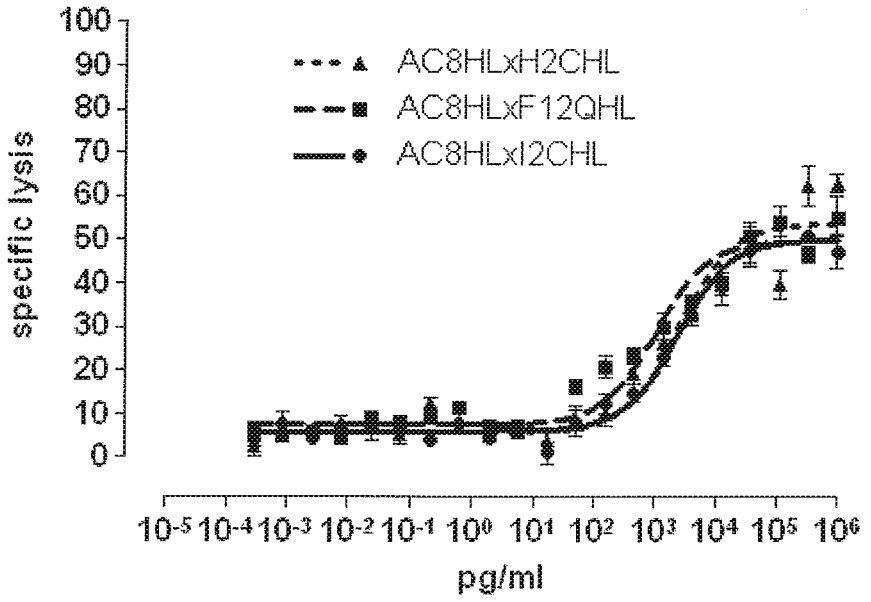
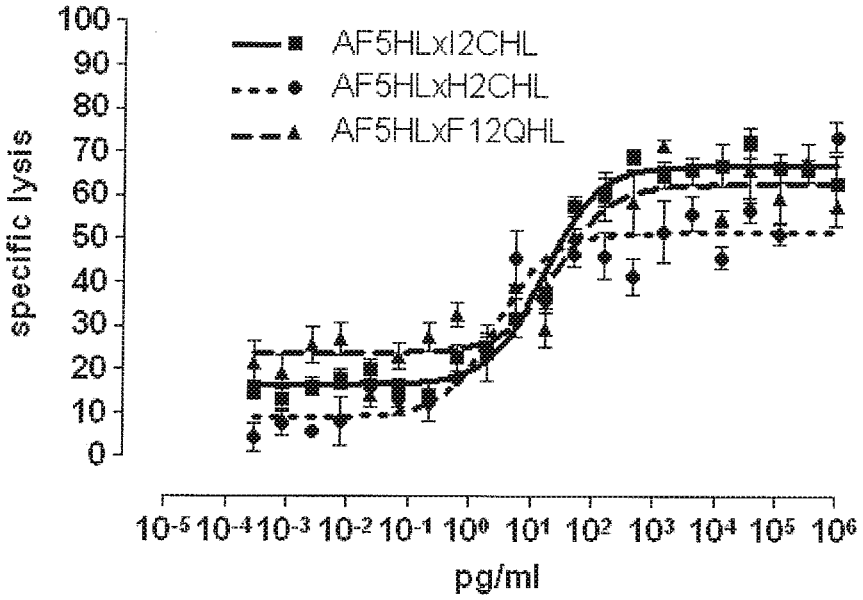


Figure 30(1)

33



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33

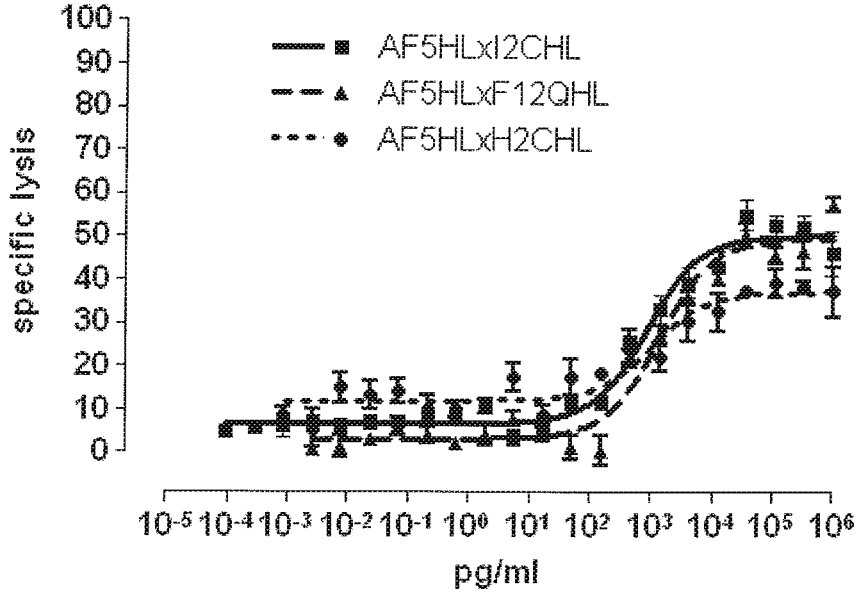
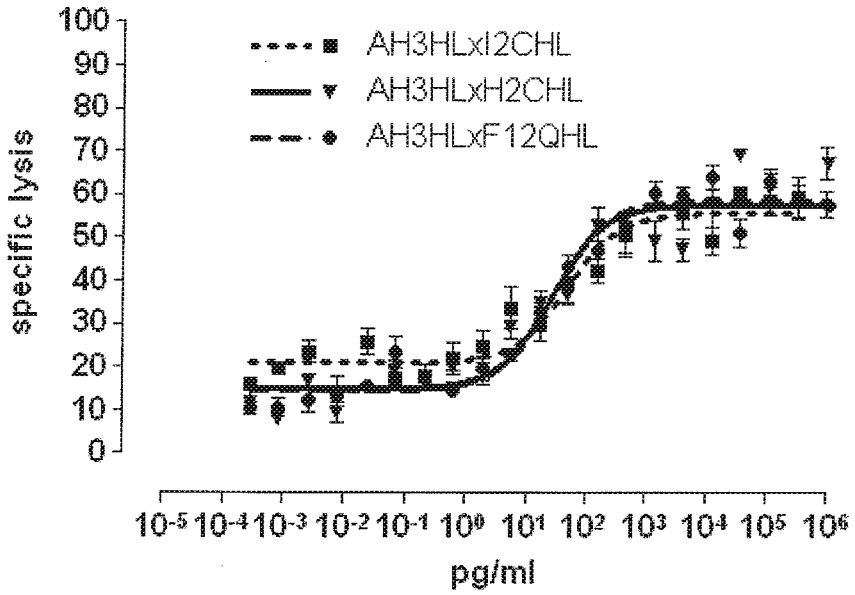


Figure 30(2)

33



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33

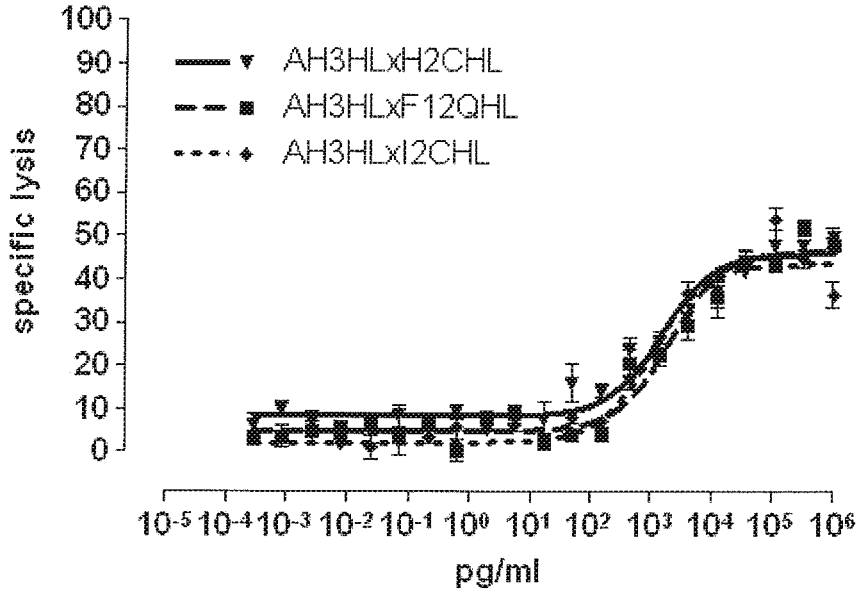
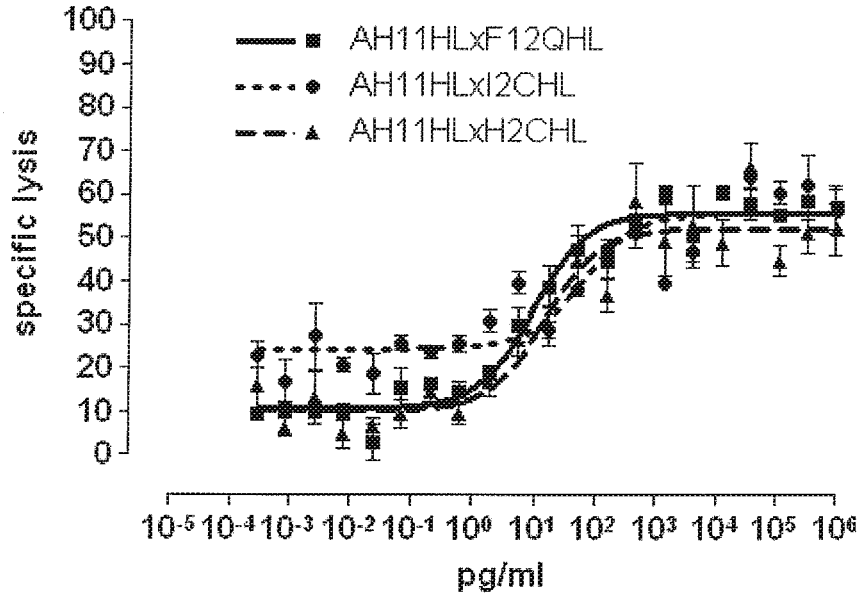


Figure 30(3)

33



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33

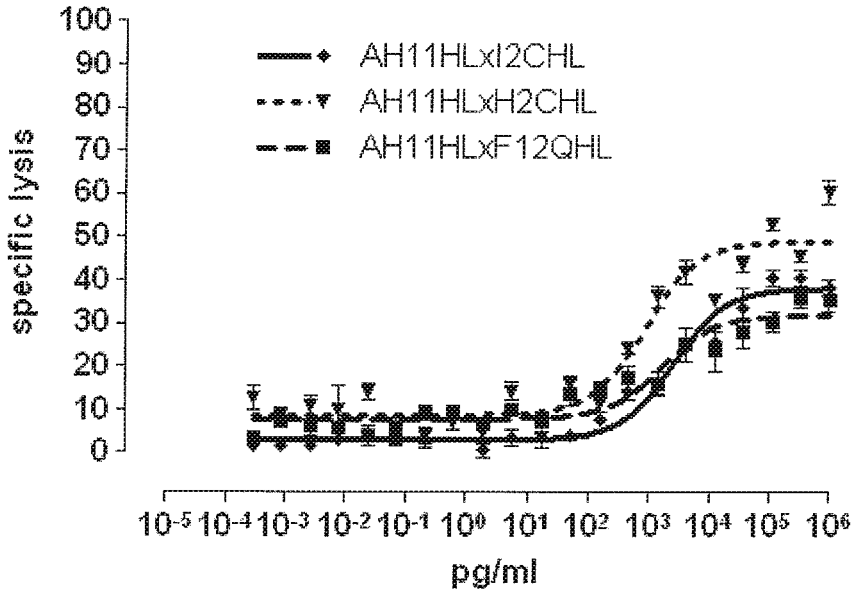
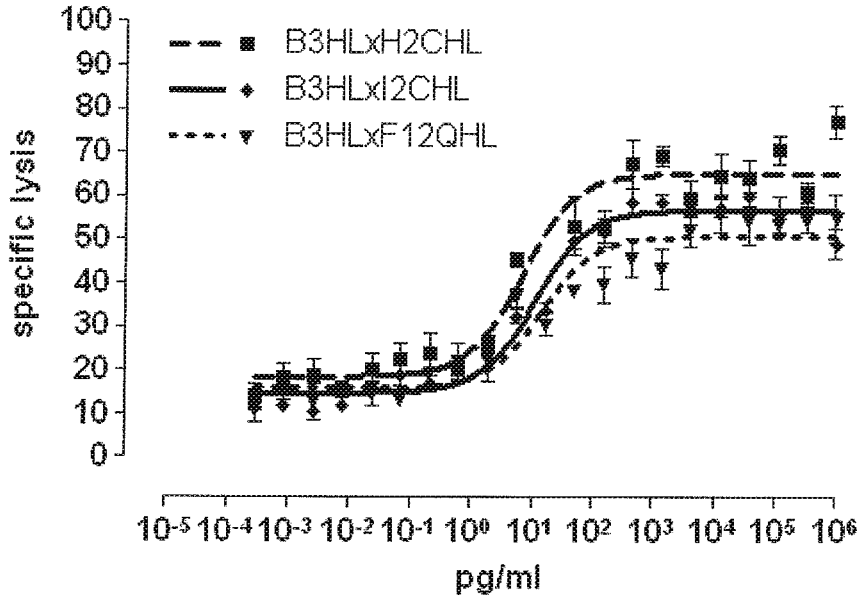


Figure 30(4)

33



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33

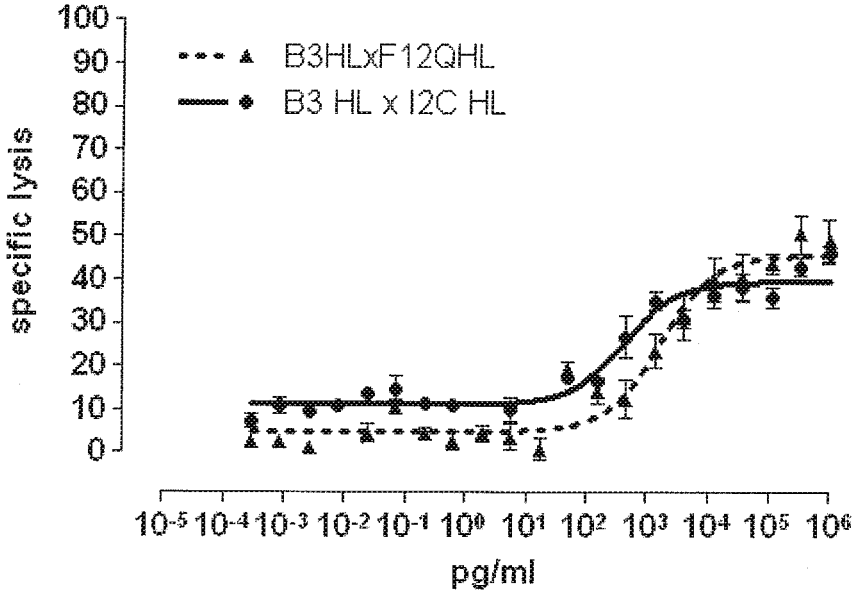
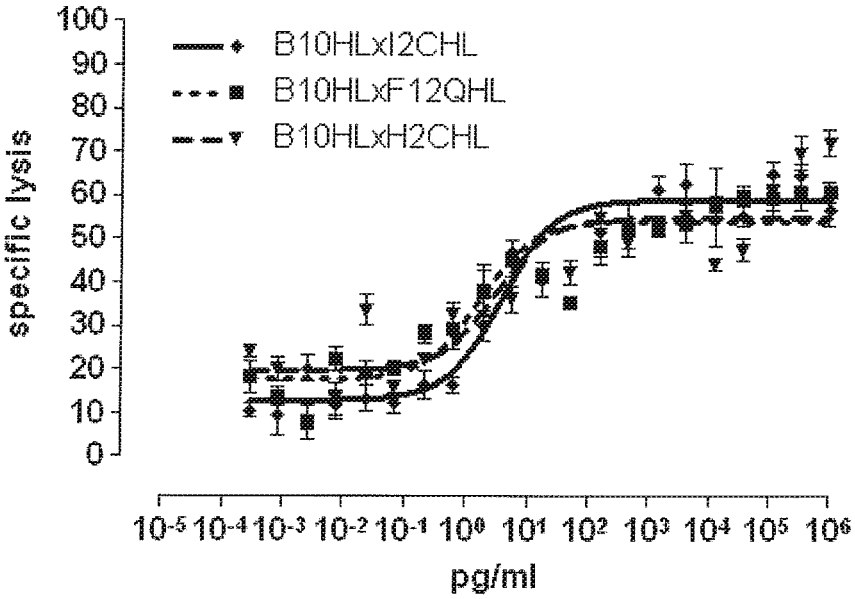


Figure 30(5)

33



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33

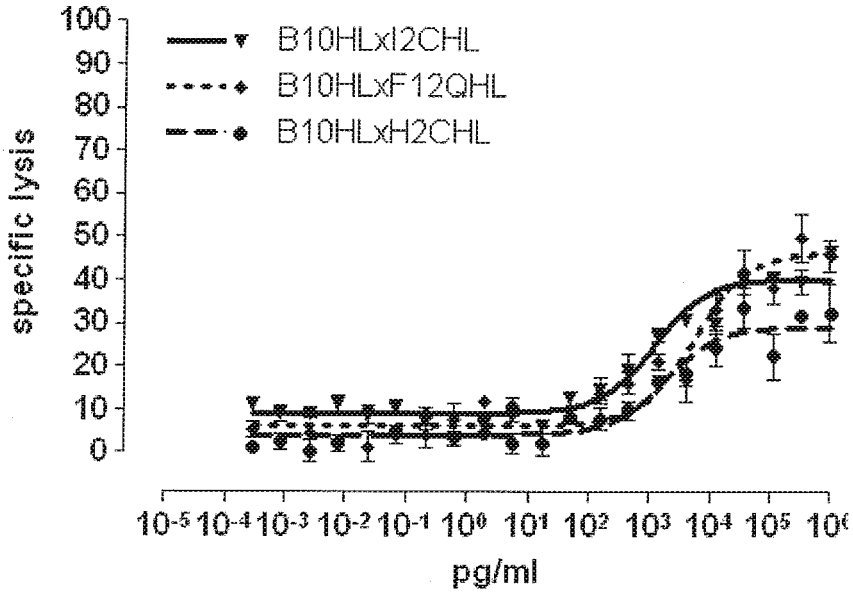
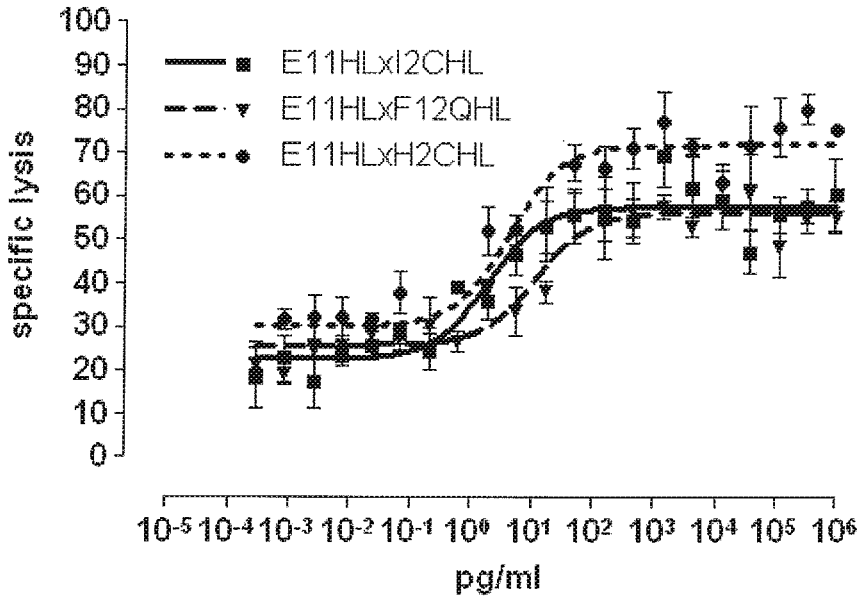


Figure 30(6)

33



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33

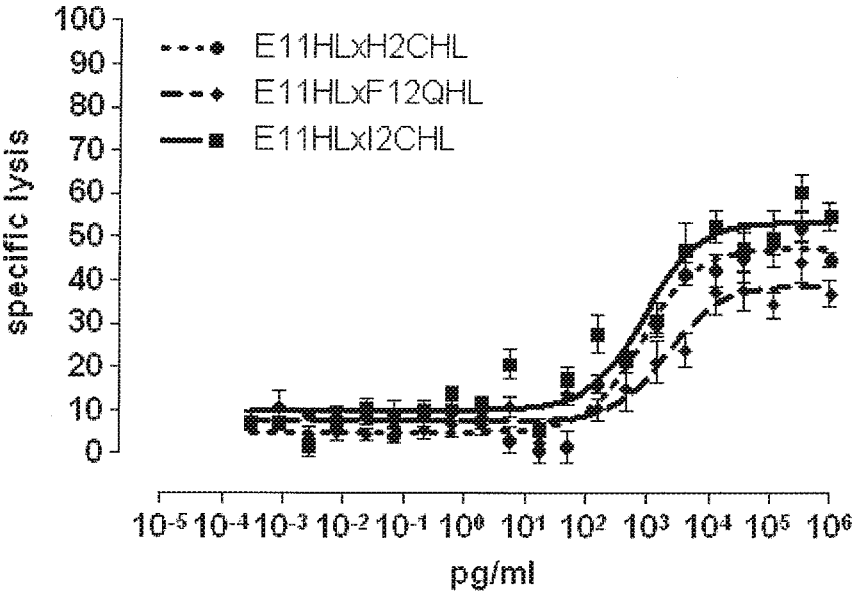
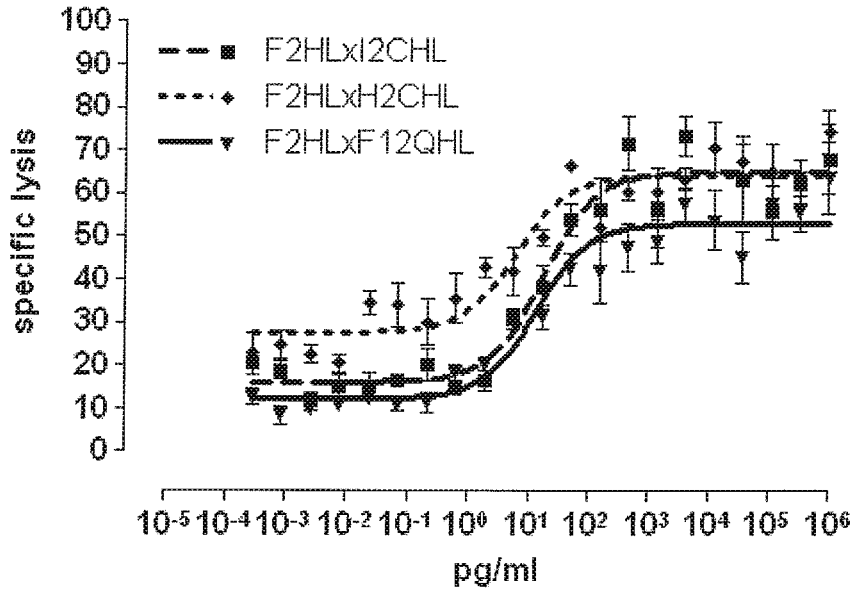


Figure 30(7)

33



4119

33

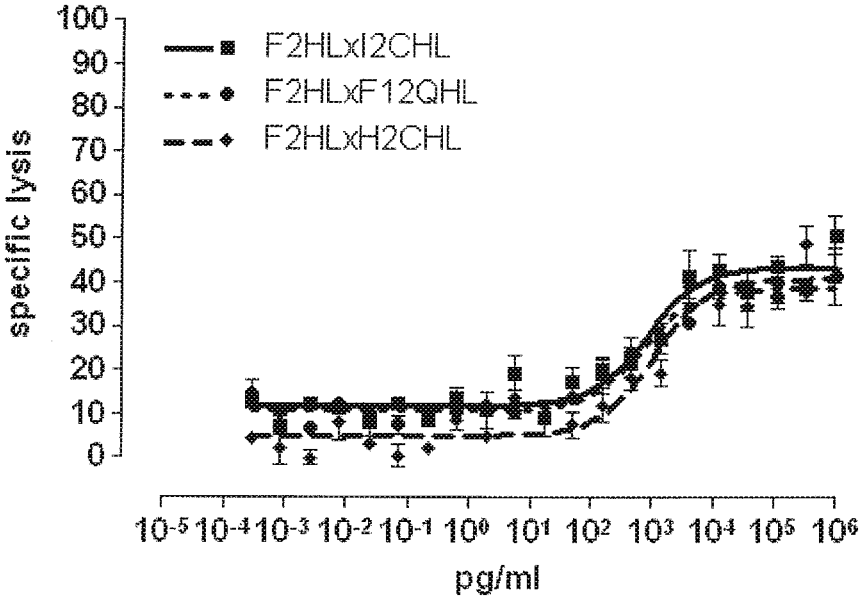


Figure 30(8)

Figure 31

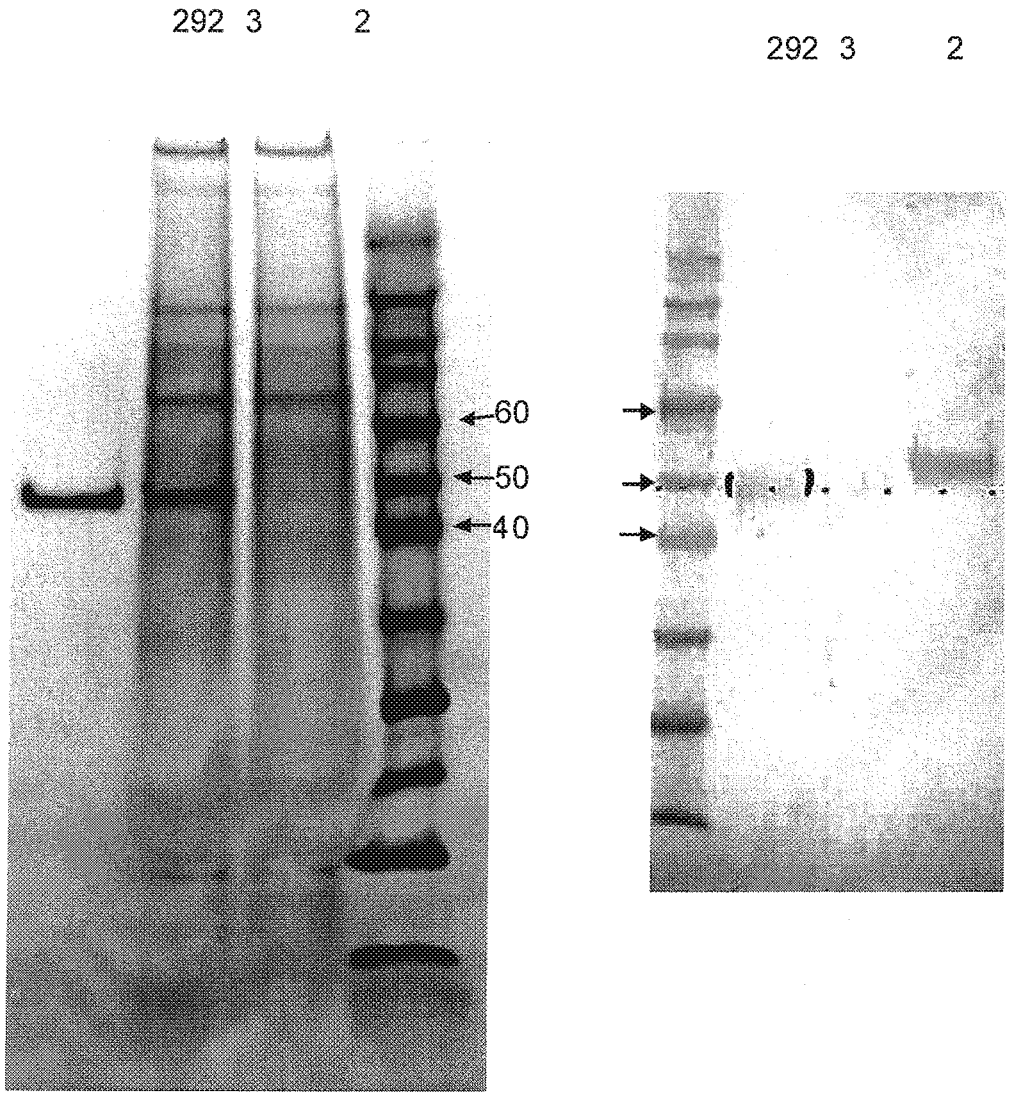


Figure 32

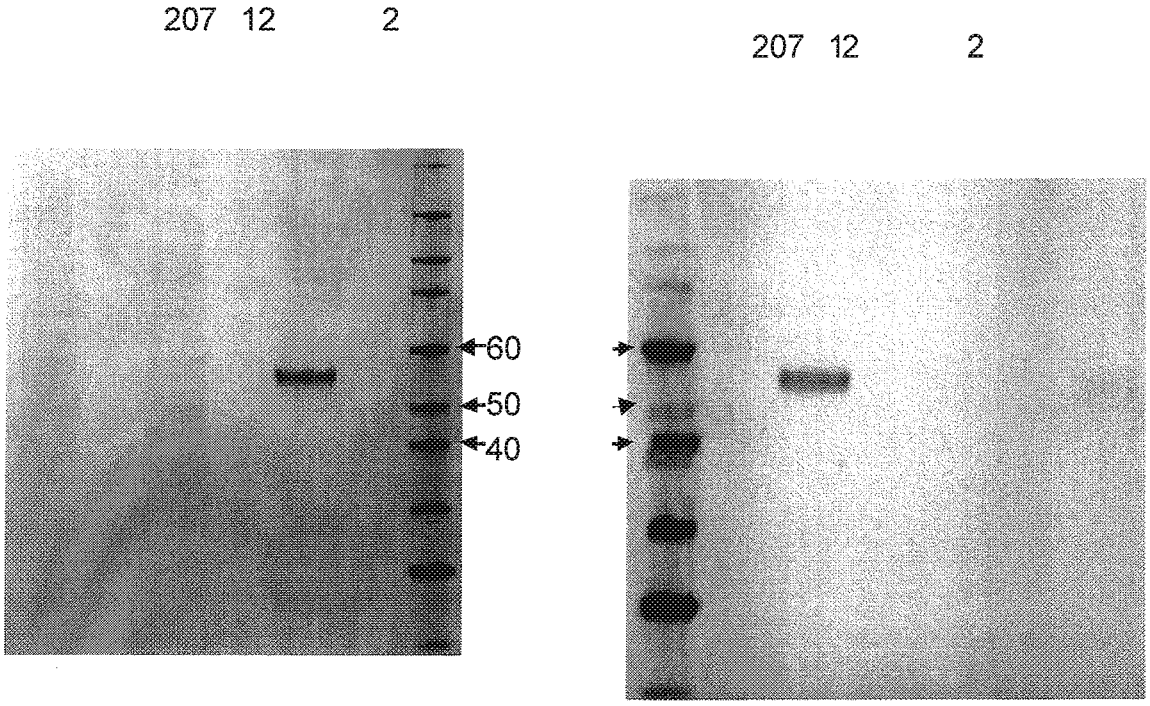


Figure 33

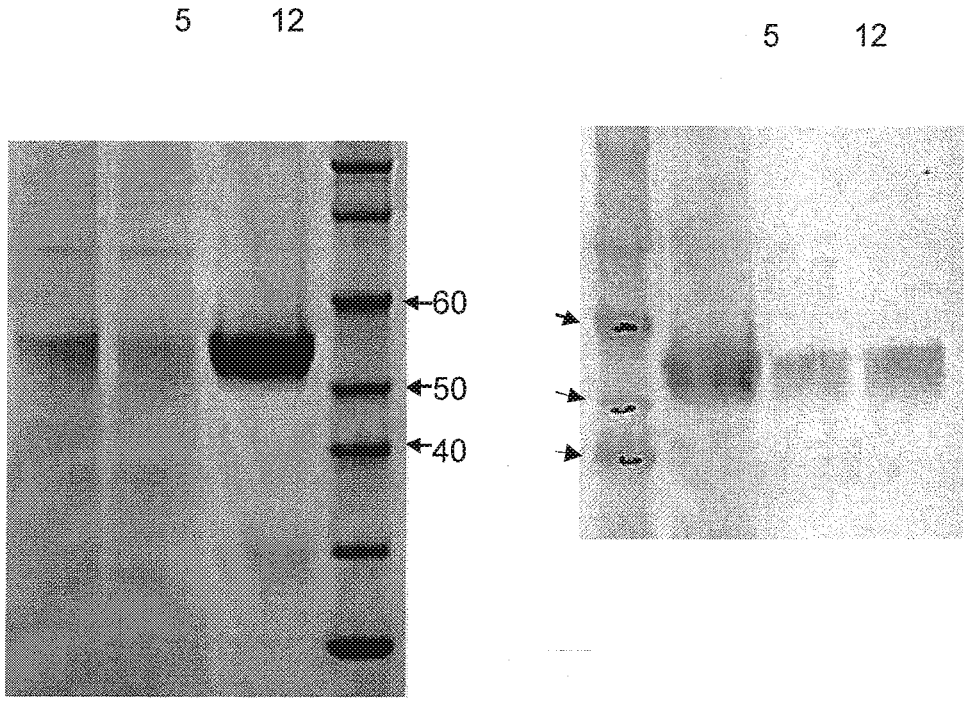
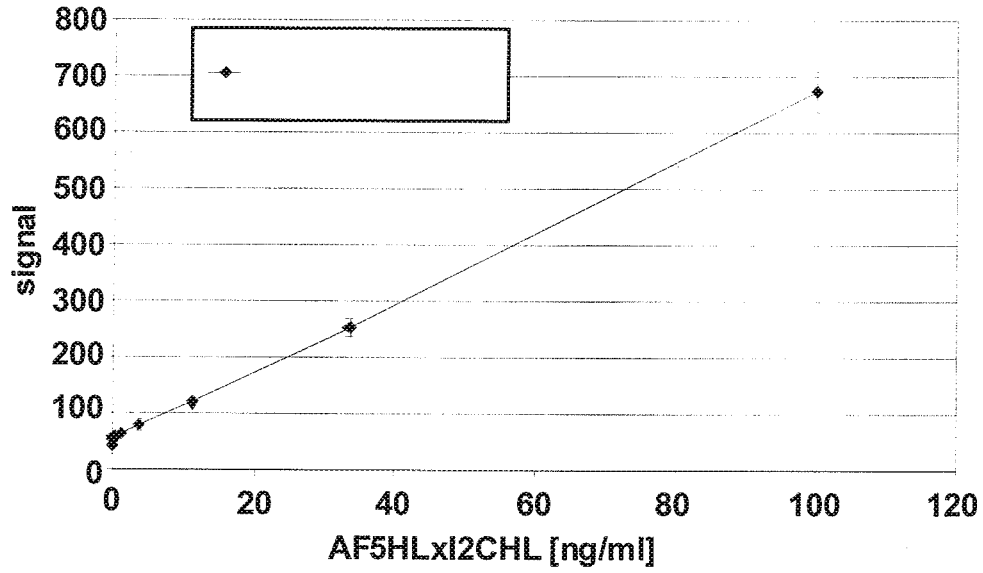


Figure 34


800
700
600
500
400
300
200
100
0
signal
0
20
40
60
80
100
120
AF5HLxI2CHL [ng/ml]

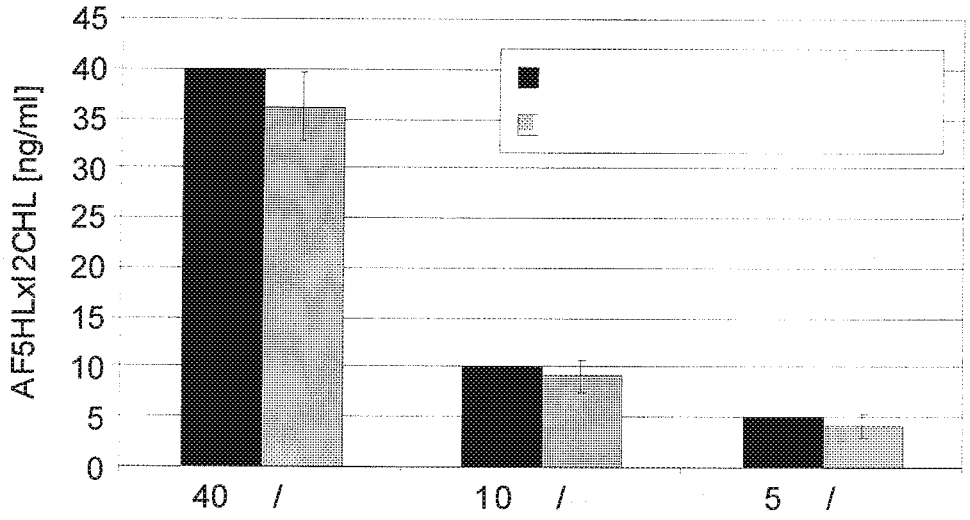
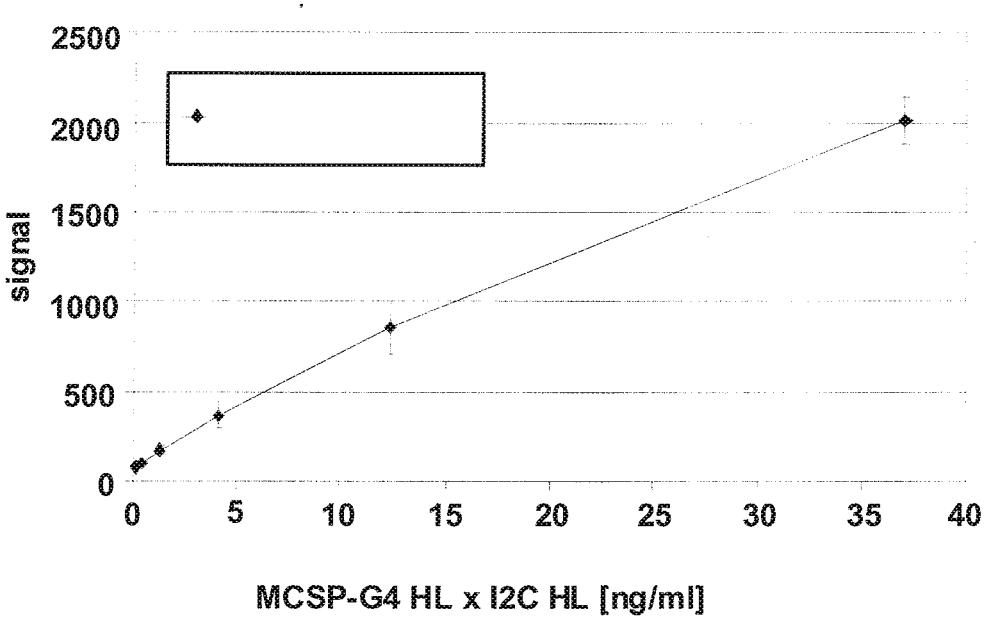

45
40
35
30
25
20
15
10
5
0
AF5HLxI2CHL [ng/ml]
40 /
10 /
5 /

Figure 35


2500
2000
1500
1000
500
0
signal
0
5
10
15
20
25
30
35
40
MCSP-G4 HL x I2C HL [ng/ml]

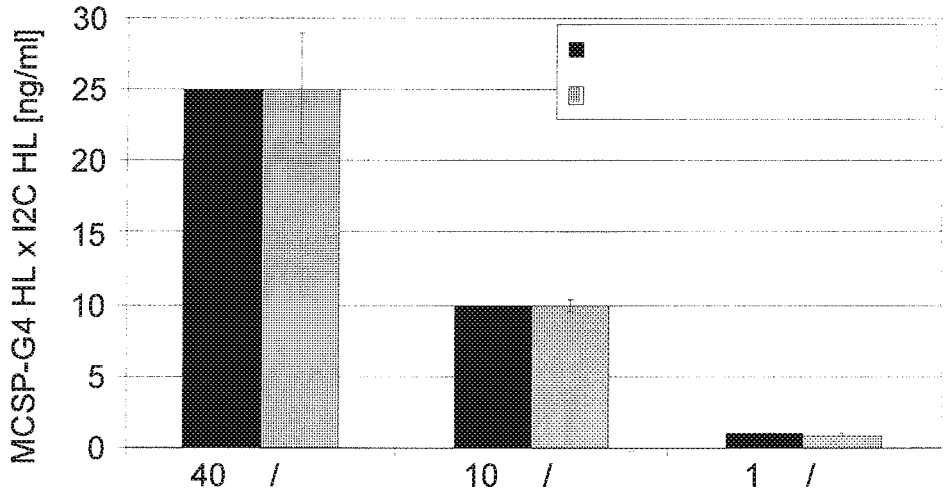

30
25
20
15
10
5
0
MCSP-G4 HL x I2C HL [ng/ml]
40 /
10 /
1 /

Figure 36

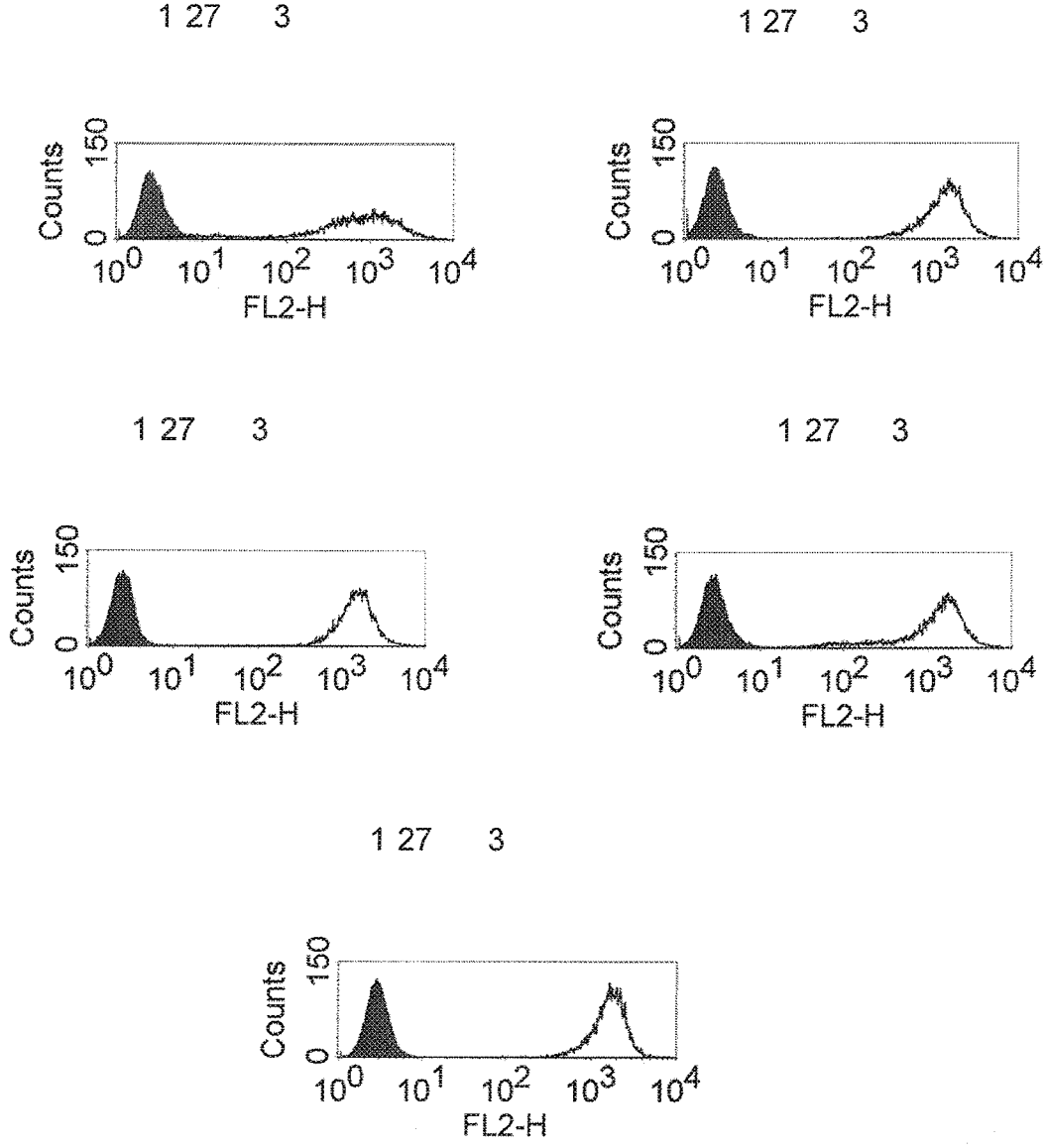

1 27 3
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 37

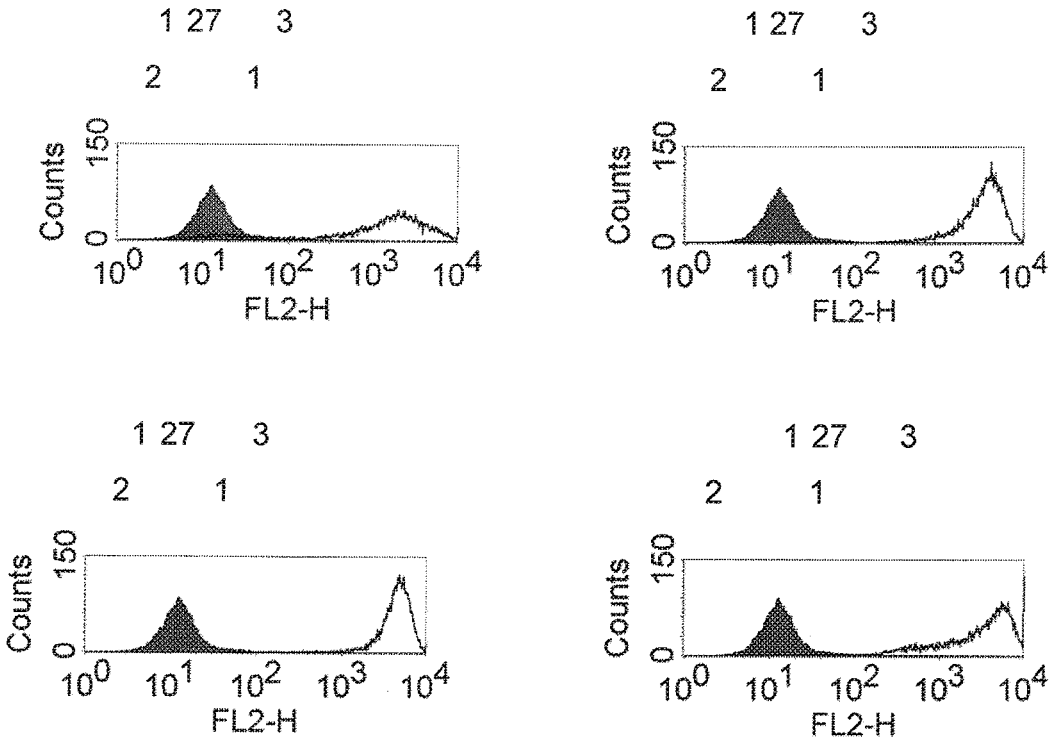
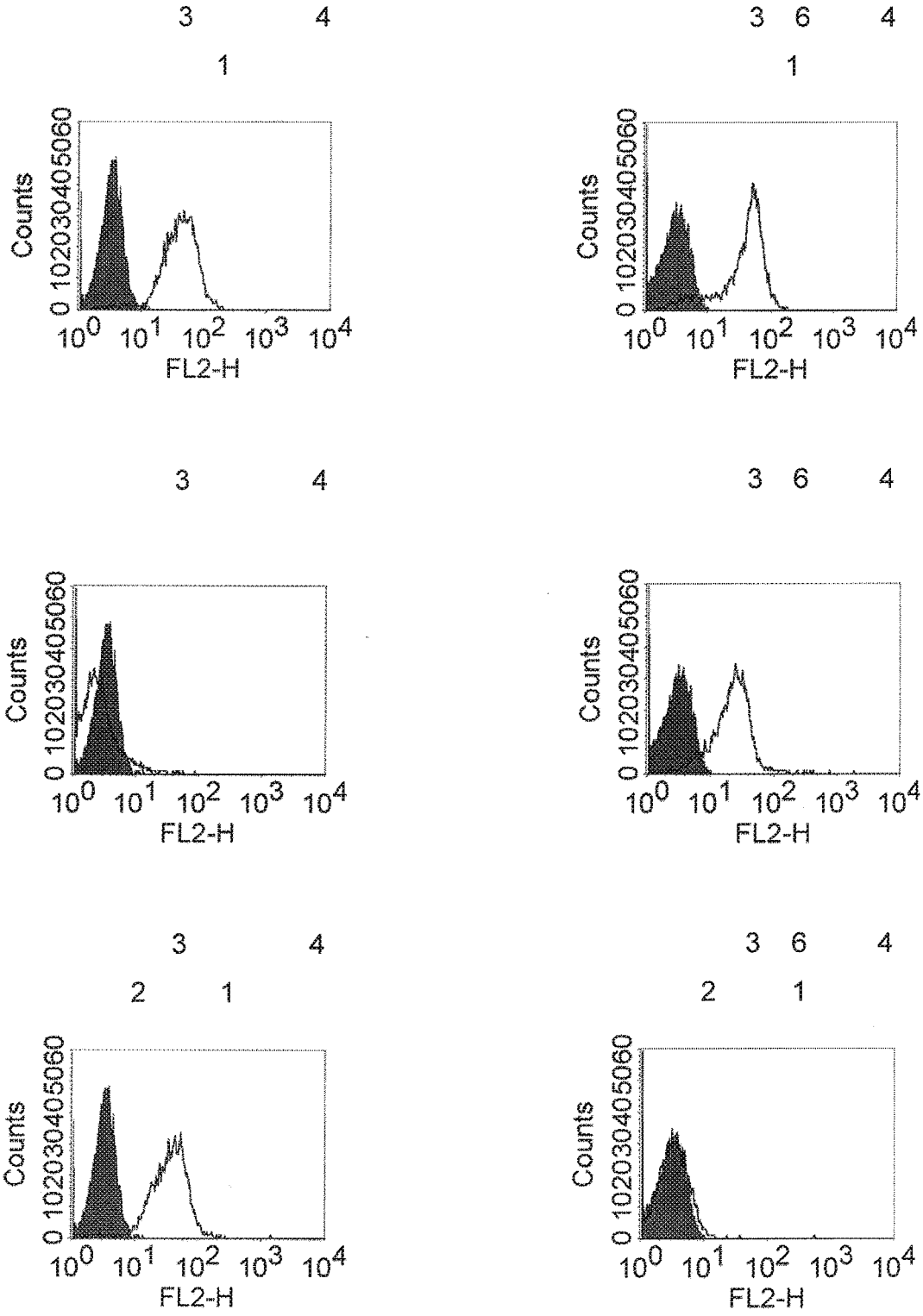

1 27 3
2 1
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
2 1
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
2 1
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 27 3
2 1
Counts
150
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 38


3
4
1
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H
3 6
4
1
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H
3
4
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H
3 6
4
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H
3
4
2
1
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H
3 6
4
2
1
Counts
0 10 20 30 40 50 60
10^0 10^1 10^2 10^3 10^4
FL2-H

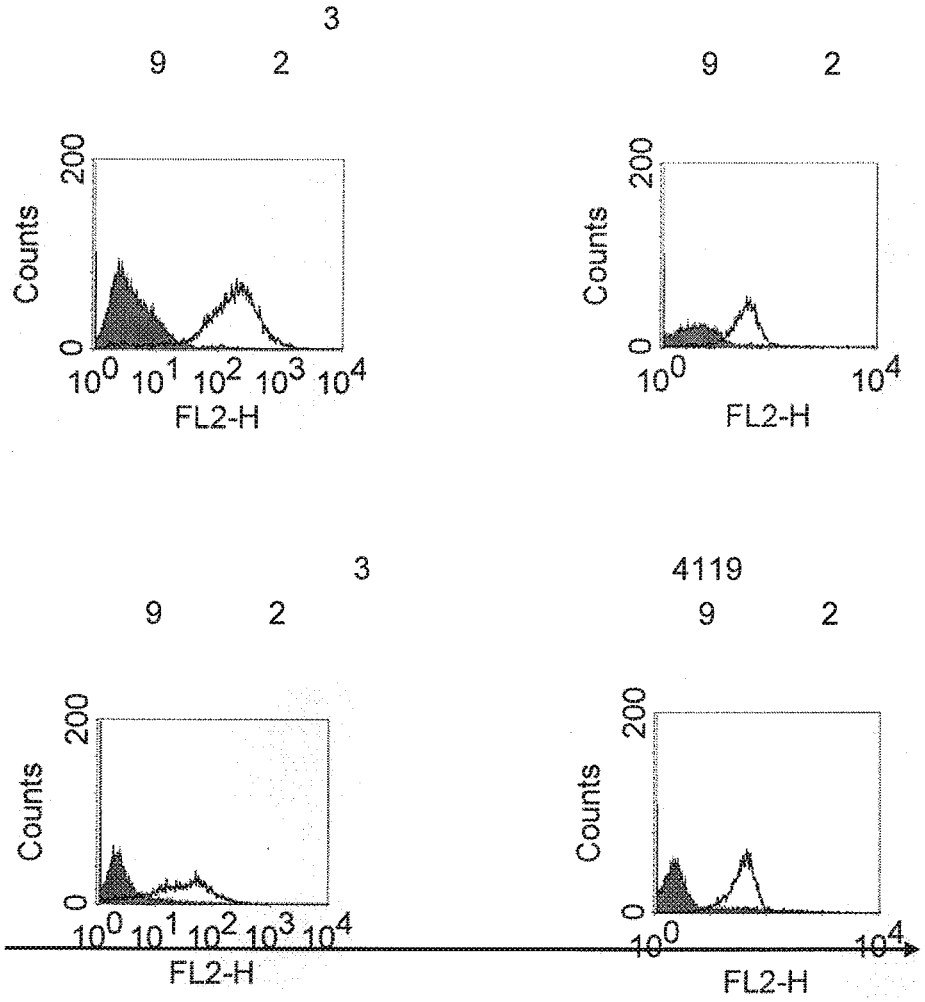

3
9 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
9 2
Counts
200
0
10^0
10^4
FL2-H
3
9 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
9 2
Counts
200
0
10^0
10^4
FL2-H

Figure 39a

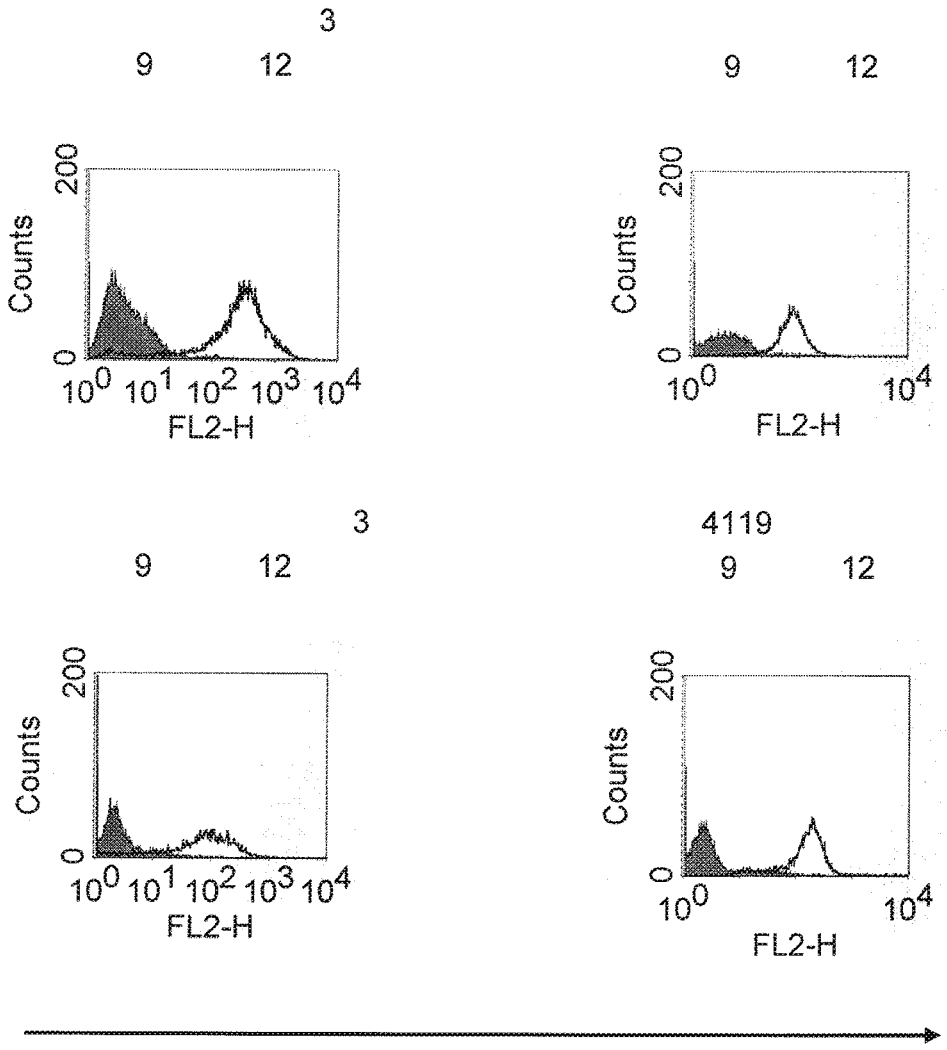

3
9
12
200
Counts
0
10^0 10^1 10^2 10^3 10^4
FL2-H
9
12
200
Counts
0
10^0
10^4
FL2-H
3
9
12
200
Counts
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
9
12
200
Counts
0
10^0
10^4
FL2-H

Figure 39b

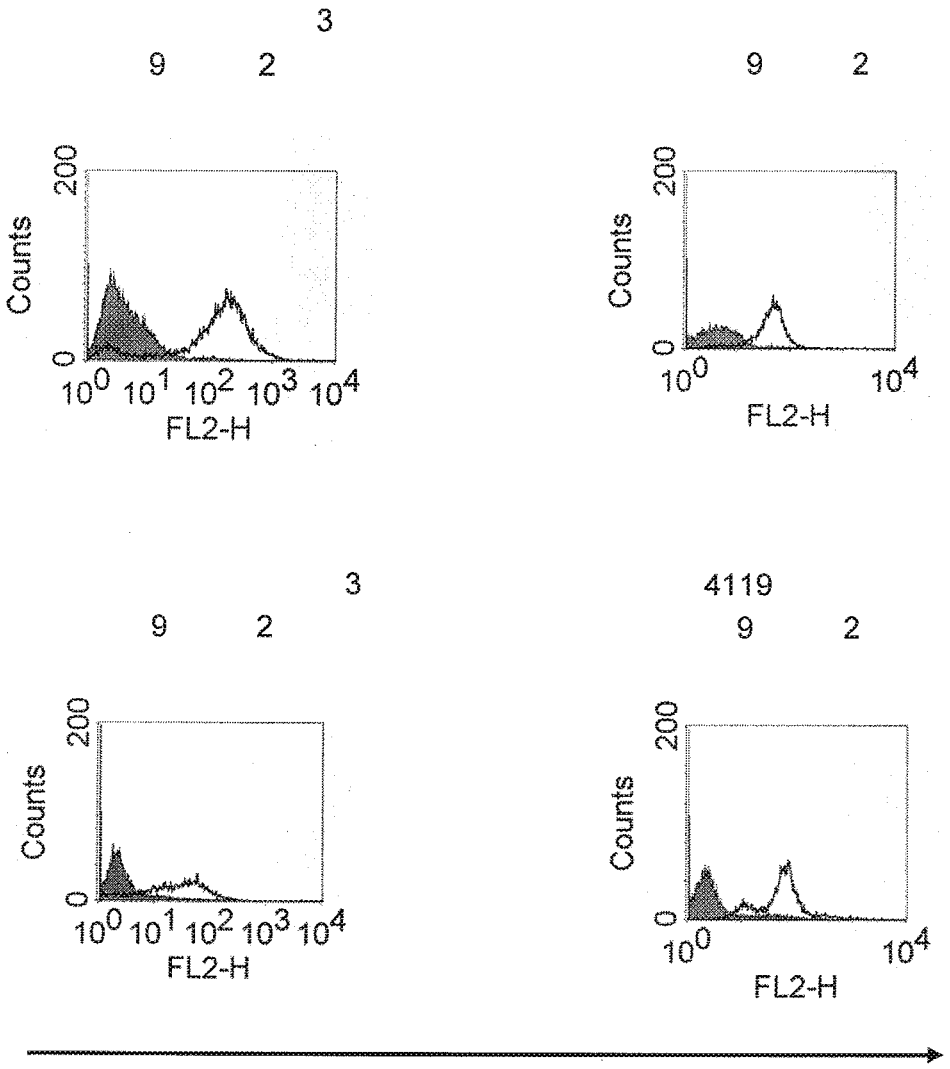

3
9 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
9 2
Counts
200
0
10^0
10^4
FL2-H
3
9 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
9 2
Counts
200
0
10^0
10^4
FL2-H

Figure 39c

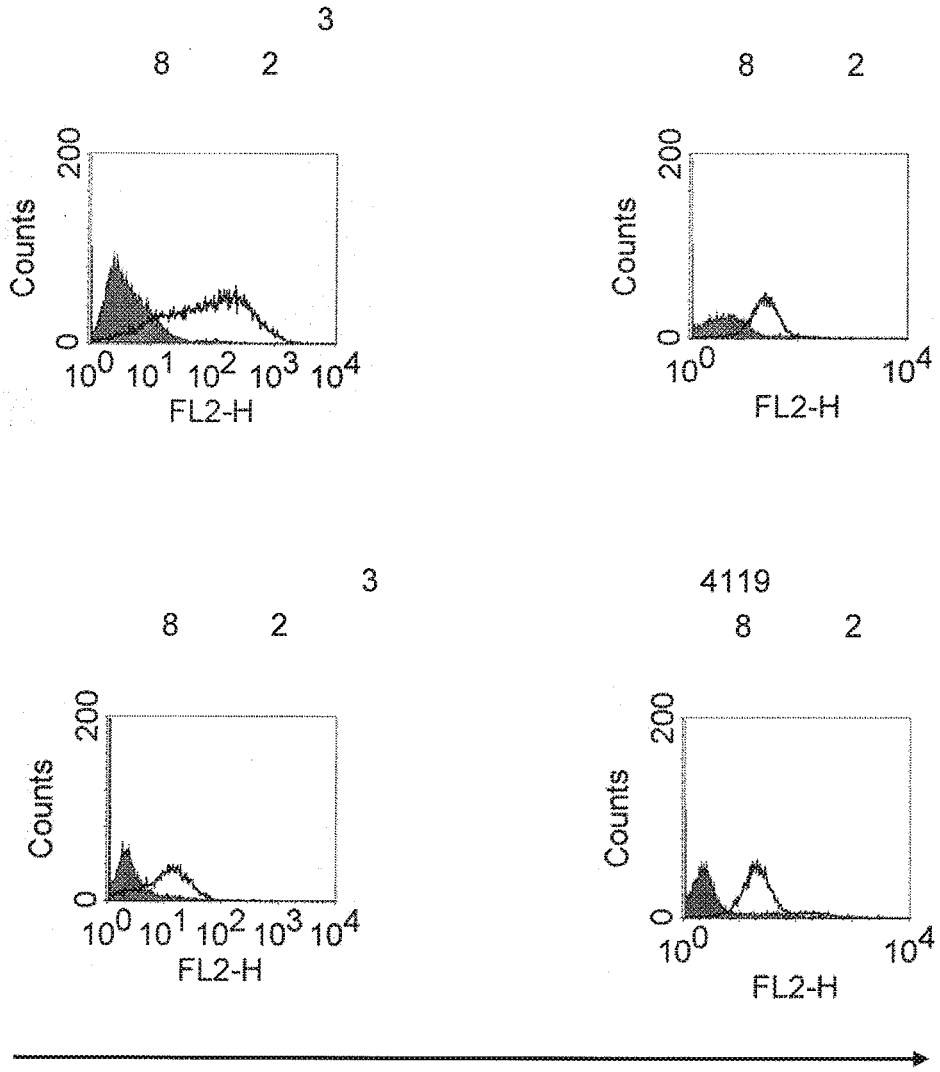

3
8 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
8 2
Counts
200
0
10^0
10^4
FL2-H
3
8 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
8 2
Counts
200
0
10^0
10^4
FL2-H

Figure 39d

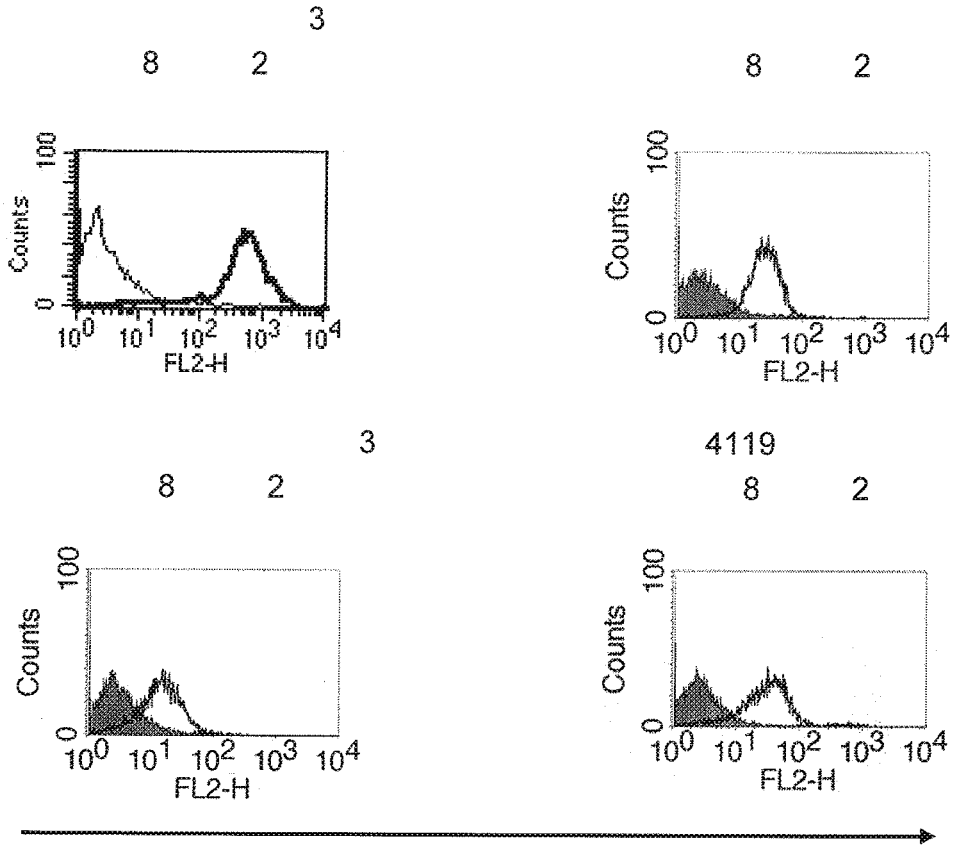

3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39e

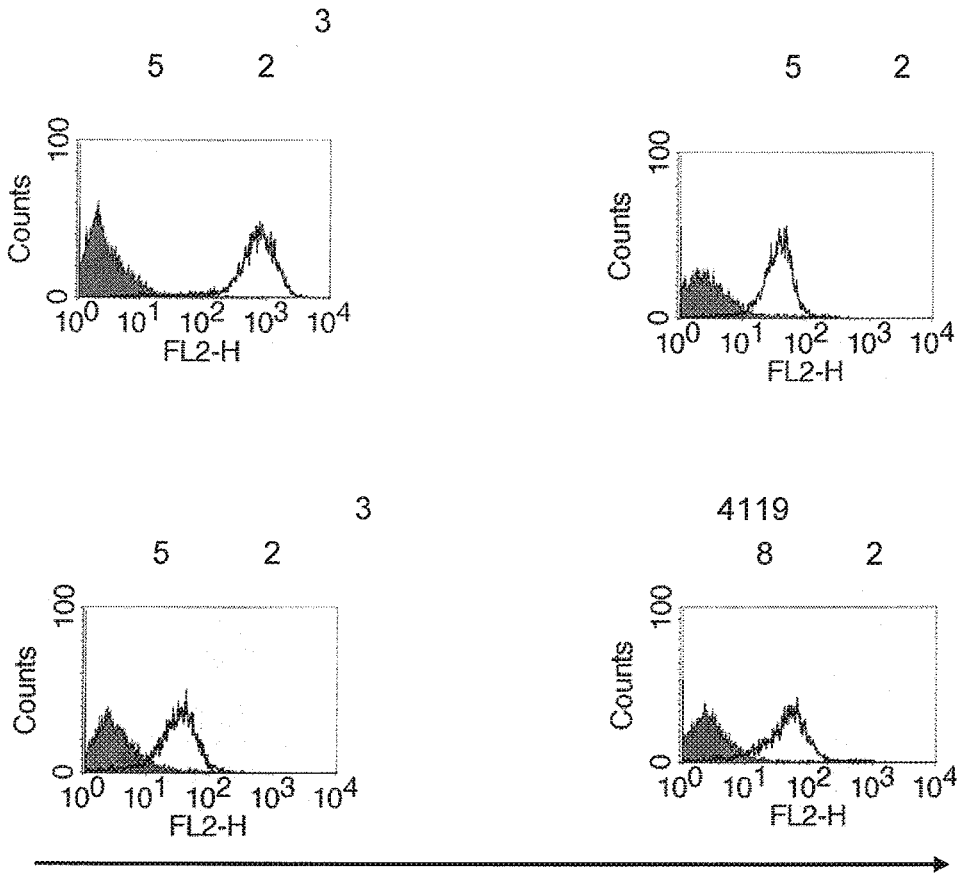

3
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39f

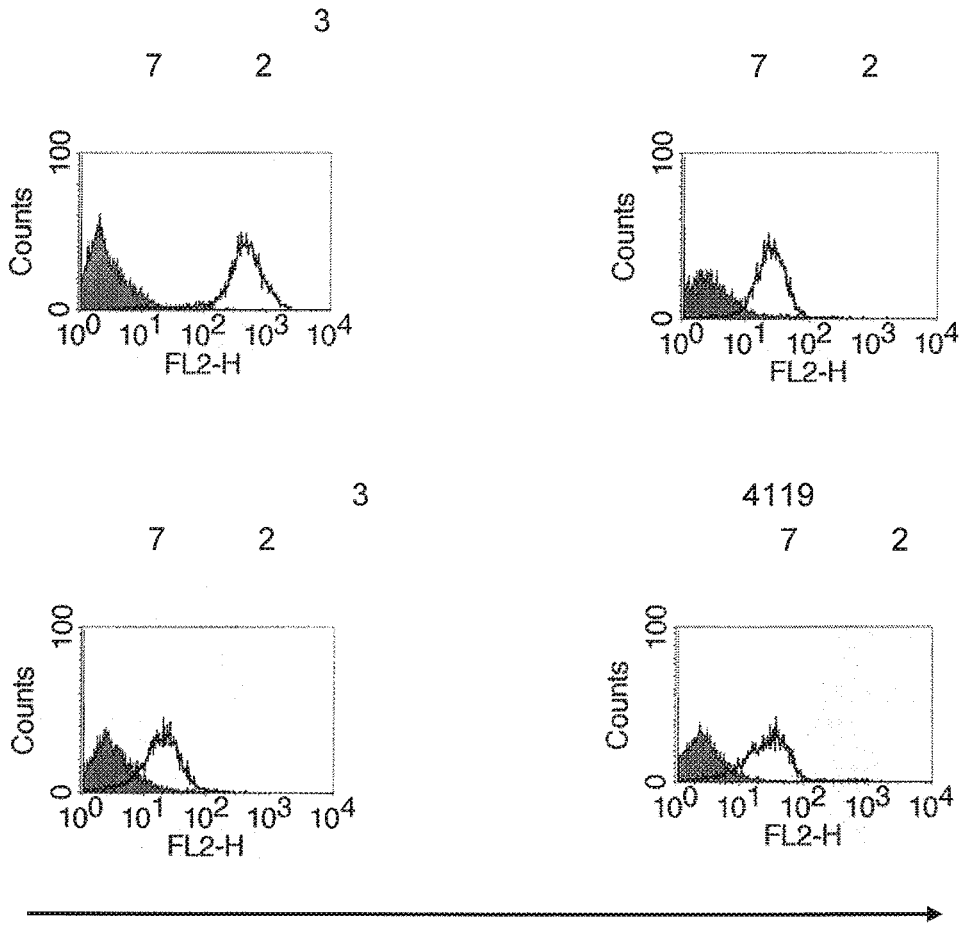

3
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39g

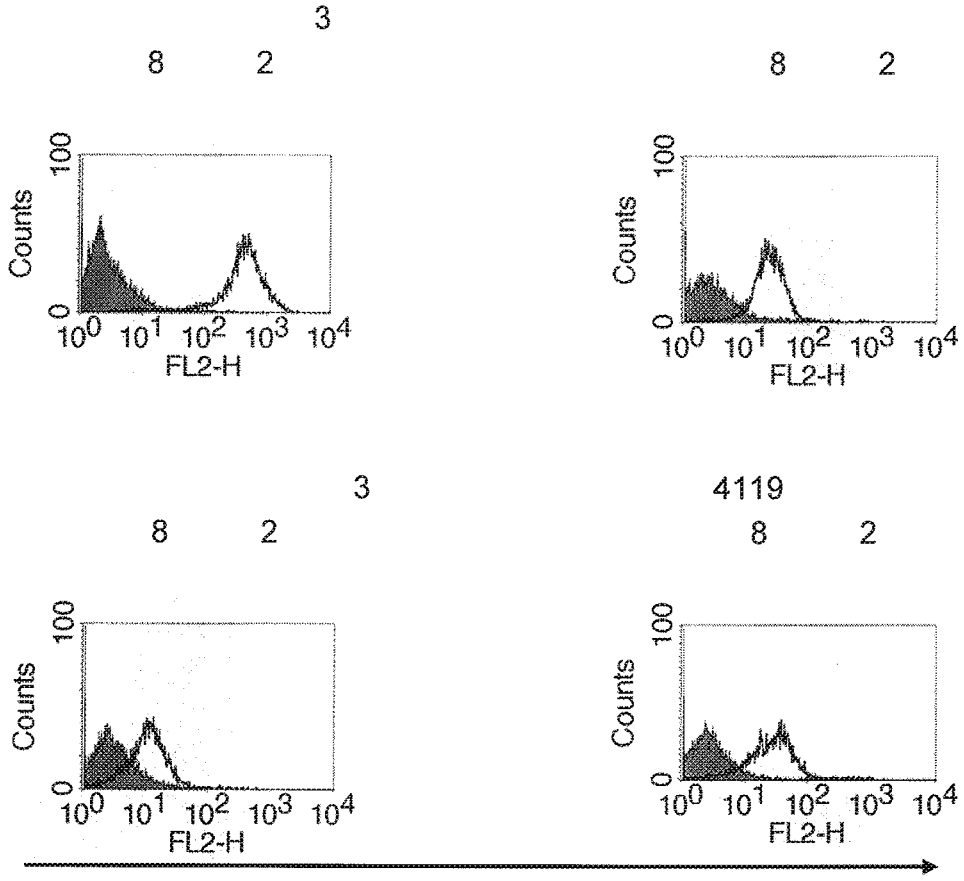

3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39h

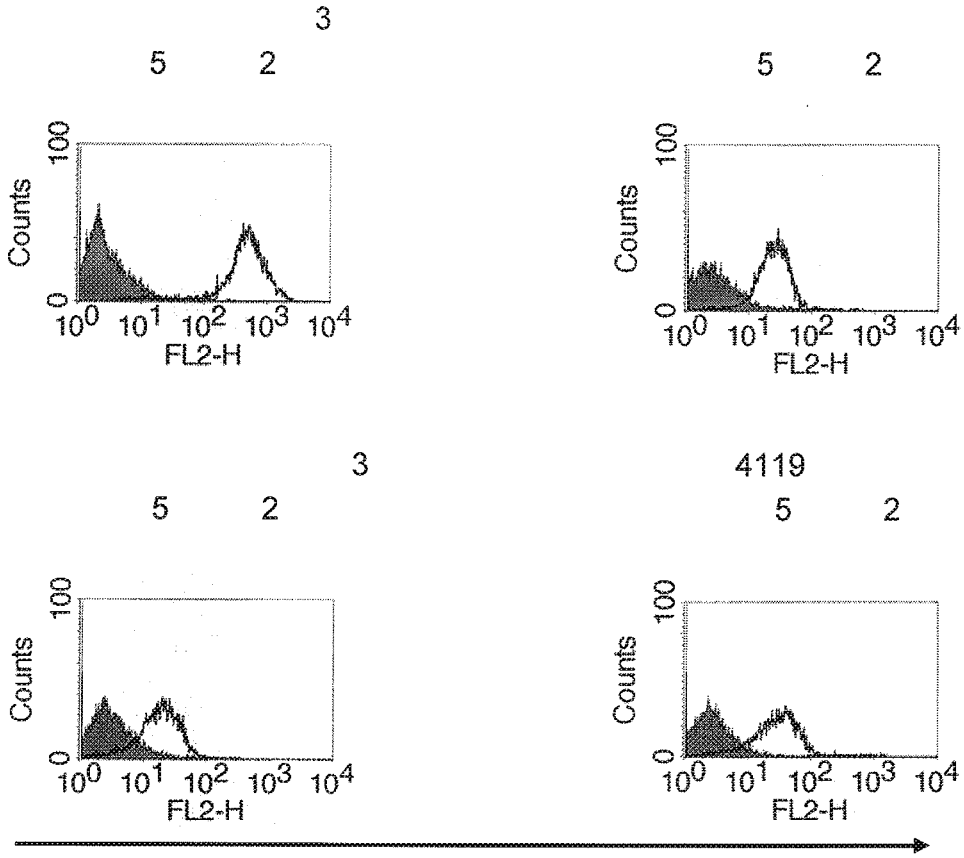

3
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
5 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39i

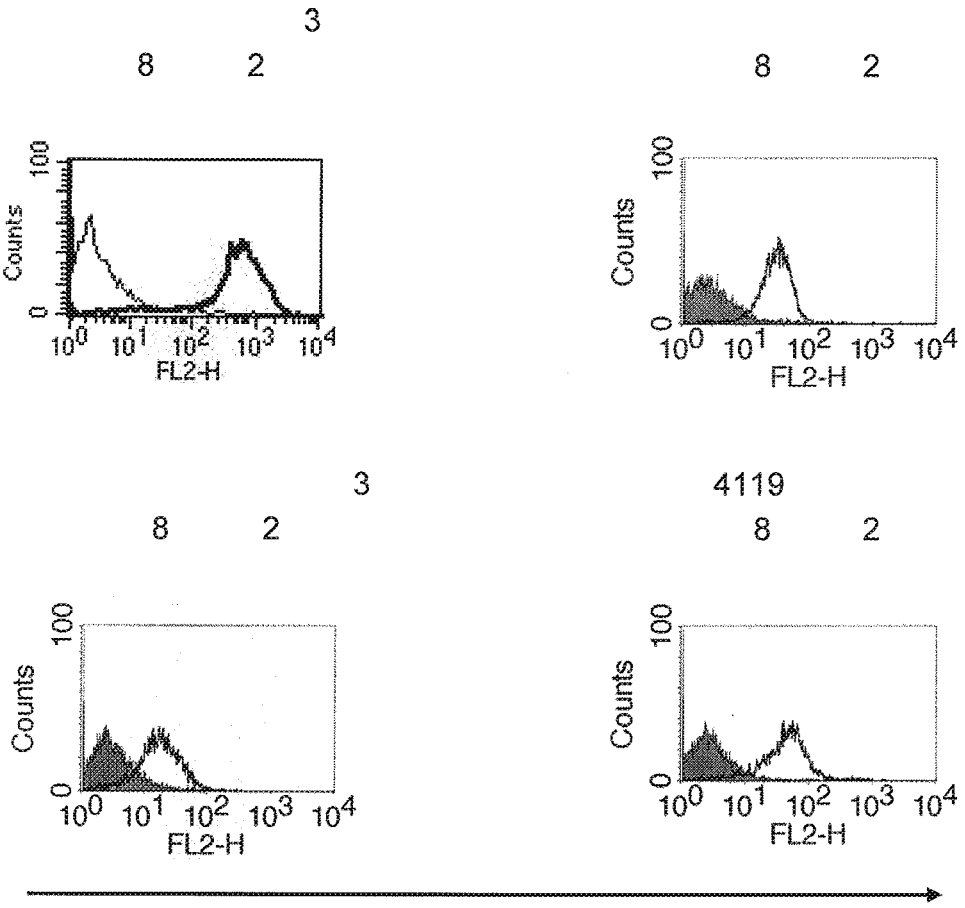

3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
8 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39j

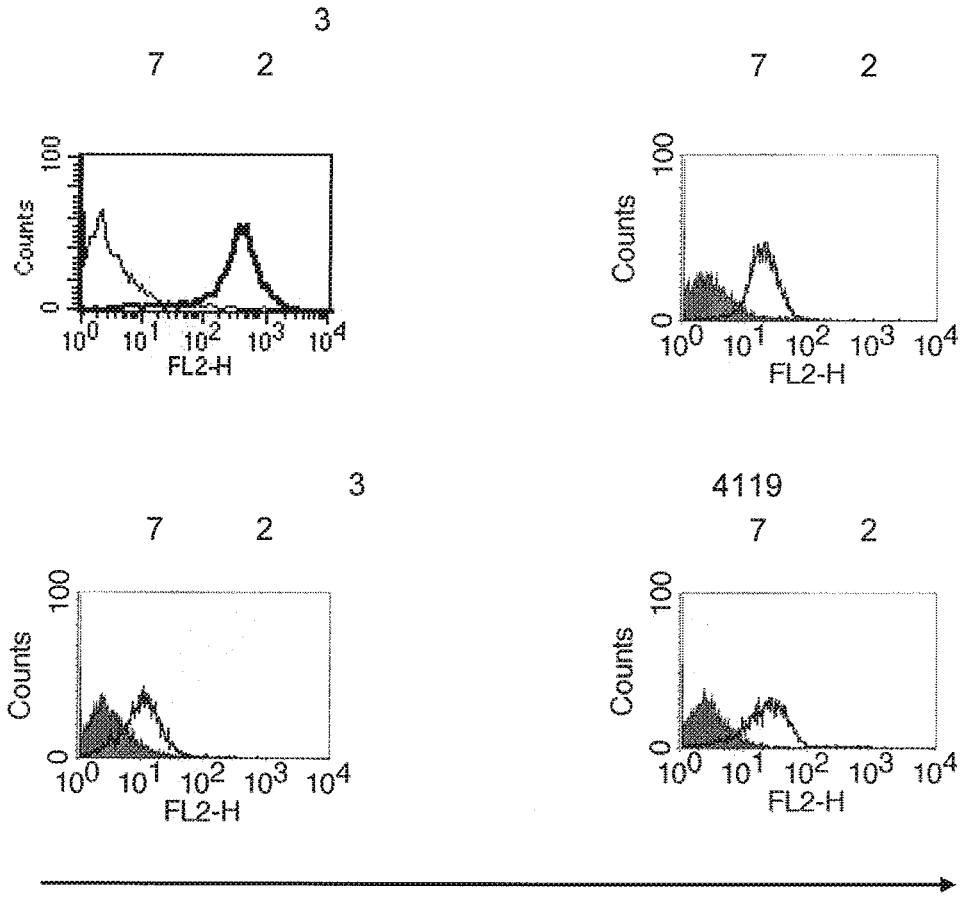

3
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
7 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39k

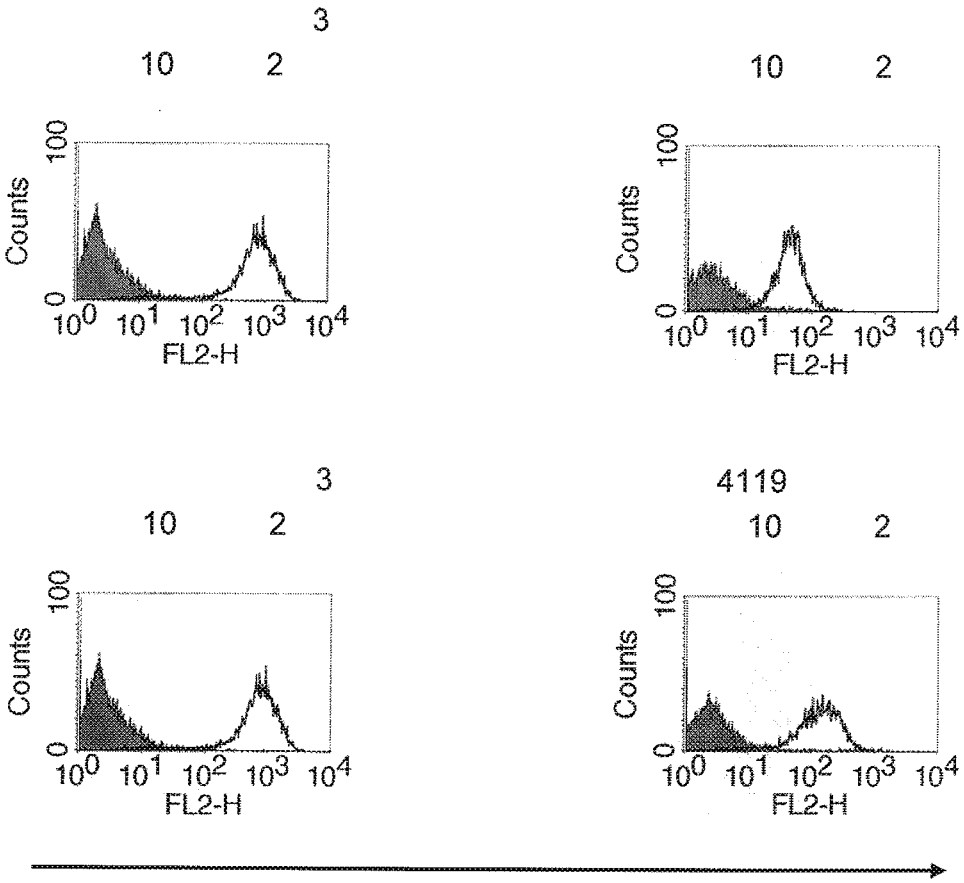
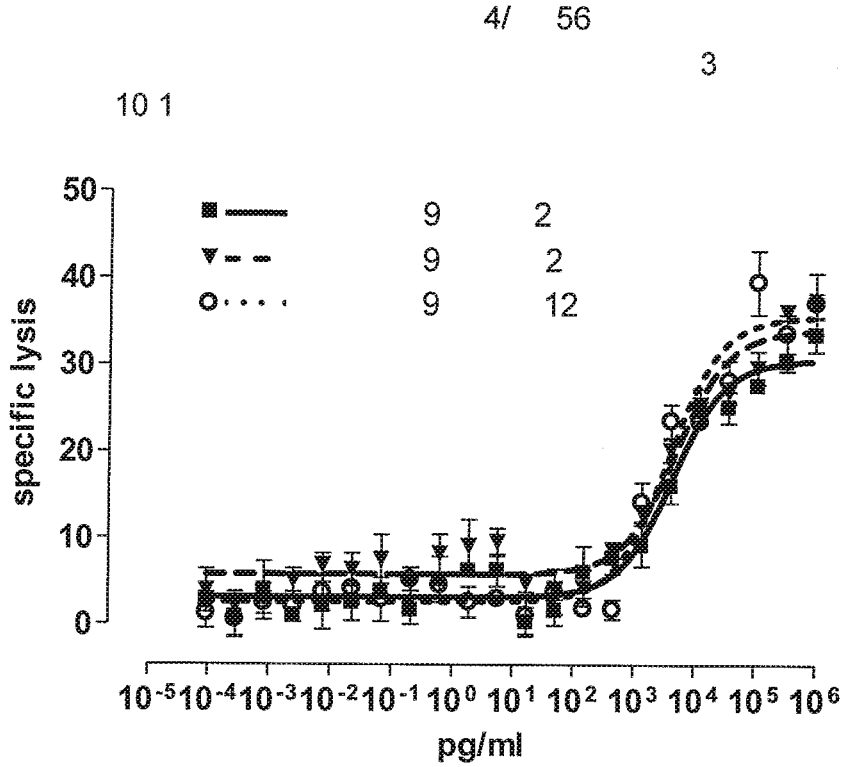

3
10 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
10 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
3
10 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
10 2
Counts
100
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 39I

Figure 40a


4/ 56
3
10 1
50
40
30
20
10
0
specific lysis
9 2
9 2
9 12
10-5 10-4 10-3 10-2 10-1 100 101 102 103 104 105 106
pg/ml

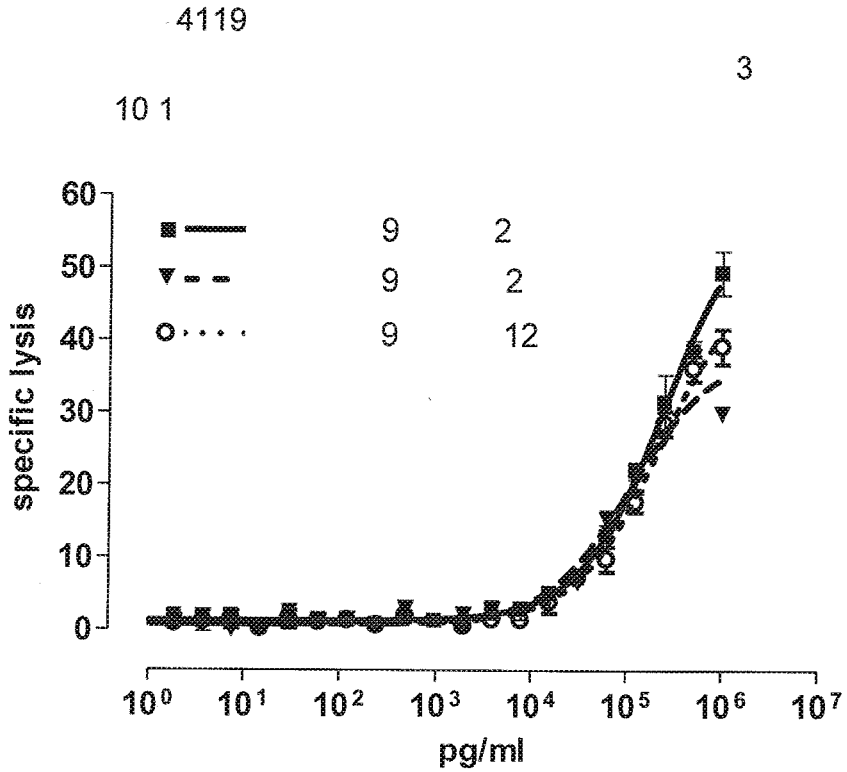
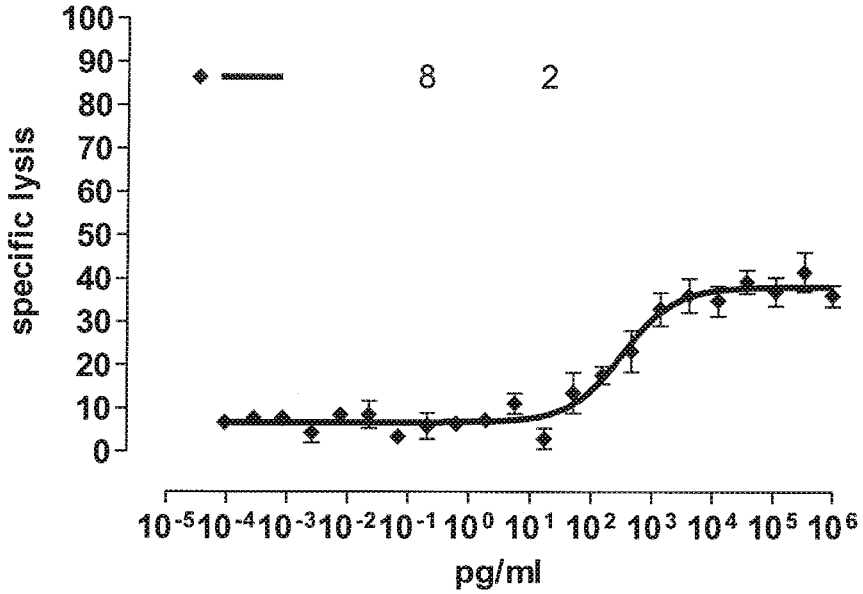

4119
3
10 1
60
50
40
30
20
10
0
specific lysis
9 2
9 2
9 12
100 101 102 103 104 105 106 107
pg/ml

Figure 40b

4/ 56

3

10 1



4119

3

10 1

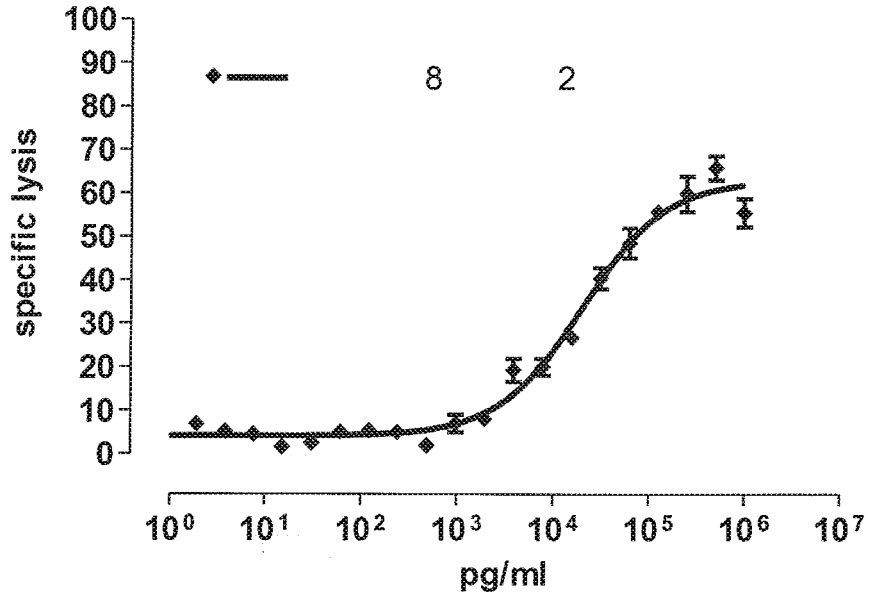
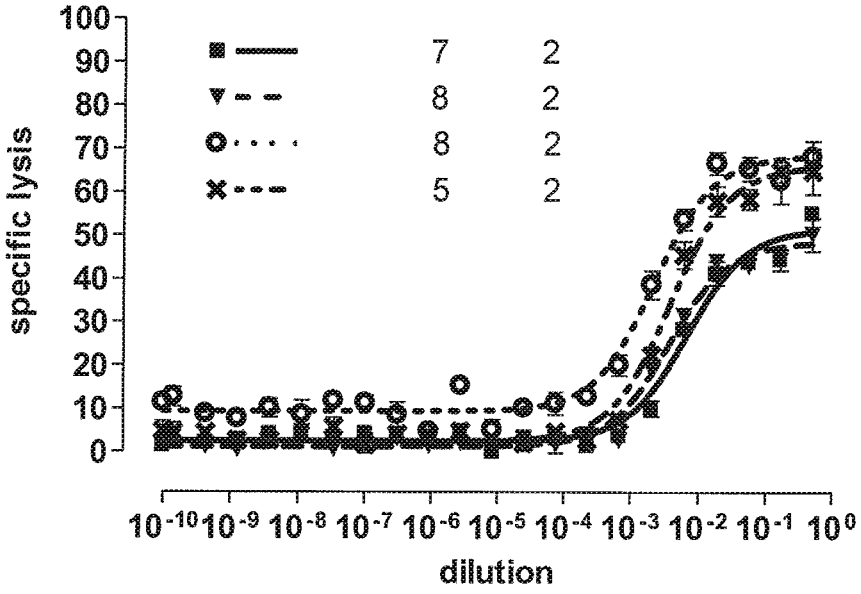


Figure 40c

4/ 56

3

10 1



4119

3

10 1

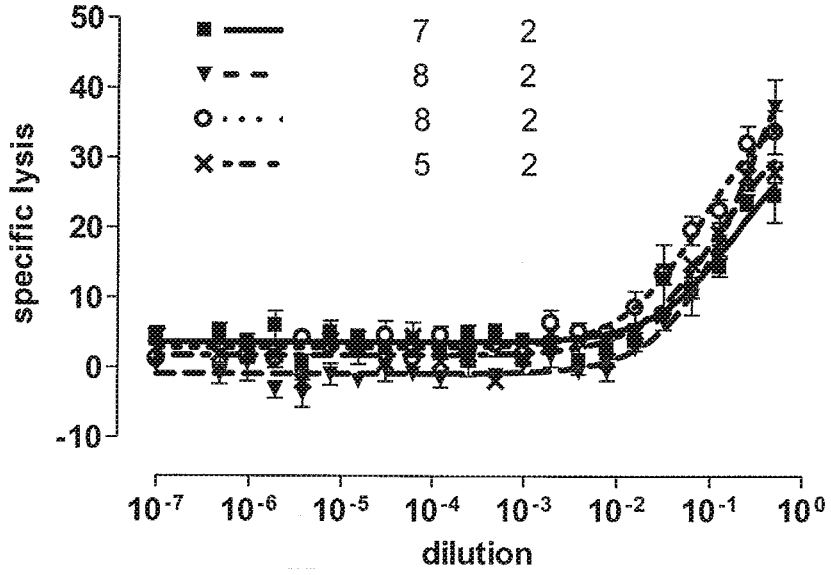
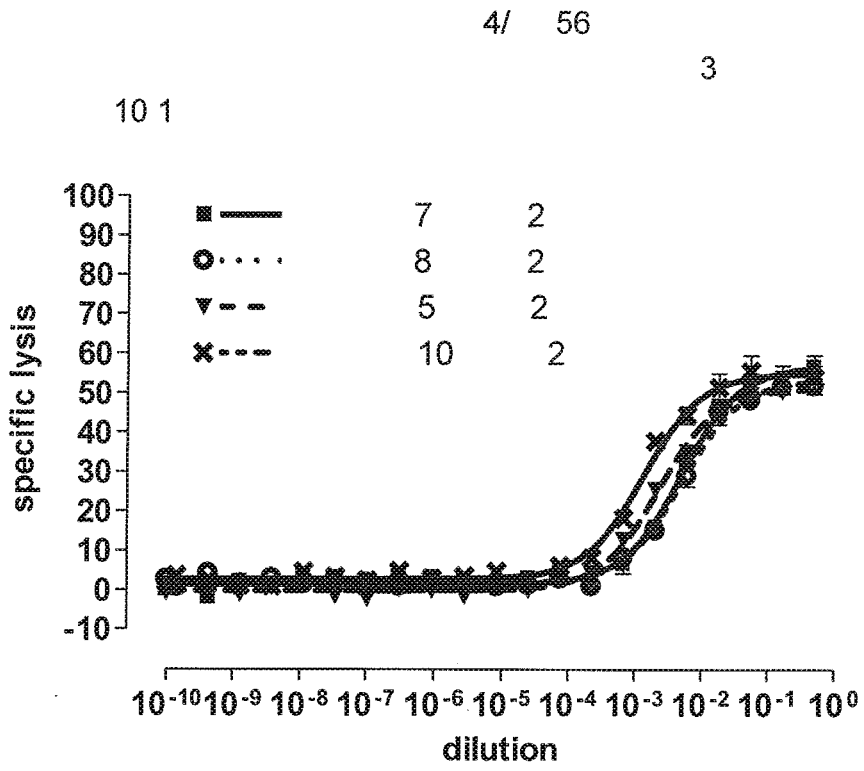


Figure 40d


4/ 56
3
10 1
100
90
80
70
60
50
40
30
20
10
0
-10
specific lysis
7 2
8 2
5 2
10 2
10-10 10-9 10-8 10-7 10-6 10-5 10-4 10-3 10-2 10-1 100
dilution

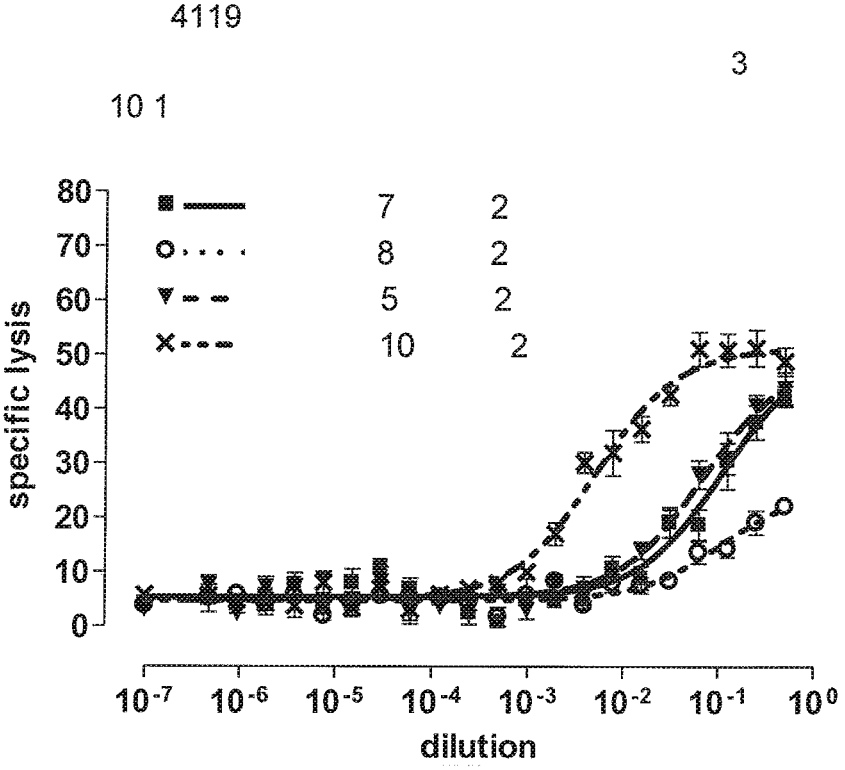

4119
3
10 1
80
70
60
50
40
30
20
10
0
specific lysis
7 2
8 2
5 2
10 2
10-7 10-6 10-5 10-4 10-3 10-2 10-1 100
dilution

Figure 41a

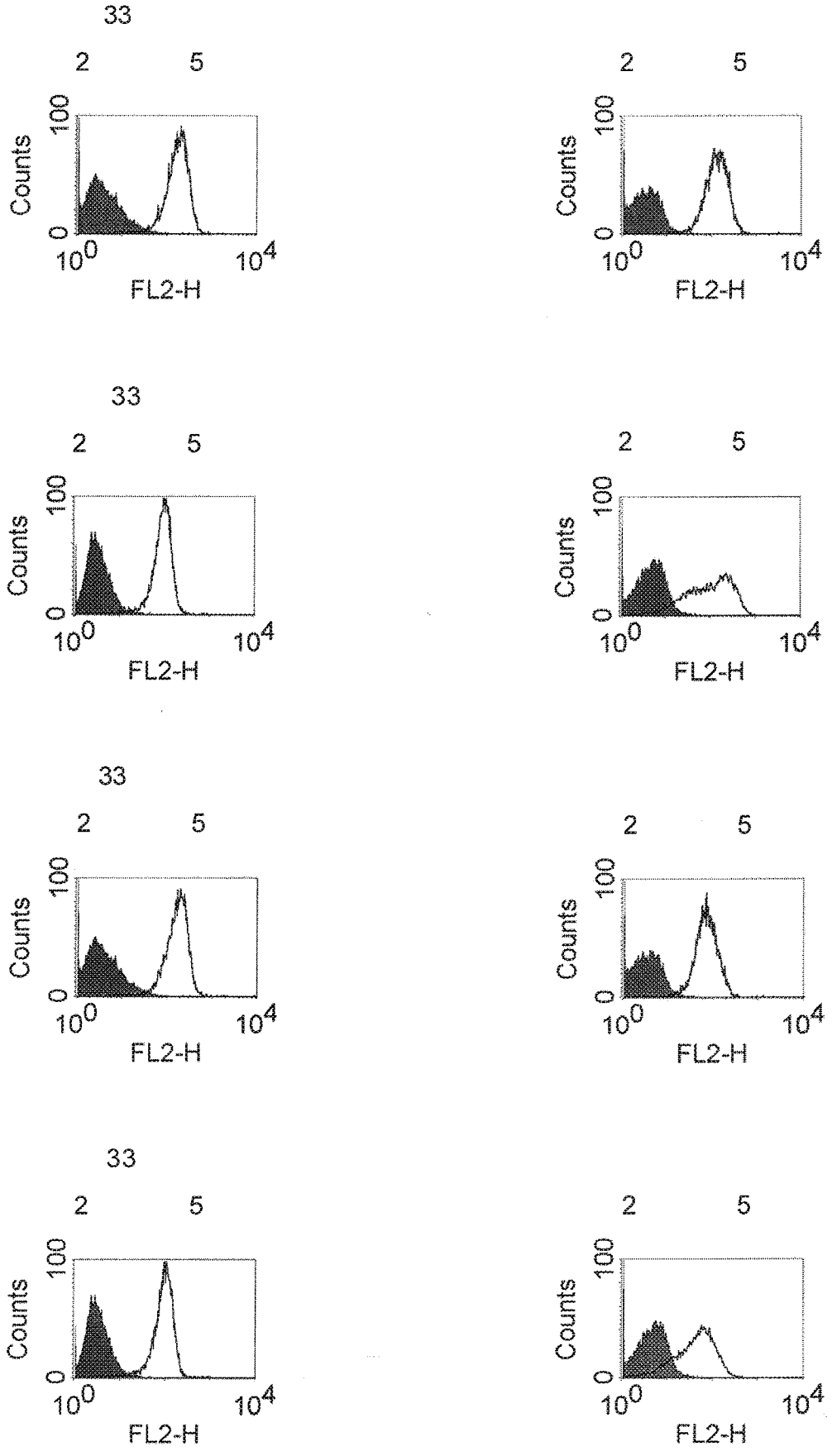


Figure 41b

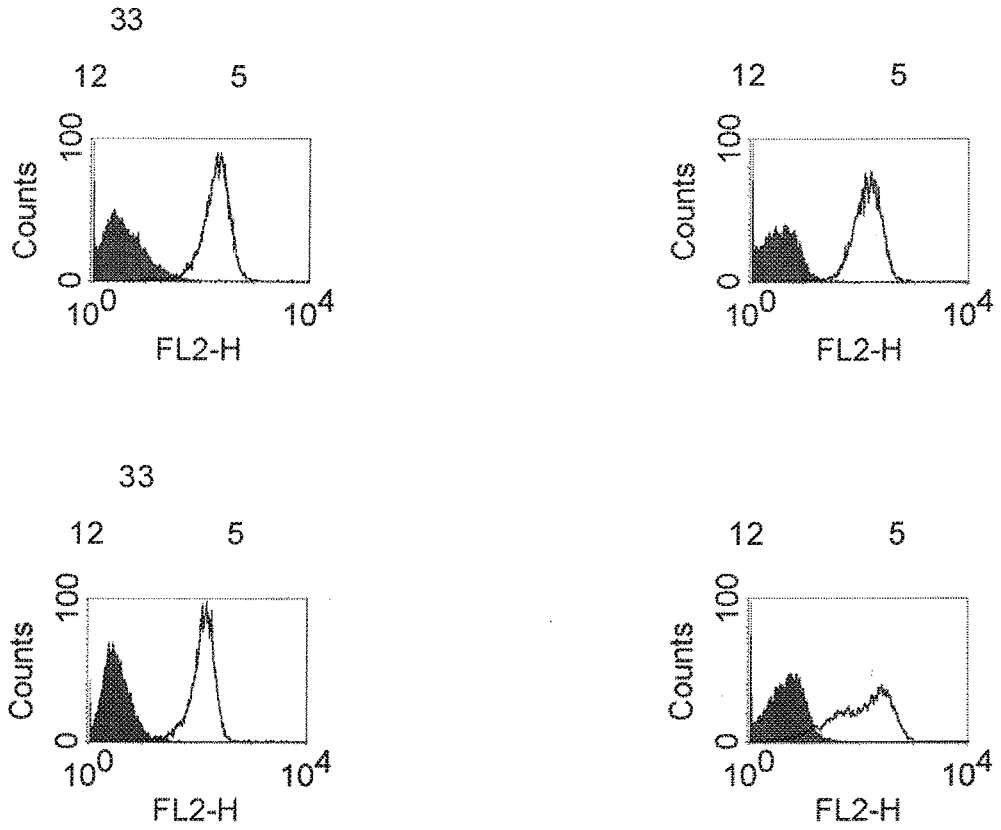
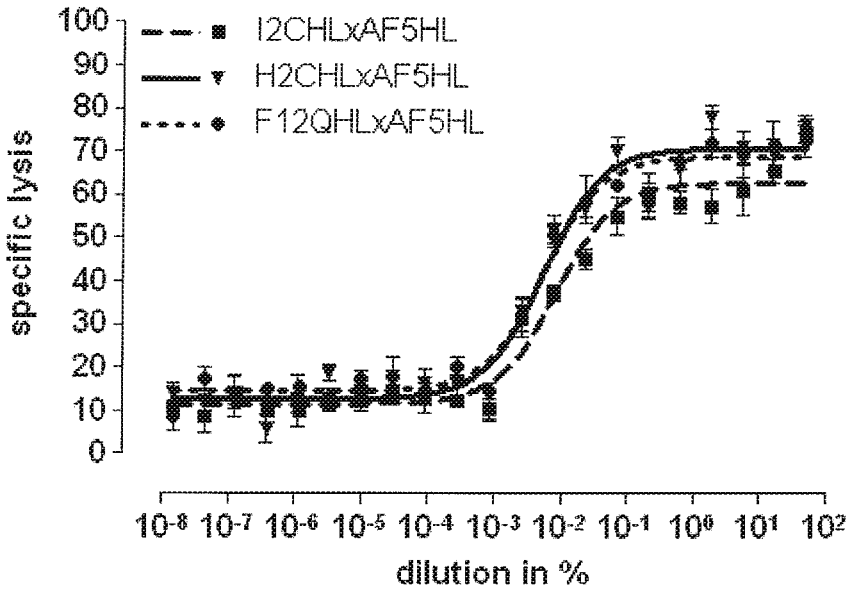

33
12
5
Counts
100
0
10^0
10^4
FL2-H
12
5
Counts
100
0
10^0
10^4
FL2-H
33
12
5
Counts
100
0
10^0
10^4
FL2-H
12
5
Counts
100
0
10^0
10^4
FL2-H

Figure 42

4/ 56

33



4119

33

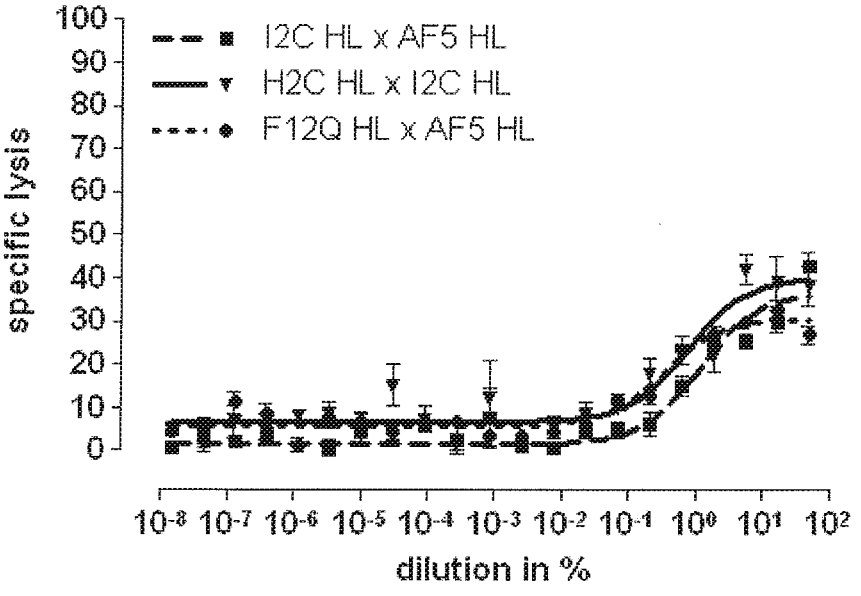


Figure 43

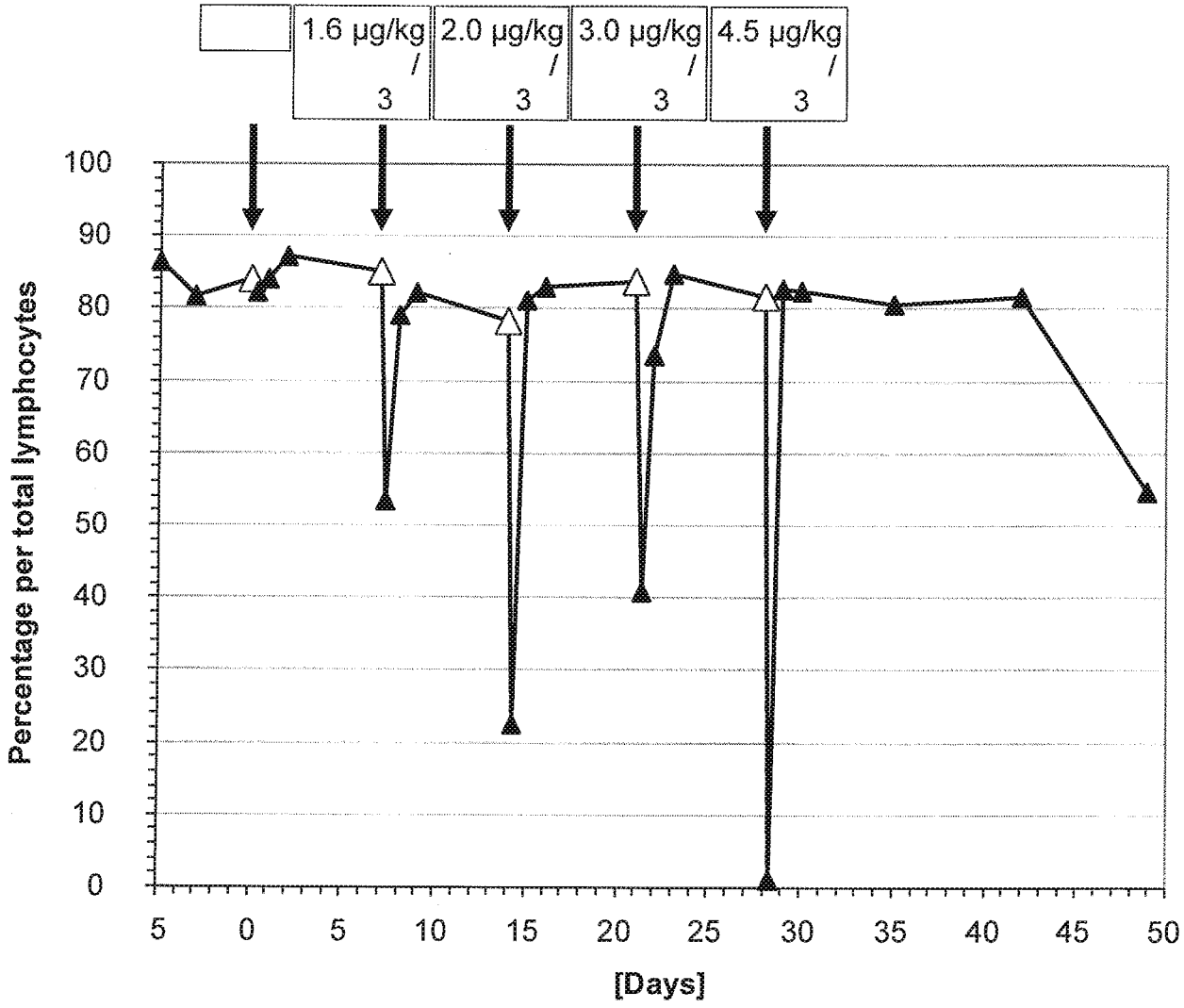

1.6 µg/kg / 3
2.0 µg/kg / 3
3.0 µg/kg / 3
4.5 µg/kg / 3
Percentage per total lymphocytes
100
90
80
70
60
50
40
30
20
10
0
5
0
5
10
15
20
25
30
35
40
45
50
[Days]

Figure 44

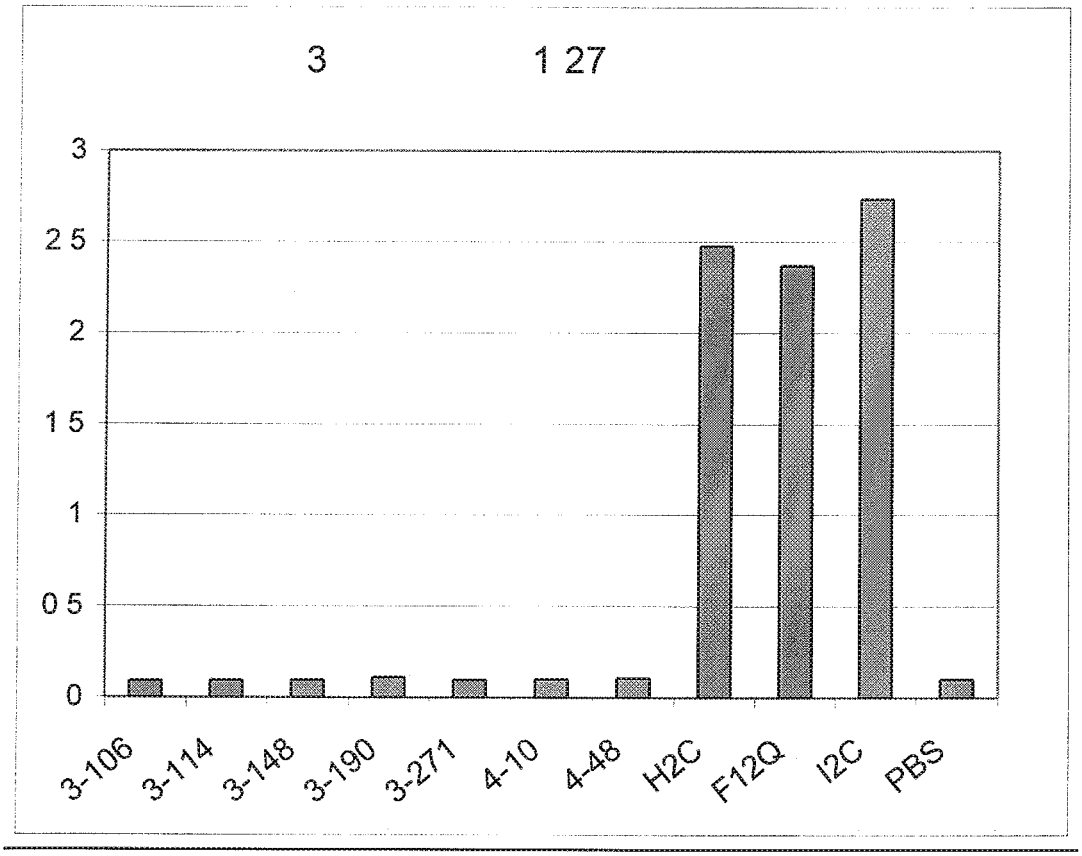
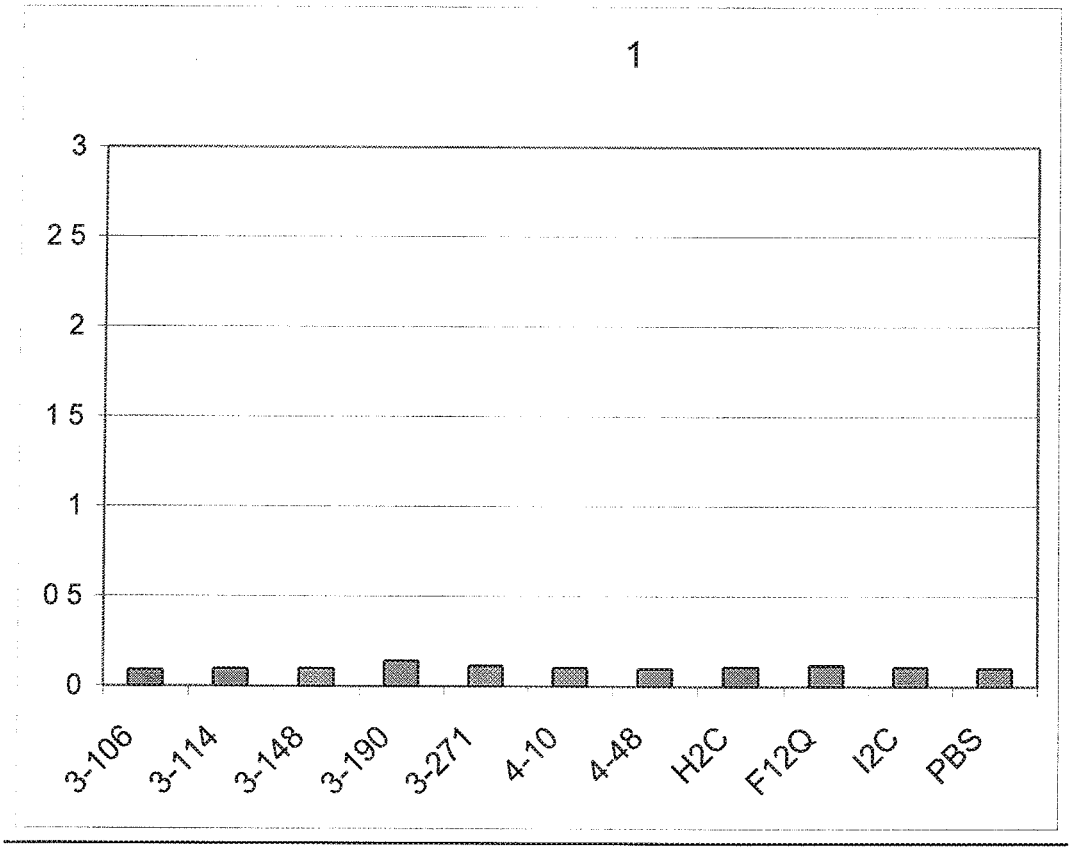

3 1 27
3
2 5
2
1 5
1
0 5
0
3-106
3-114
3-148
3-190
3-271
4-10
4-48
H2C
F12Q
I2C
PBS

Figure 45


1
3
2 5
2
1 5
1
0 5
0
3-106
3-114
3-148
3-190
3-271
4-10
4-48
H2C
F12Q
I2C
PBS

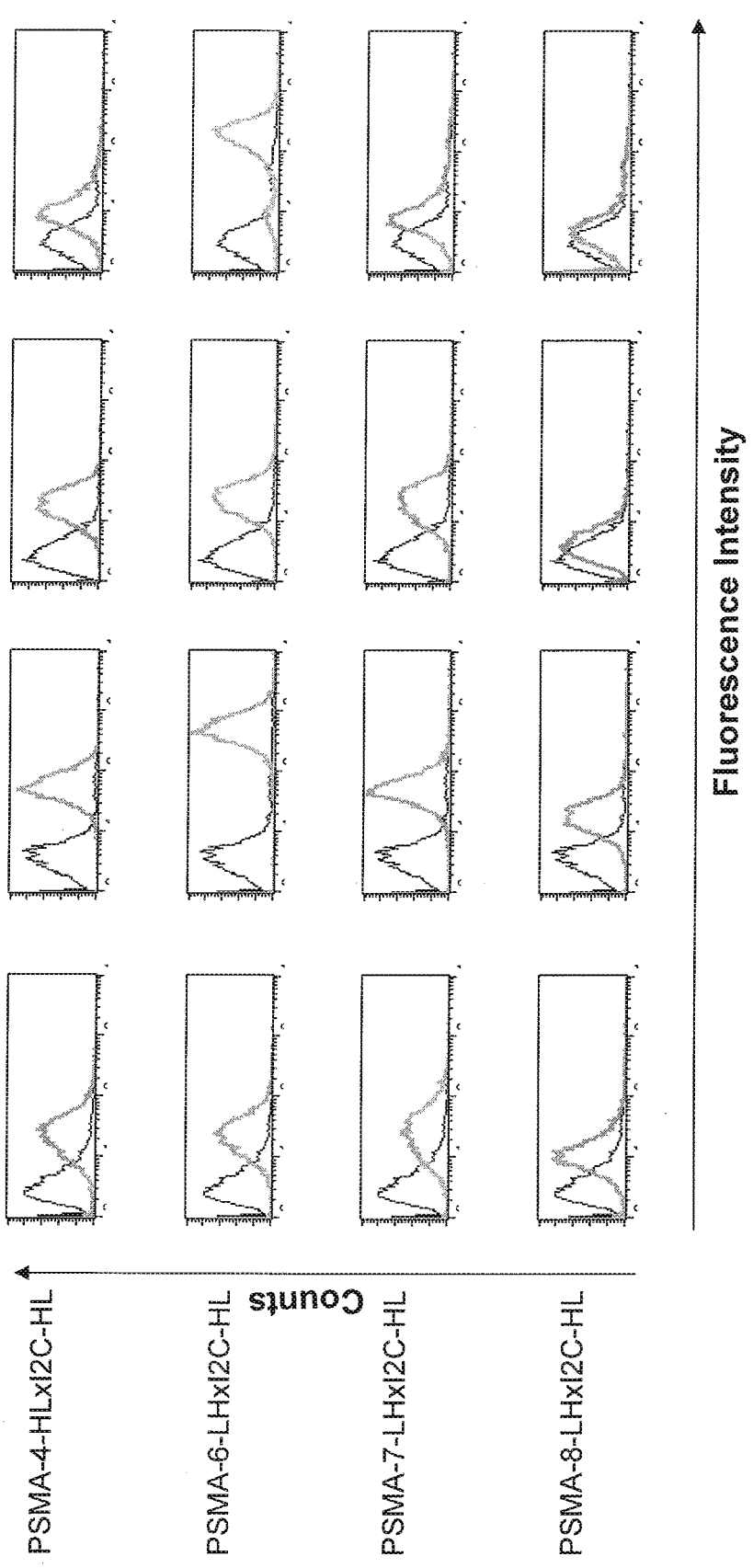

CHO human PSMA
HPB-All (human)
CHO cyno PSMA
4119 LnPx (cyno)
PSMA-4-HLxI2C-HL
PSMA-6-LHxI2C-HL
PSMA-7-LHxI2C-HL
PSMA-8-LHxI2C-HL
Counts
Fluorescence Intensity

Figure 46 (1)

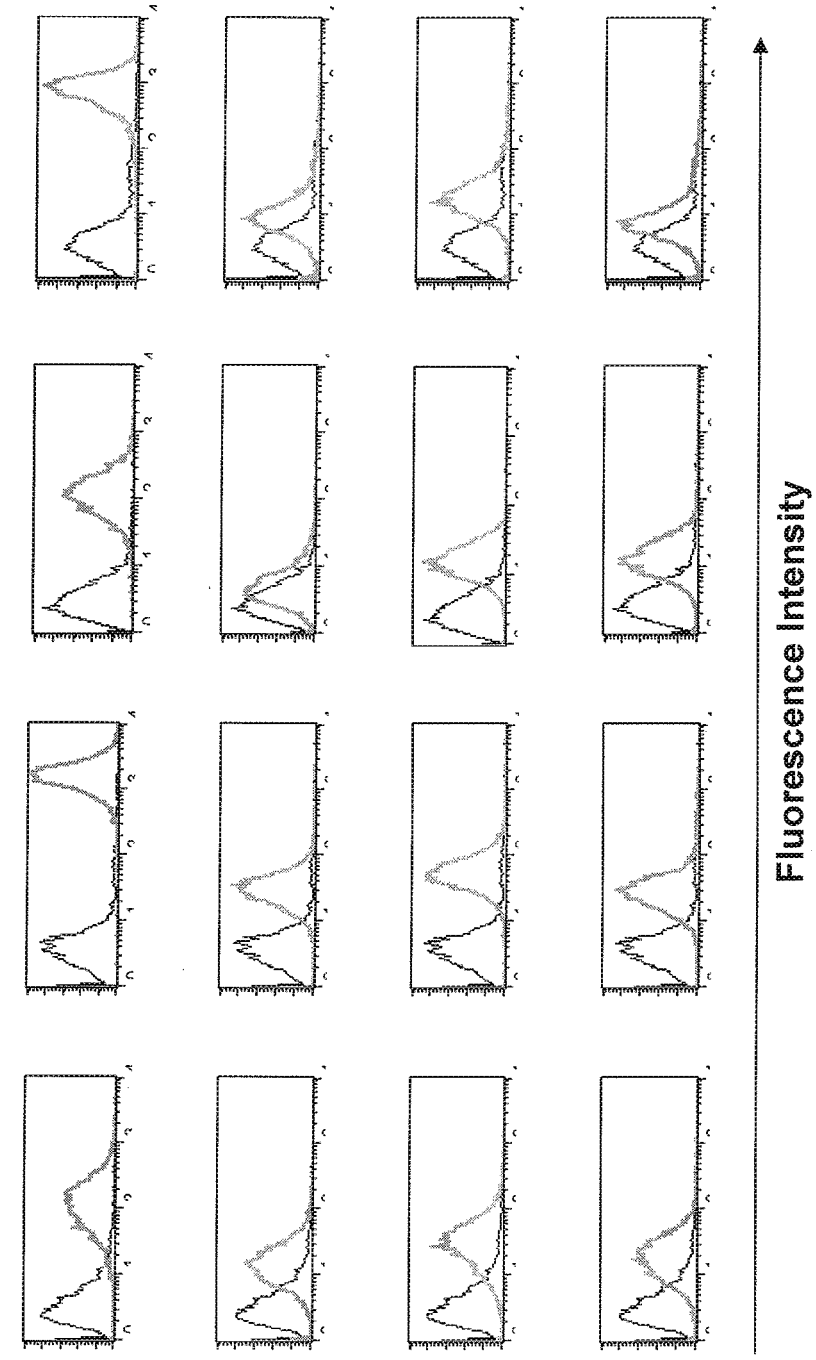

CHO human PSMA
HPB-All (human)
CHO cyno PSMA
4119 LnPx (cyno)
PSMA-9-LHxI2C-HL
PSMA-A-LHxI2C-HL
PSMA-B-LHxI2C-HL
PSMA-C-LHxI2C-HL
Counts
Fluorescence Intensity

Figure 46 (2)

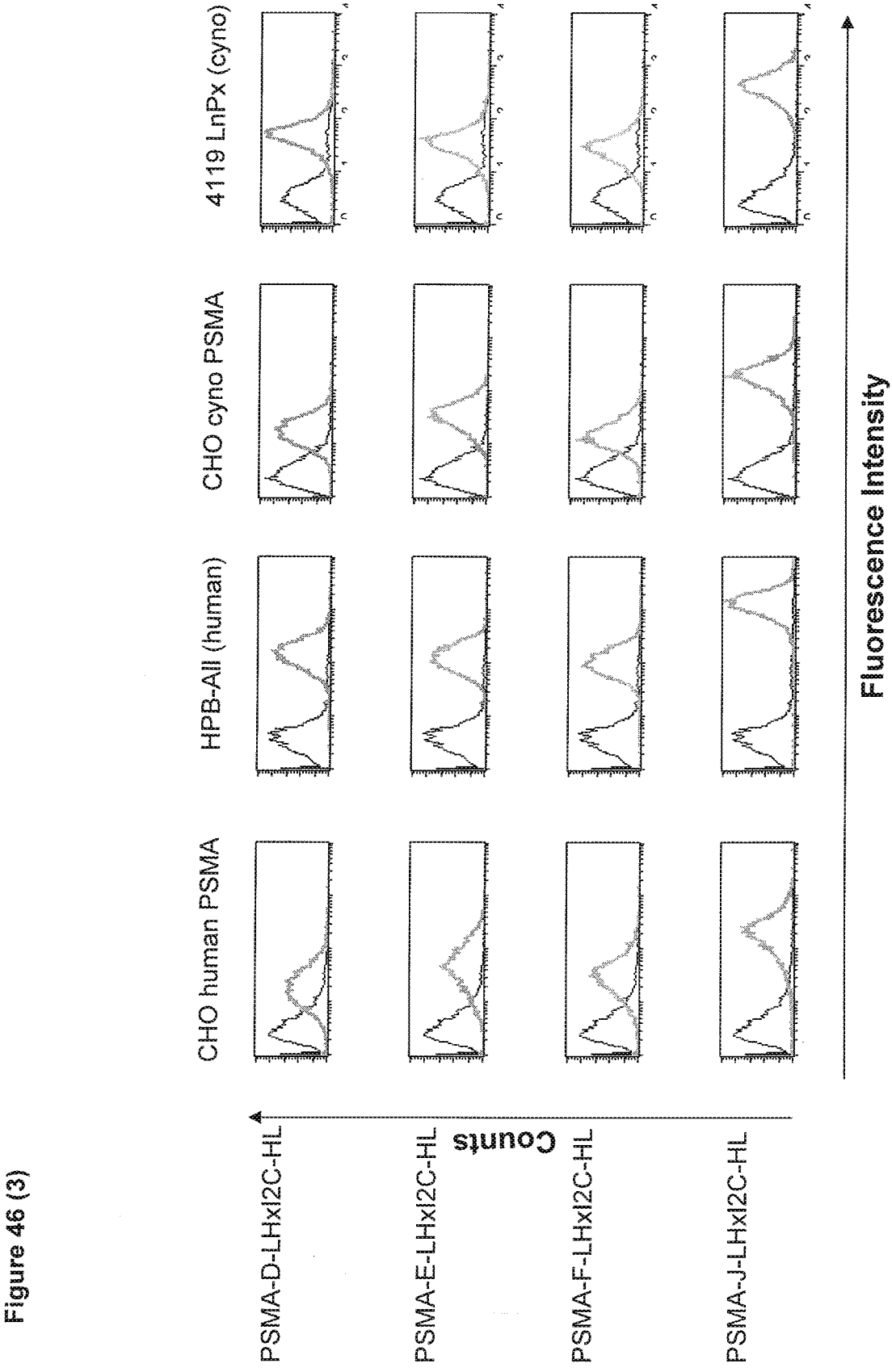

CHO human PSMA
HPB-All (human)
CHO cyno PSMA
4119 LnPx (cyno)
PSMA-D-LHxl2C-HL
PSMA-E-LHxl2C-HL
PSMA-F-LHxl2C-HL
PSMA-J-LHxl2C-HL
Counts
Fluorescence Intensity

Figure 46 (3)

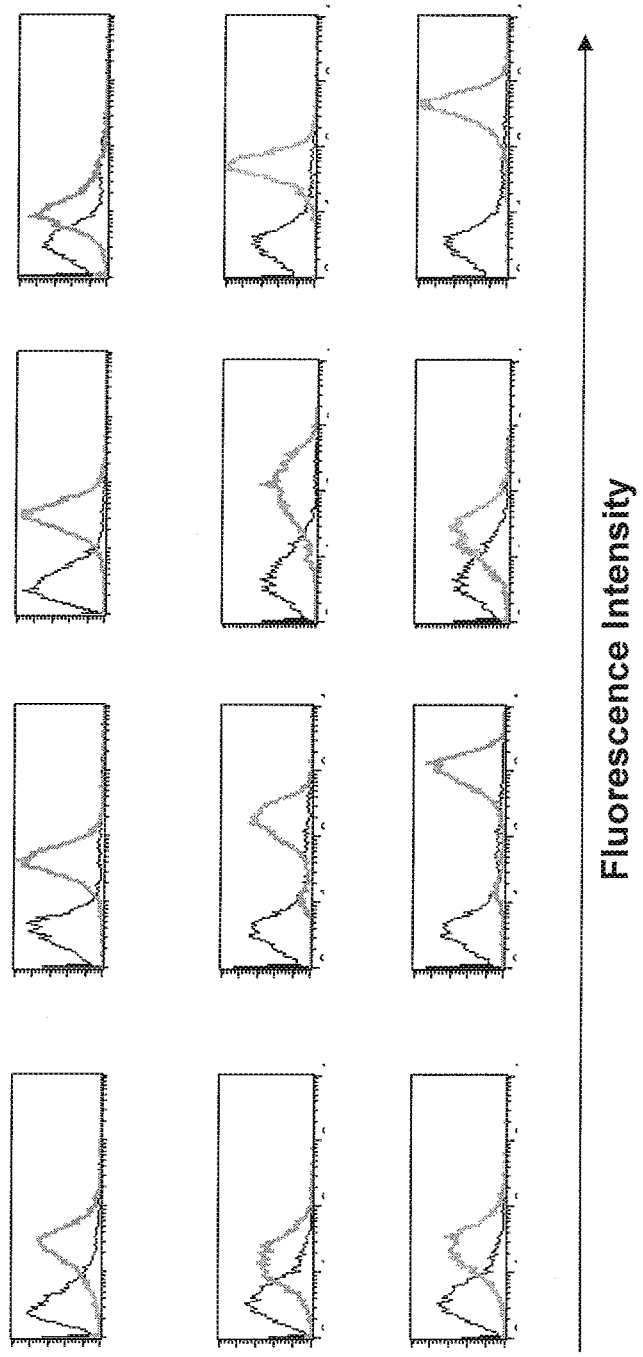
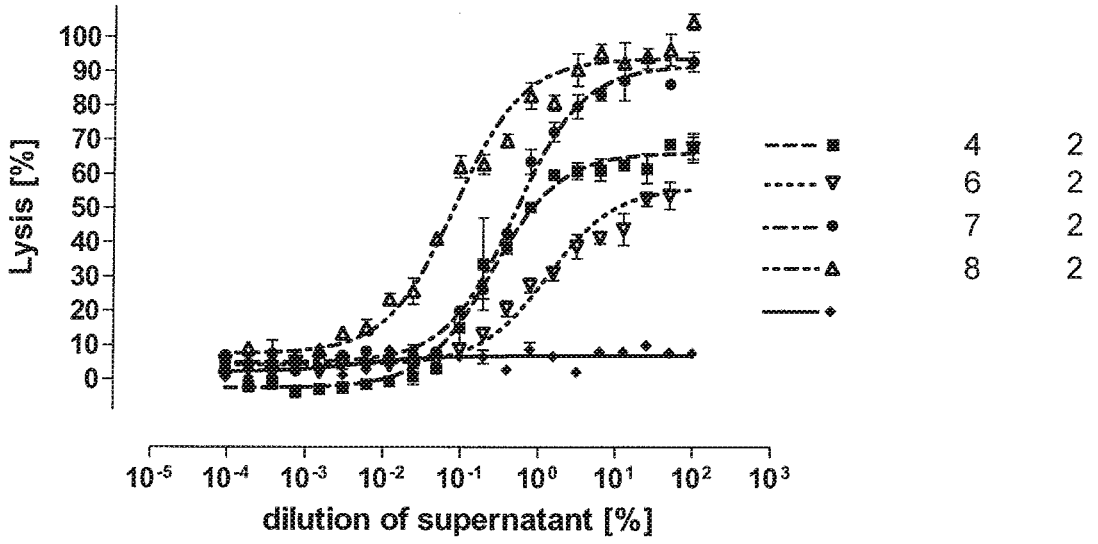

CHO human PSMA
HPB-All (human)
CHO cyno PSMA
4119 LnPx (cyno)
PSMA-L-LHxl2C-HL
PSMA-10-LHxl2C-HL
PSMA-3-HLxl2C-HL
Counts
Fluorescence Intensity

Figure 46 (4)

Figure 47(1)

A) Effector cells: CD56 depleted unstimulated human PBMC
Target cells: CHO transfected with human PSMA



B) Effector cells: CD56 depleted unstimulated human PBMC
Target cells: CHO transfected with human PSMA

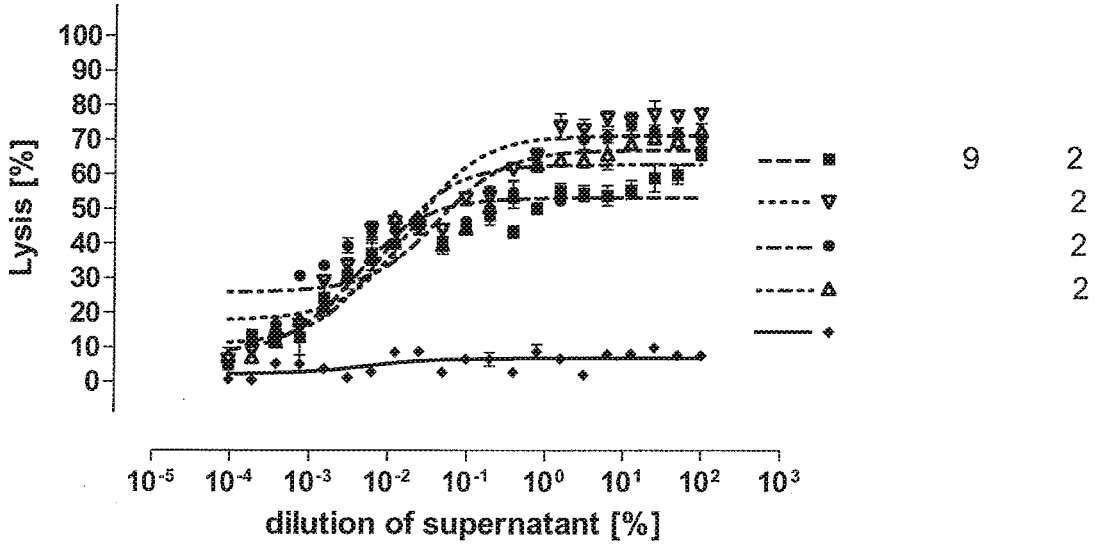
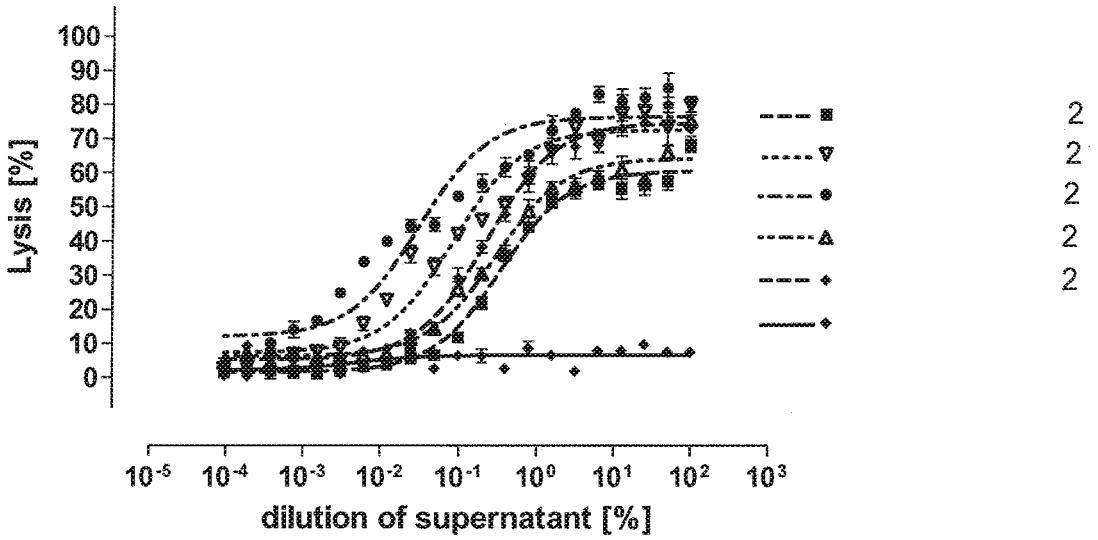


Figure 47(2)

A) Effector cells: CD56 depleted unstimulated human PBMC
Target cells: CHO transfected with human PSMA



B) Effector cells: CD56 depleted unstimulated human PBMC
Target cells: CHO transfected with human PSMA

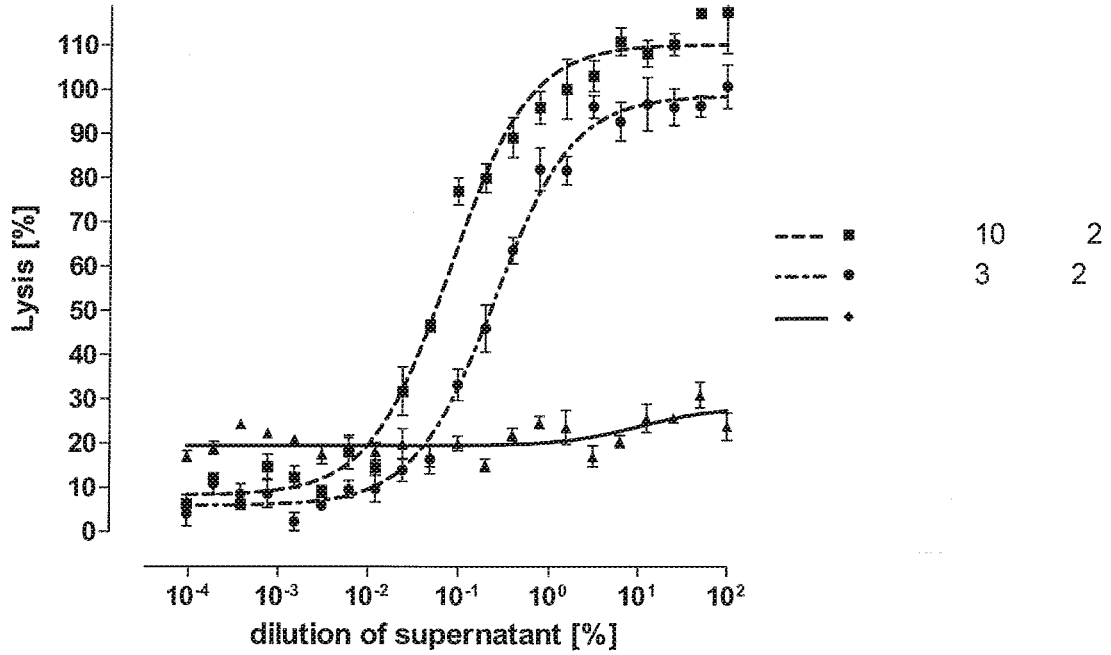
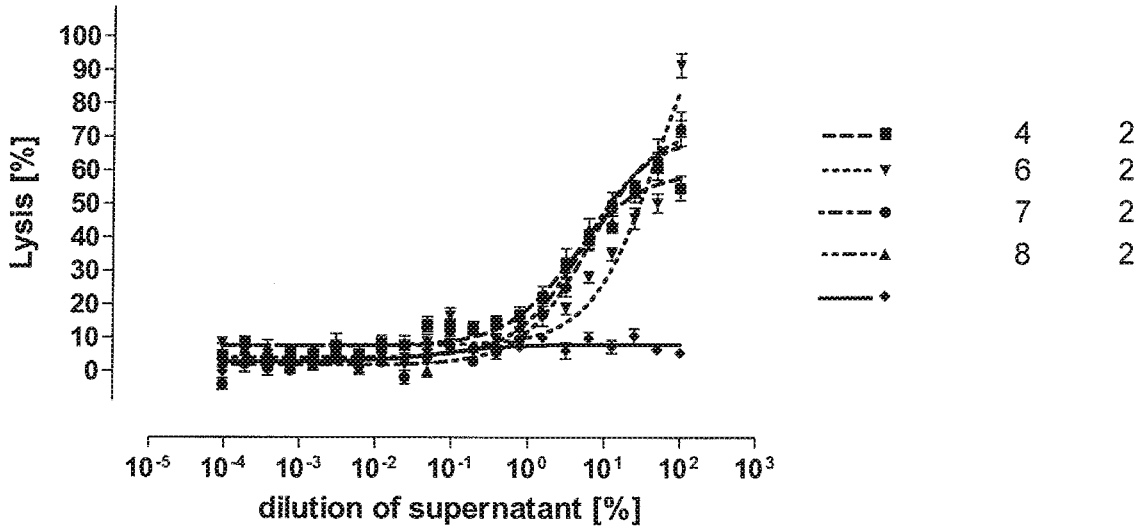


Figure 48(1)

A) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA



B) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA

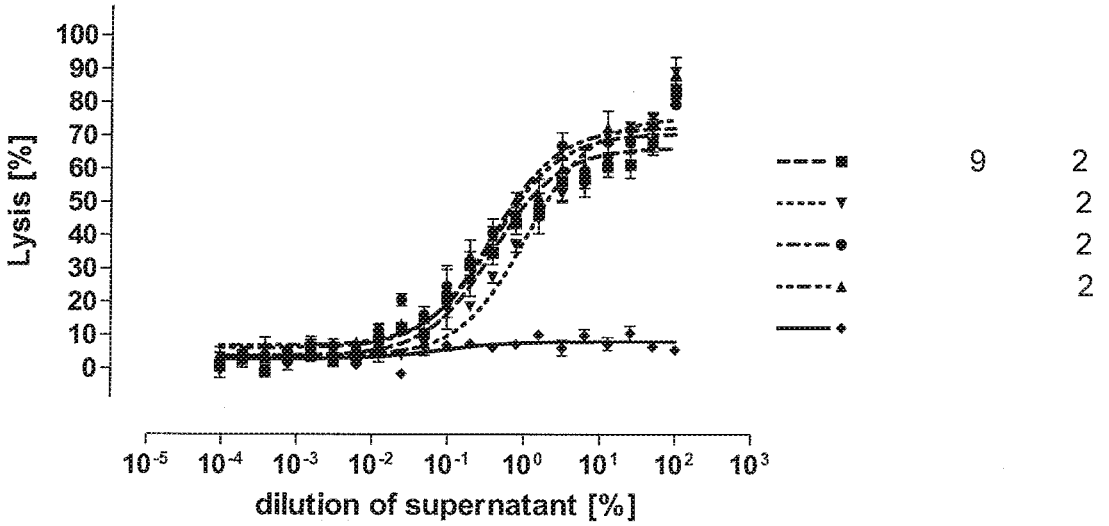
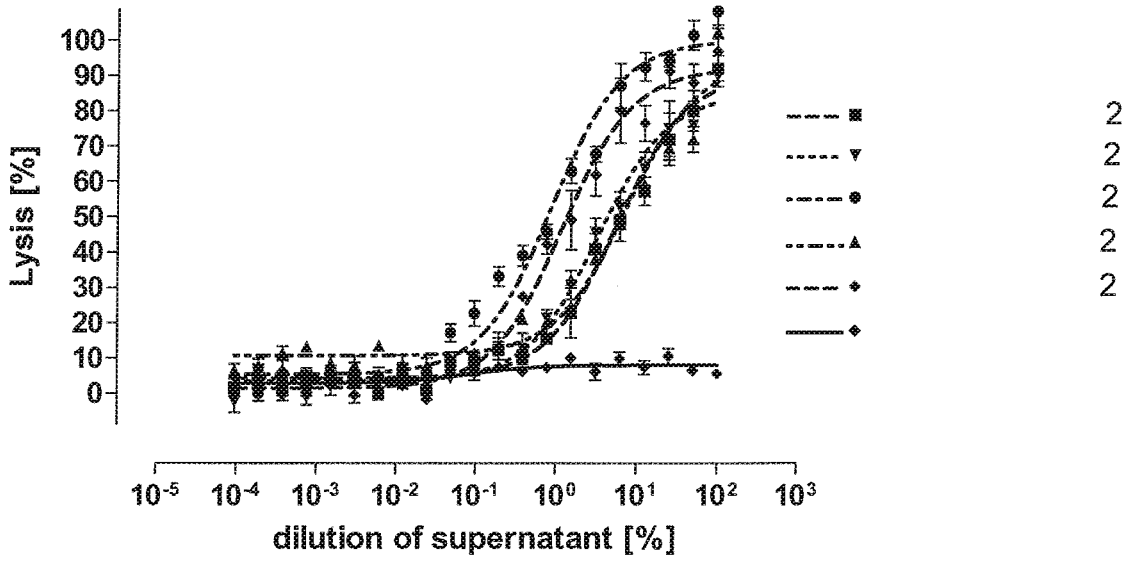


Figure 48(2)

A) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA



B) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA

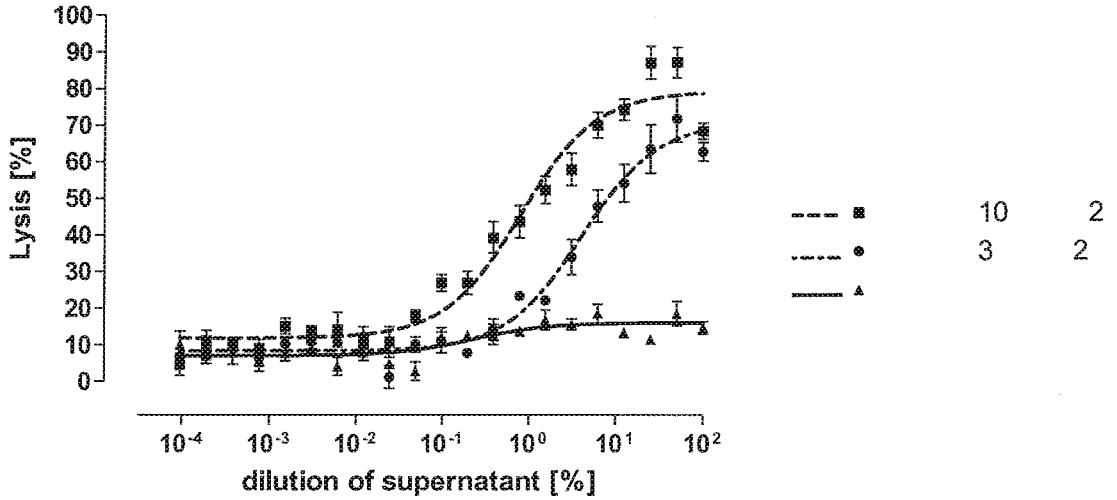


Figure 49a

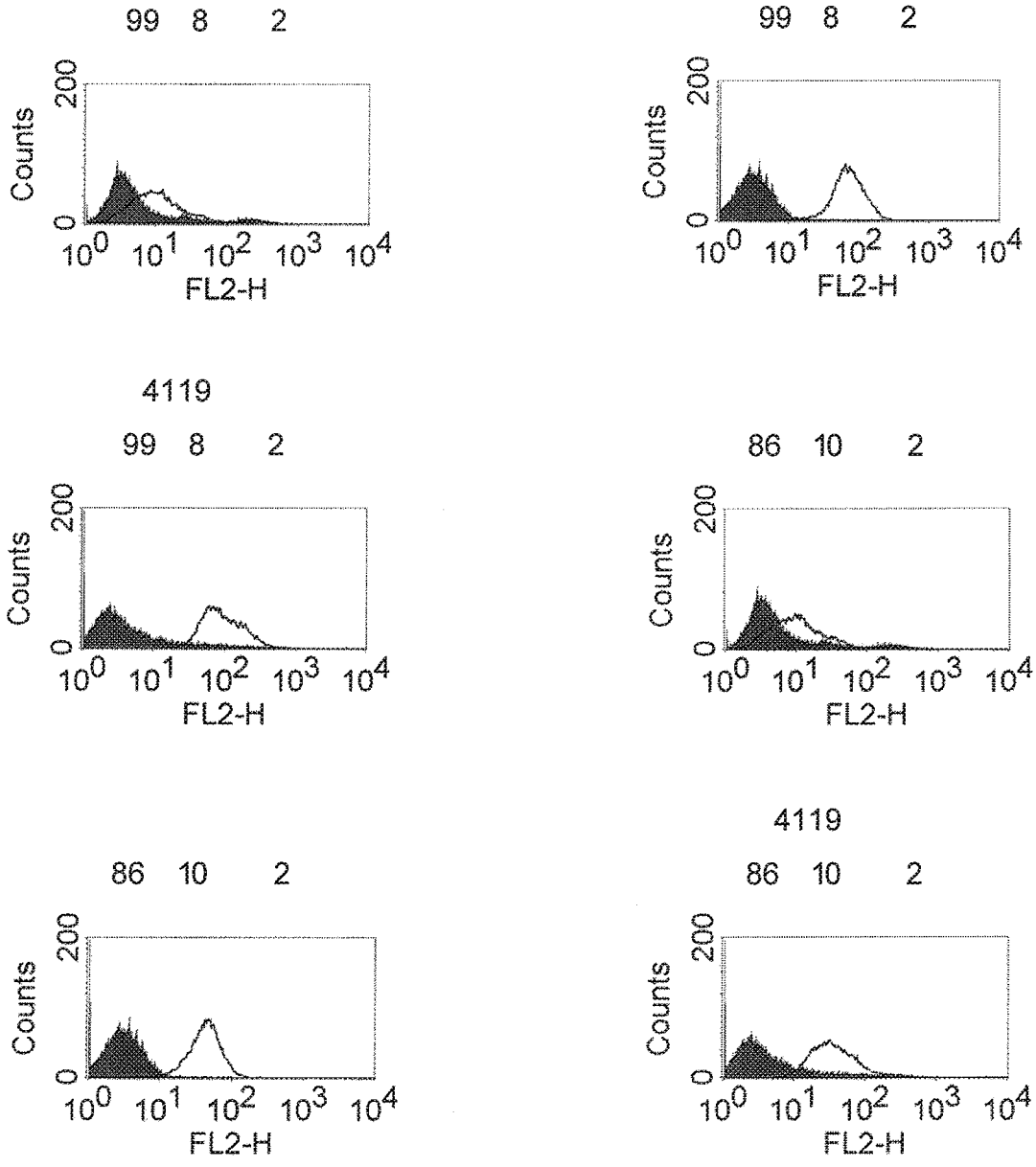
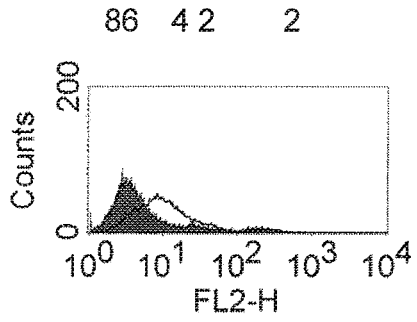
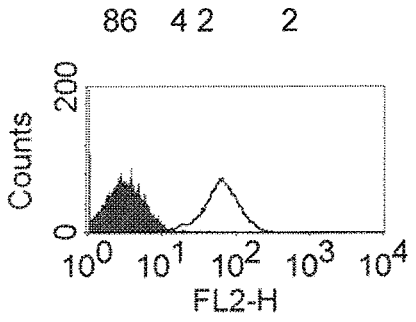
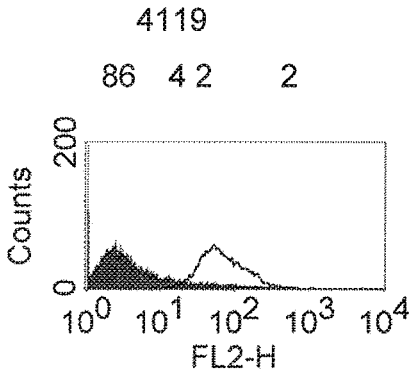
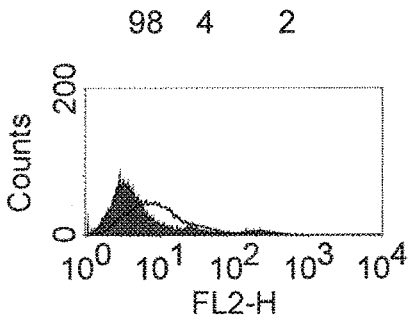

99 8 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
99 8 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
99 8 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
86 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
86 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
86 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

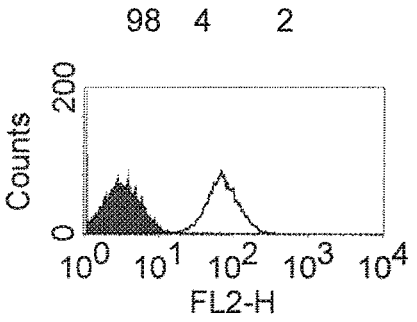
Figure 49b


86 4 2 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


86 4 2 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


4119
86 4 2 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


98 4 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


98 4 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

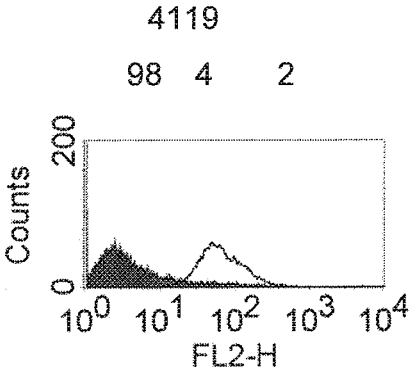
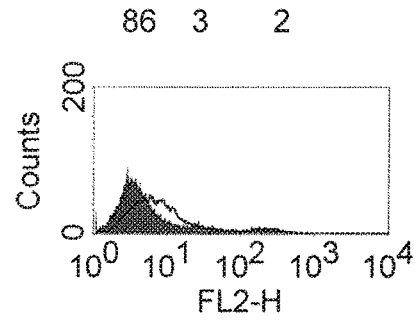
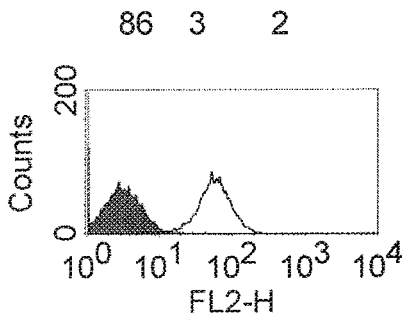
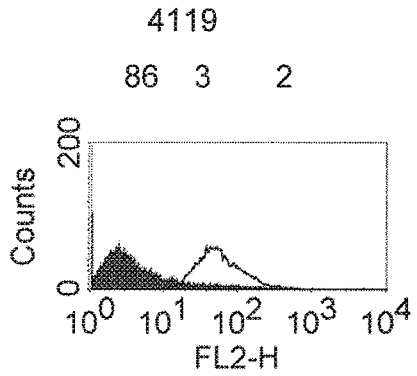
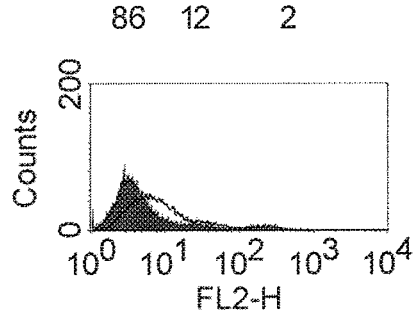

4119
98 4 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

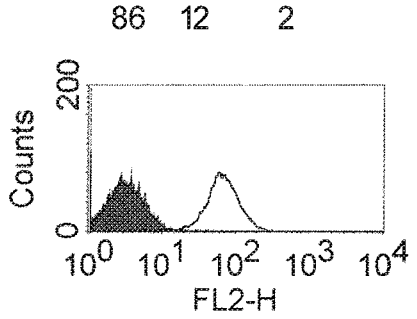
Figure 49c


86 3 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


86 3 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


4119
86 3 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


86 12 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H


86 12 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

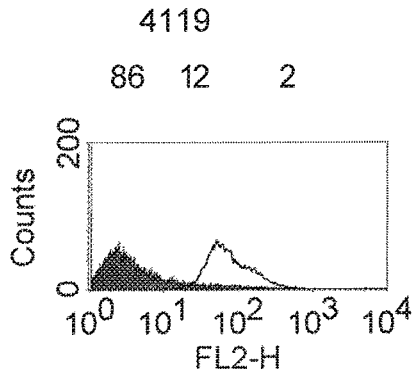

4119
86 12 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 49d

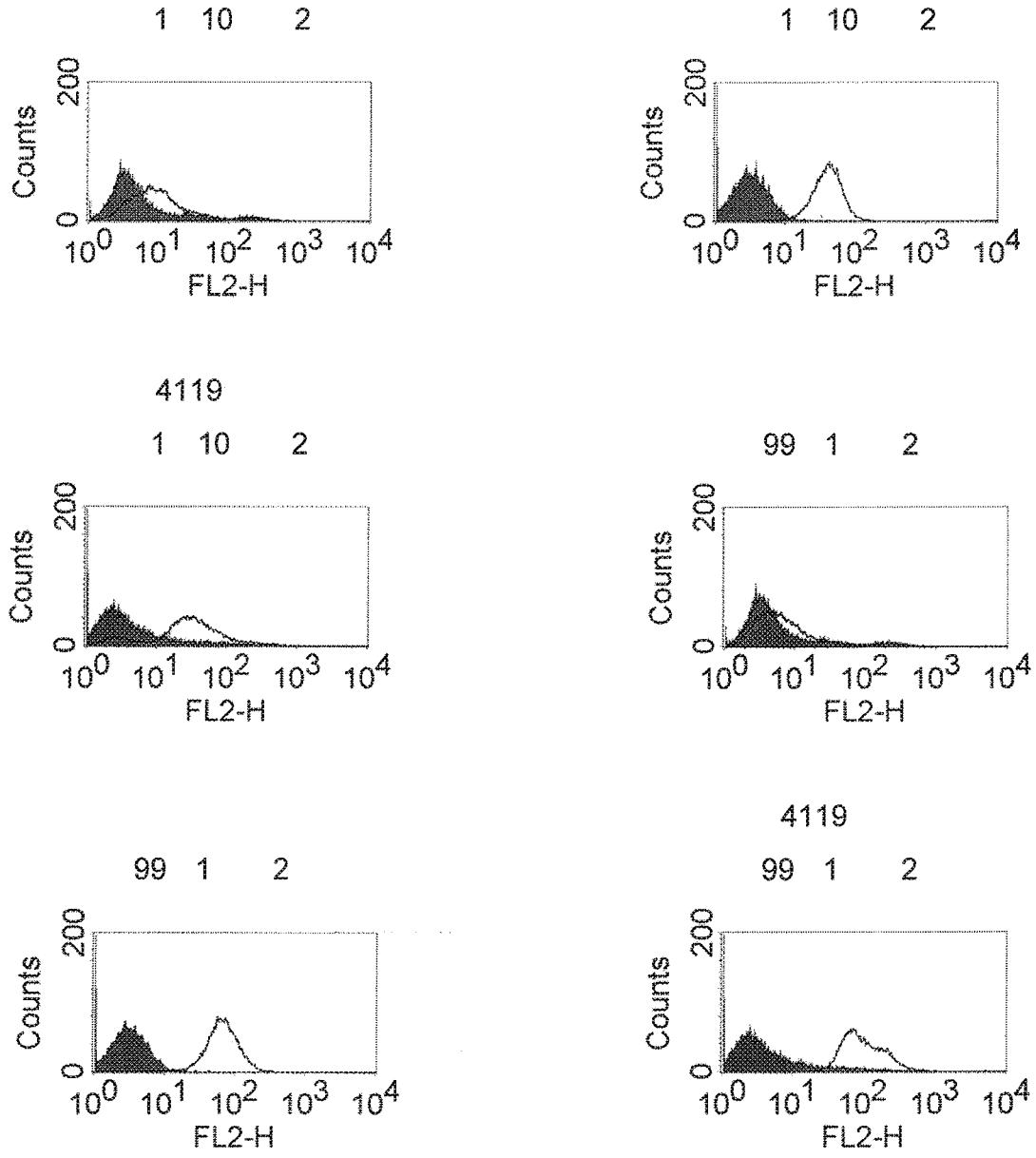

1 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
1 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
1 10 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
99 1 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
99 1 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
99 1 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 49e

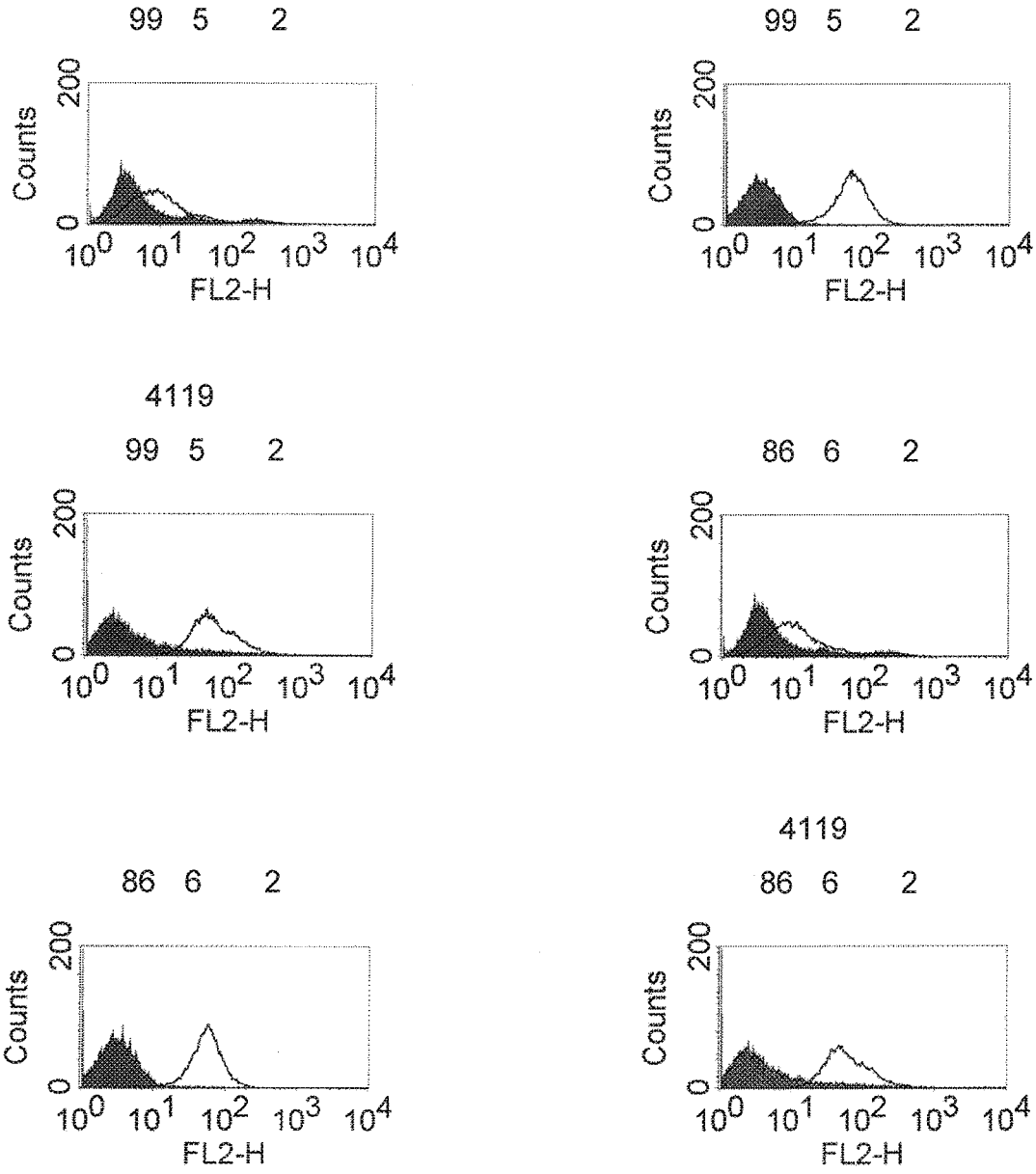
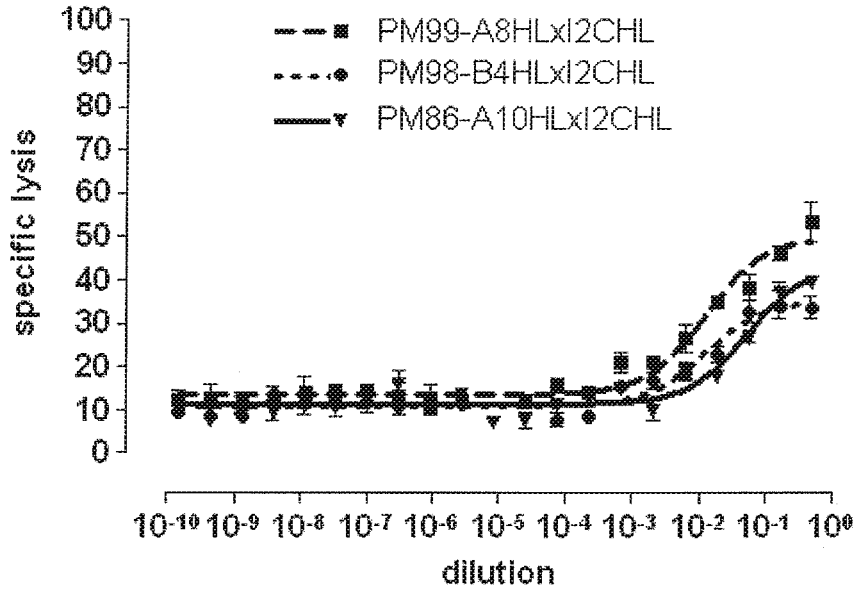

99 5 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
99 5 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
99 5 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
86 6 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
86 6 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H
4119
86 6 2
Counts
200
0
10^0 10^1 10^2 10^3 10^4
FL2-H

Figure 50(1)

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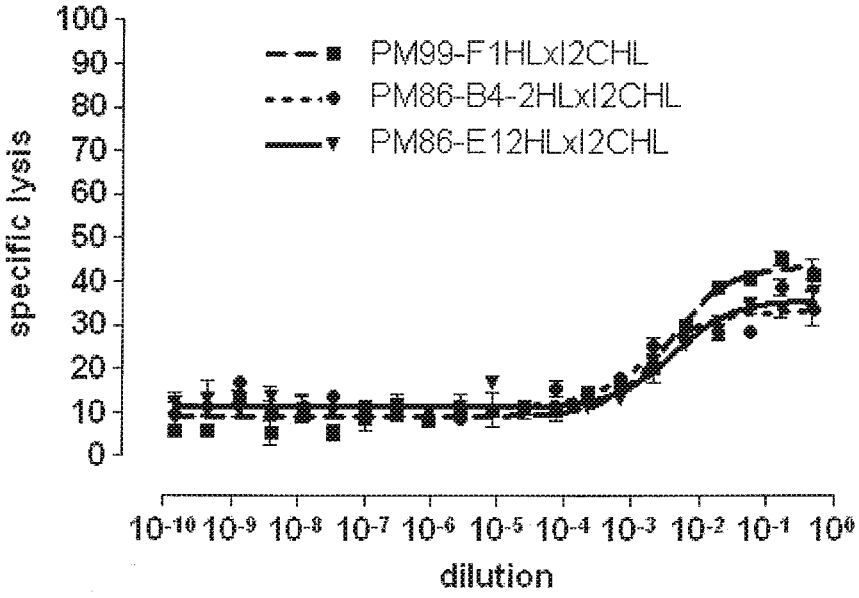
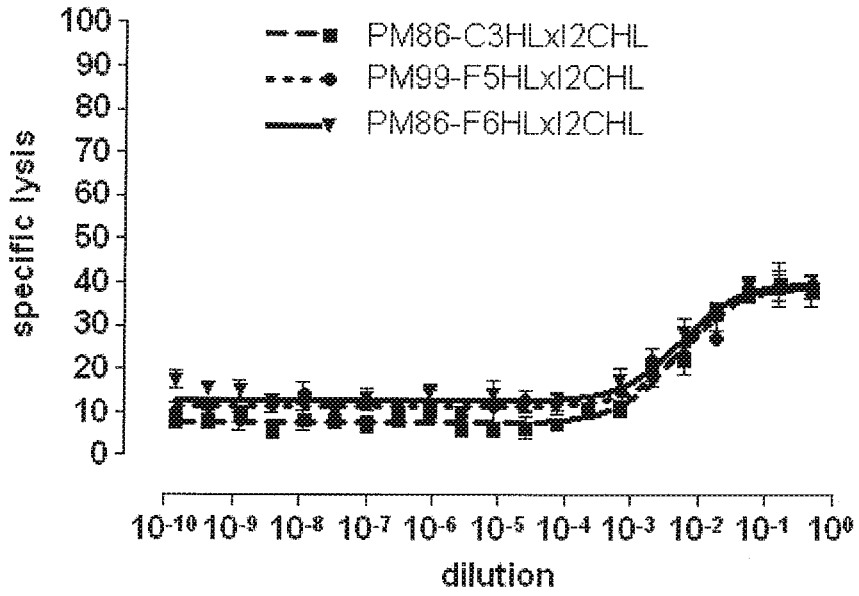


Figure 50(2)

4/ 56



4/ 56

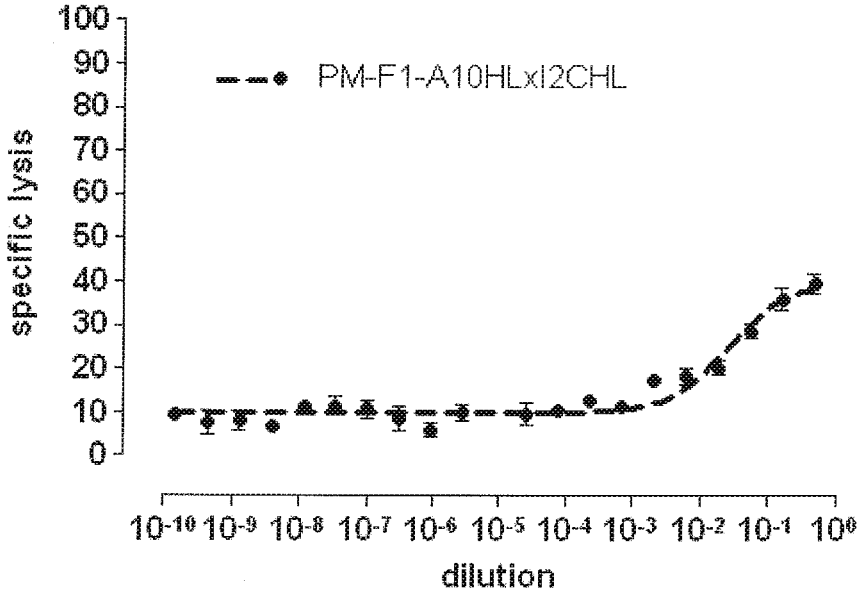
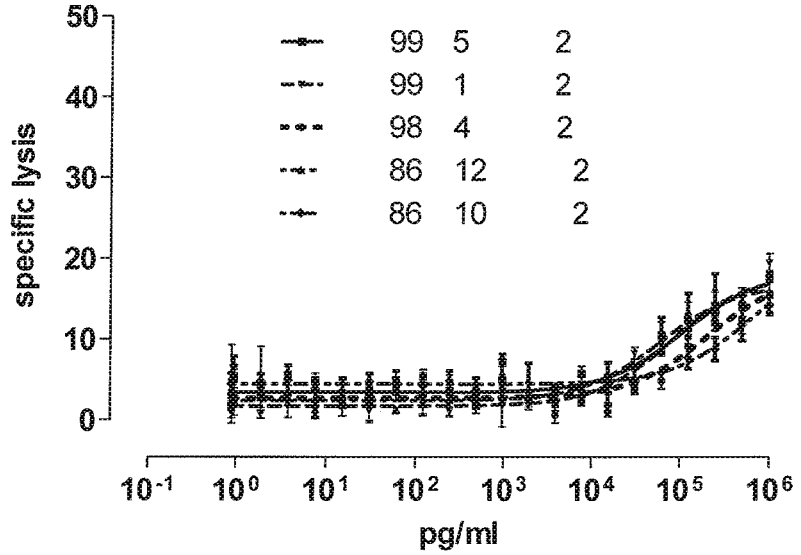
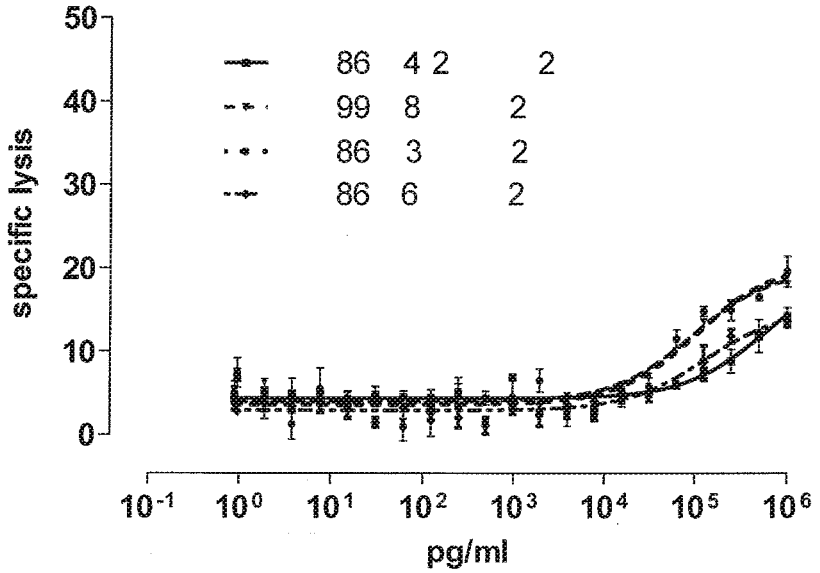


Figure 50(3)

A) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA



B) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA



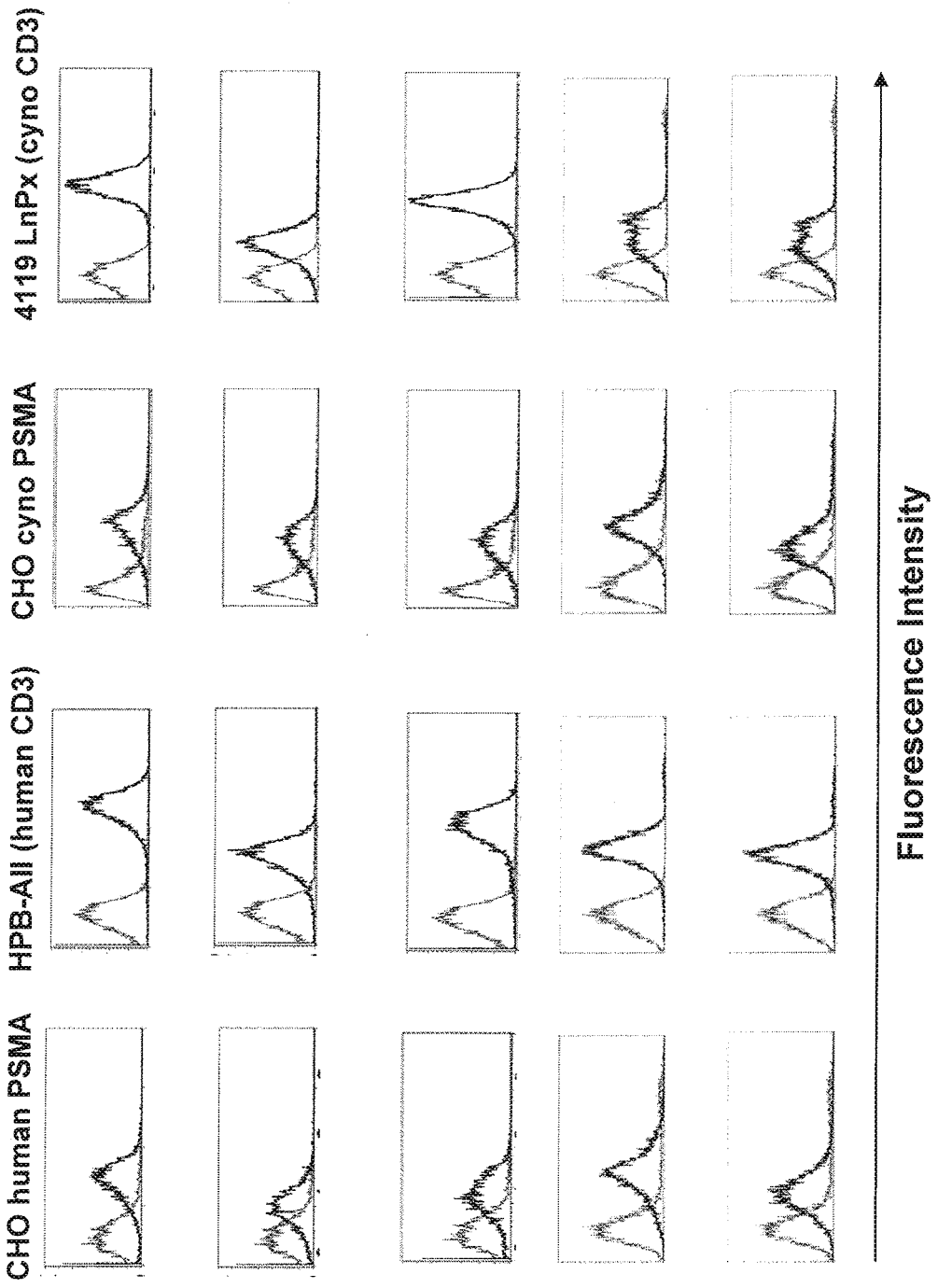

CHO human PSMA
HPB-All (human CD3)
CHO cyno PSMA
4119 LnPx (cyno CD3)
PM08-B6 HL x I2C HL
PM08-E11 HL x I2C HL
PM95-A8 HL x I2C HL
PM26-C9 HL x I2C HL
PM26-H4 x I2C HL
Counts
Fluorescence Intensity

Figure: 51a

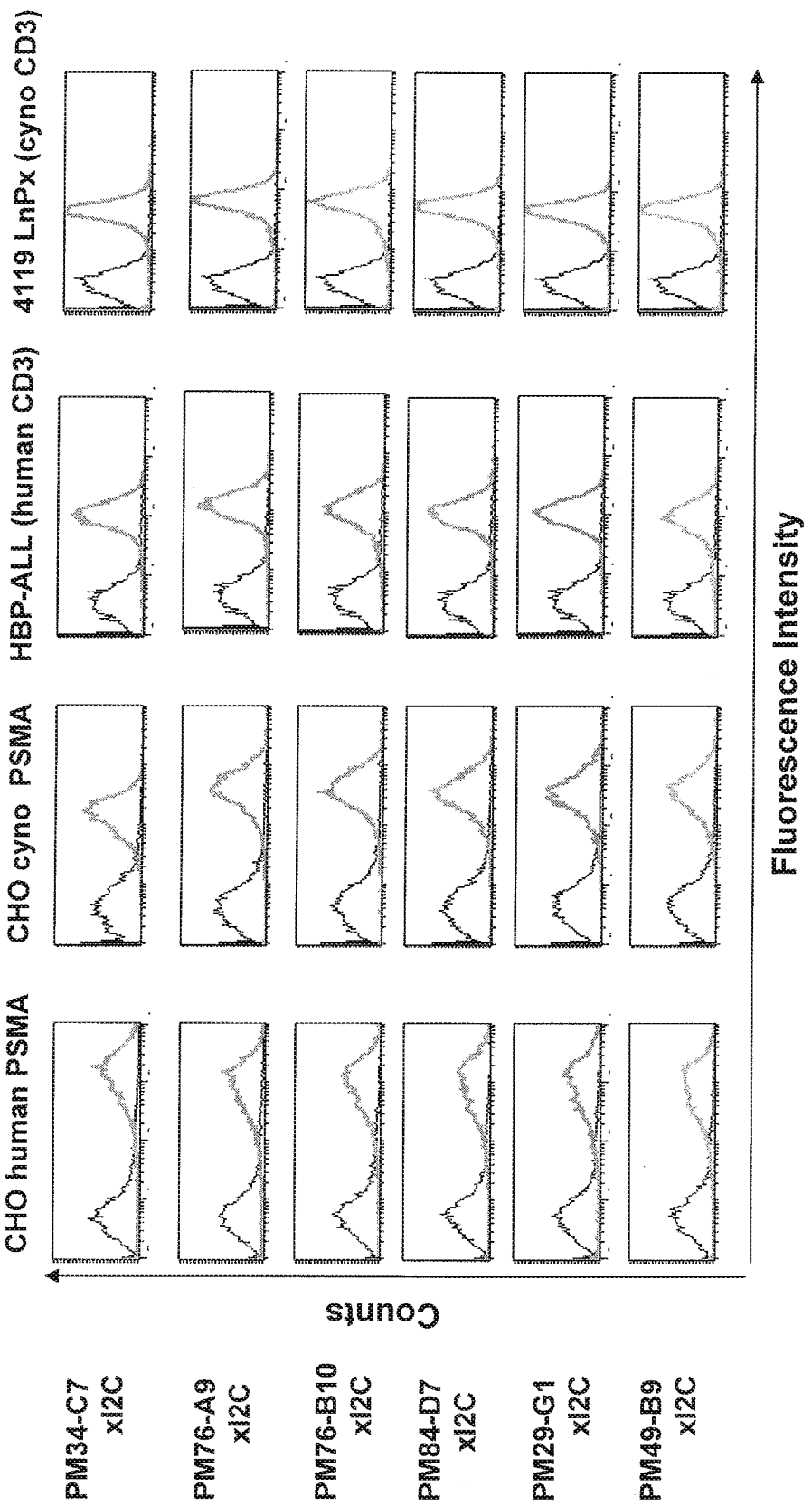

CHO human PSMA
CHO cyno PSMA
HBP-ALL (human CD3)
4119 LnPx (cyno CD3)
Counts
Fluorescence Intensity
PM34-C7 xI2C
PM76-A9 xI2C
PM76-B10 xI2C
PM84-D7 xI2C
PM29-G1 xI2C
PM49-B9 xI2C

Figure: 51b

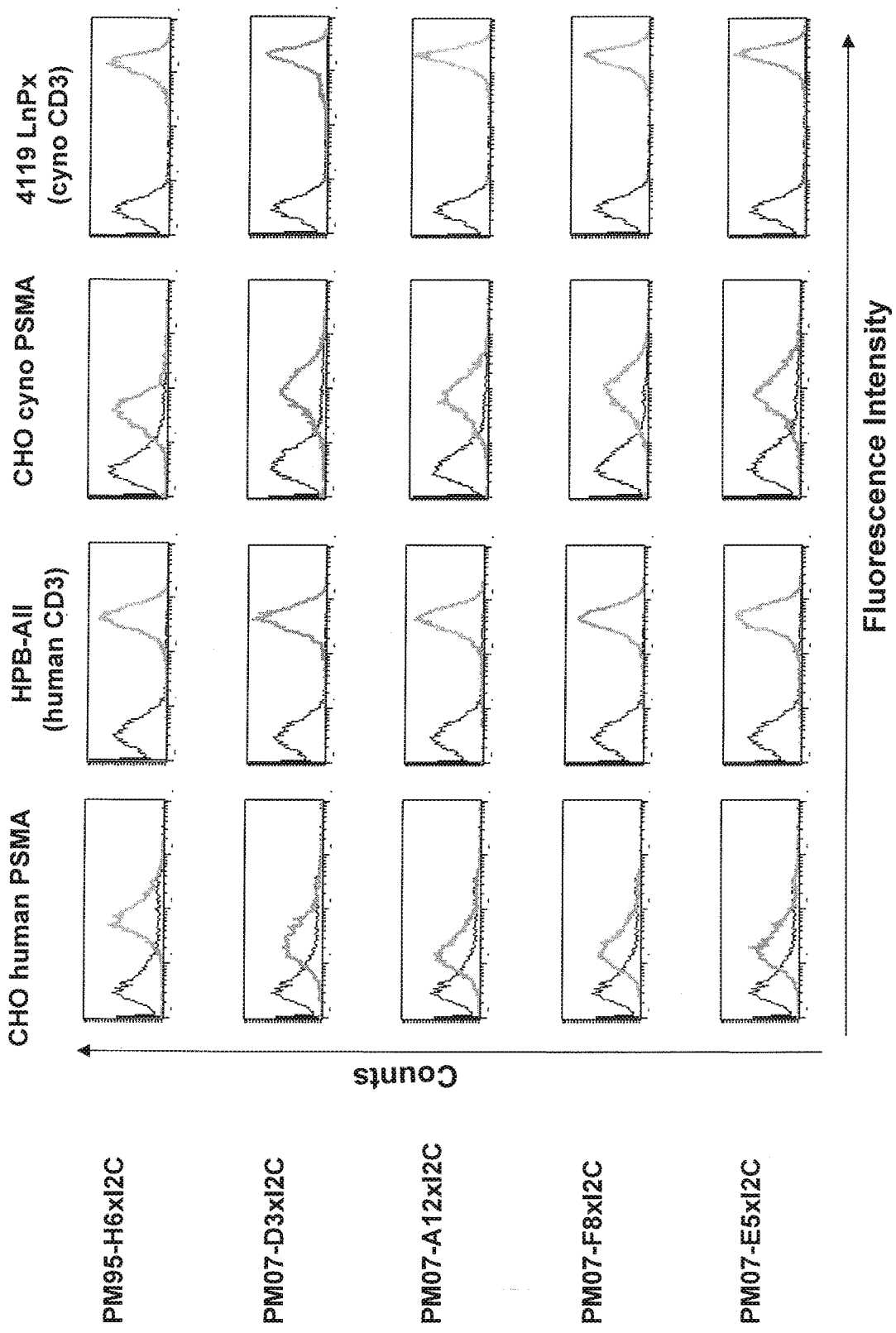
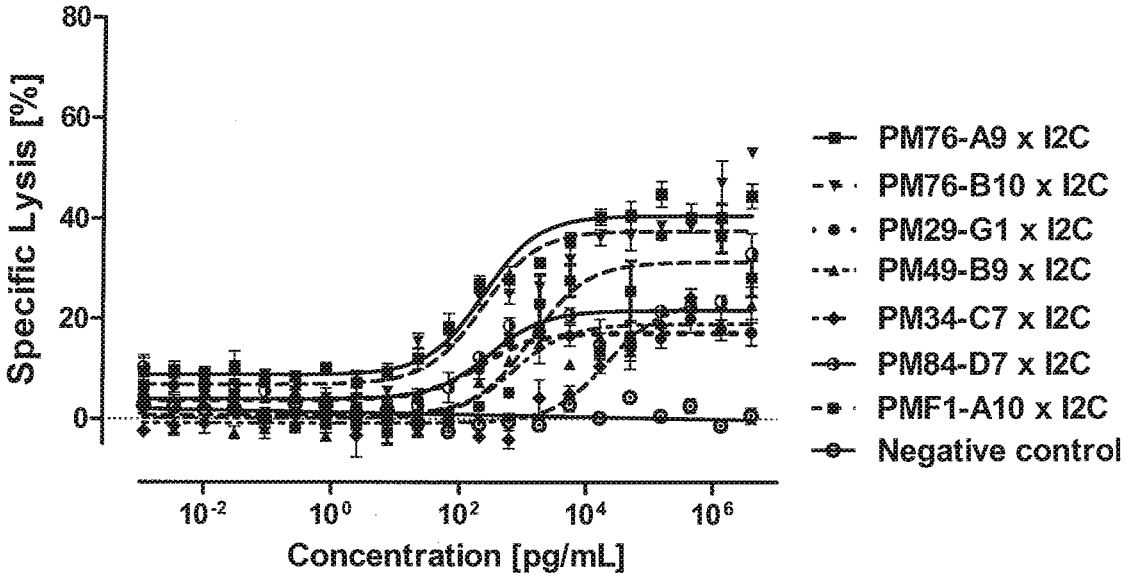

CHO human PSMA
HPB-All (human CD3)
CHO cyno PSMA
4119 LnPx (cyno CD3)
PM95-H6xI2C
PM07-D3xI2C
PM07-A12xI2C
PM07-F8xI2C
PM07-E5xI2C
Counts
Fluorescence Intensity

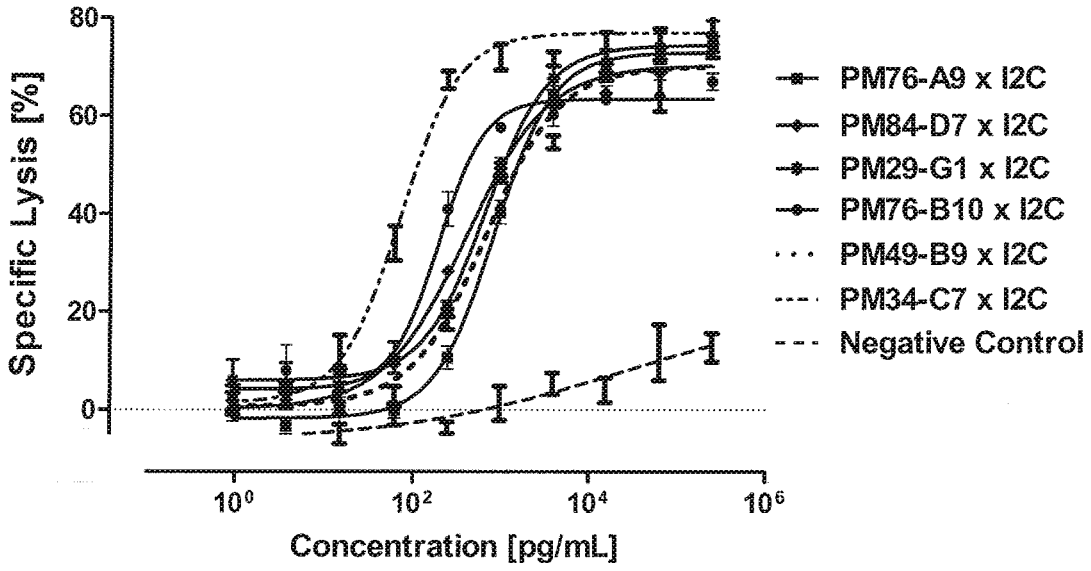
Figure: 51c

Figure 52

A) Effector cells: 4119LnPx
Target cells: CHO transfected with macaque PSMA



B) Effector cells: human unstimulated PBMC
Target cells: CHO transfected with human PSMA



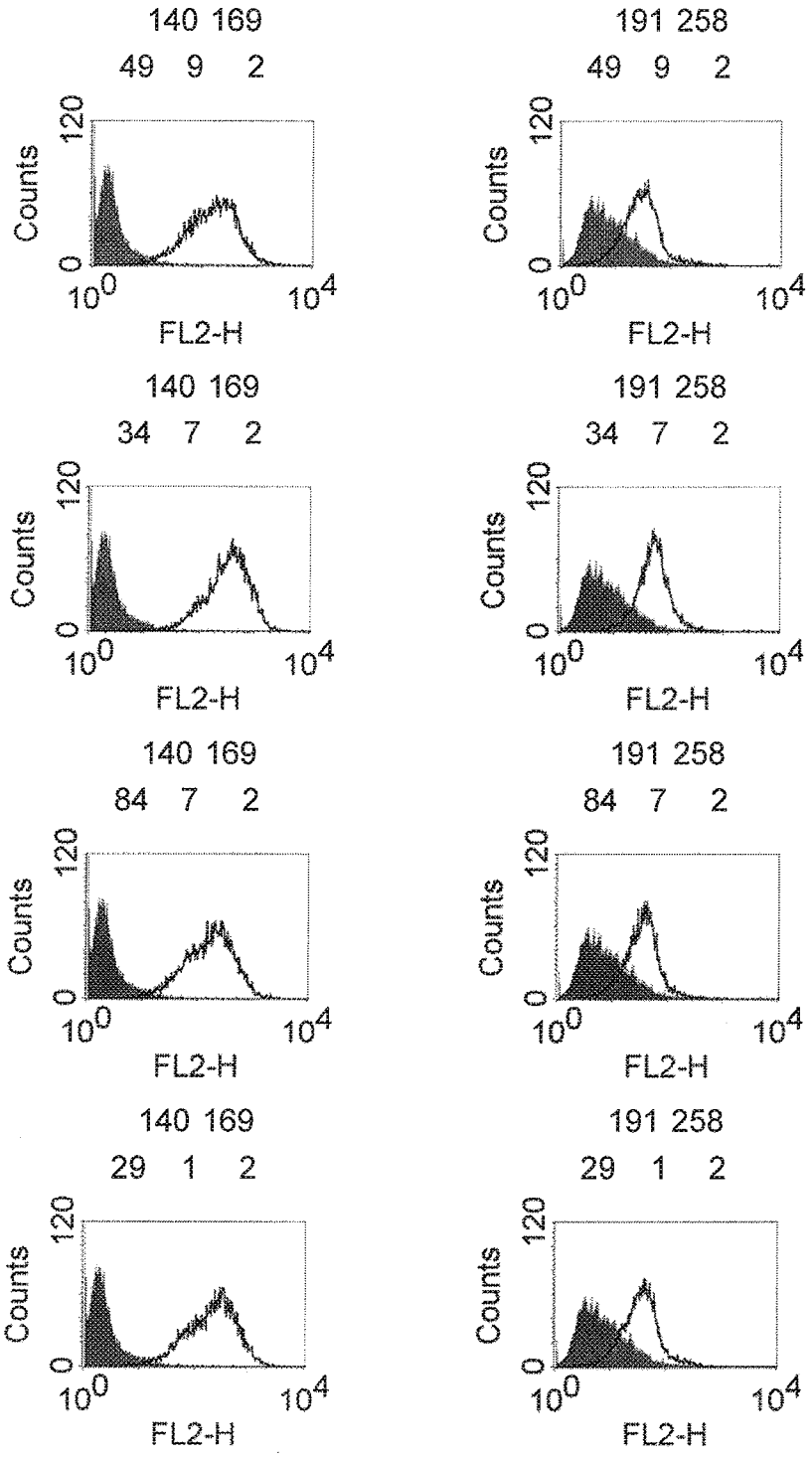

140 169
49 9 2
191 258
49 9 2
140 169
34 7 2
191 258
34 7 2
140 169
84 7 2
191 258
84 7 2
140 169
29 1 2
191 258
29 1 2
Counts
120
0
10^0
10^4
FL2-H

Figure 53a

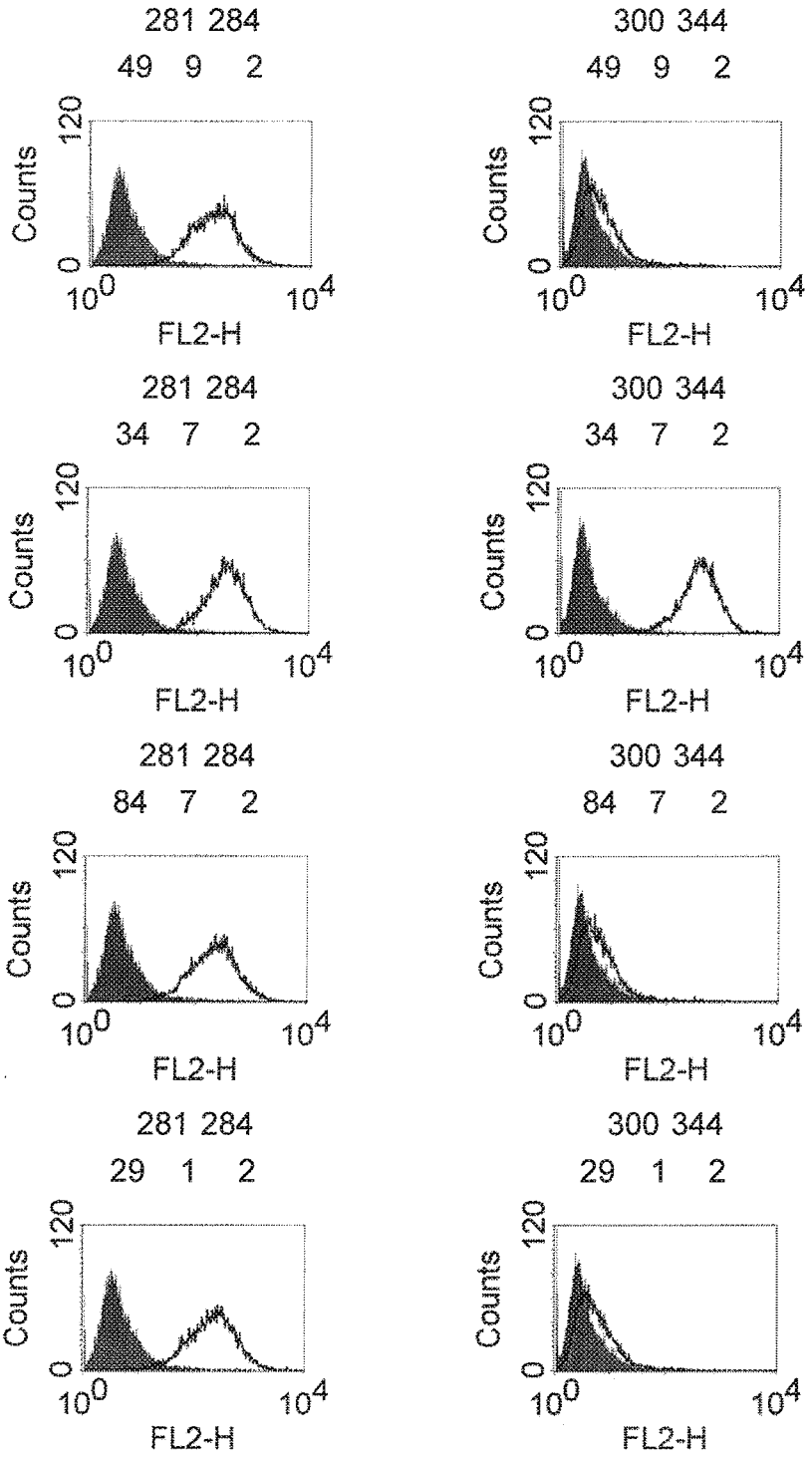

281 284
49 9 2
300 344
49 9 2
Counts
120
0
10^0
10^4
FL2-H
281 284
34 7 2
300 344
34 7 2
281 284
84 7 2
300 344
84 7 2
281 284
29 1 2
300 344
29 1 2

Figure 53b

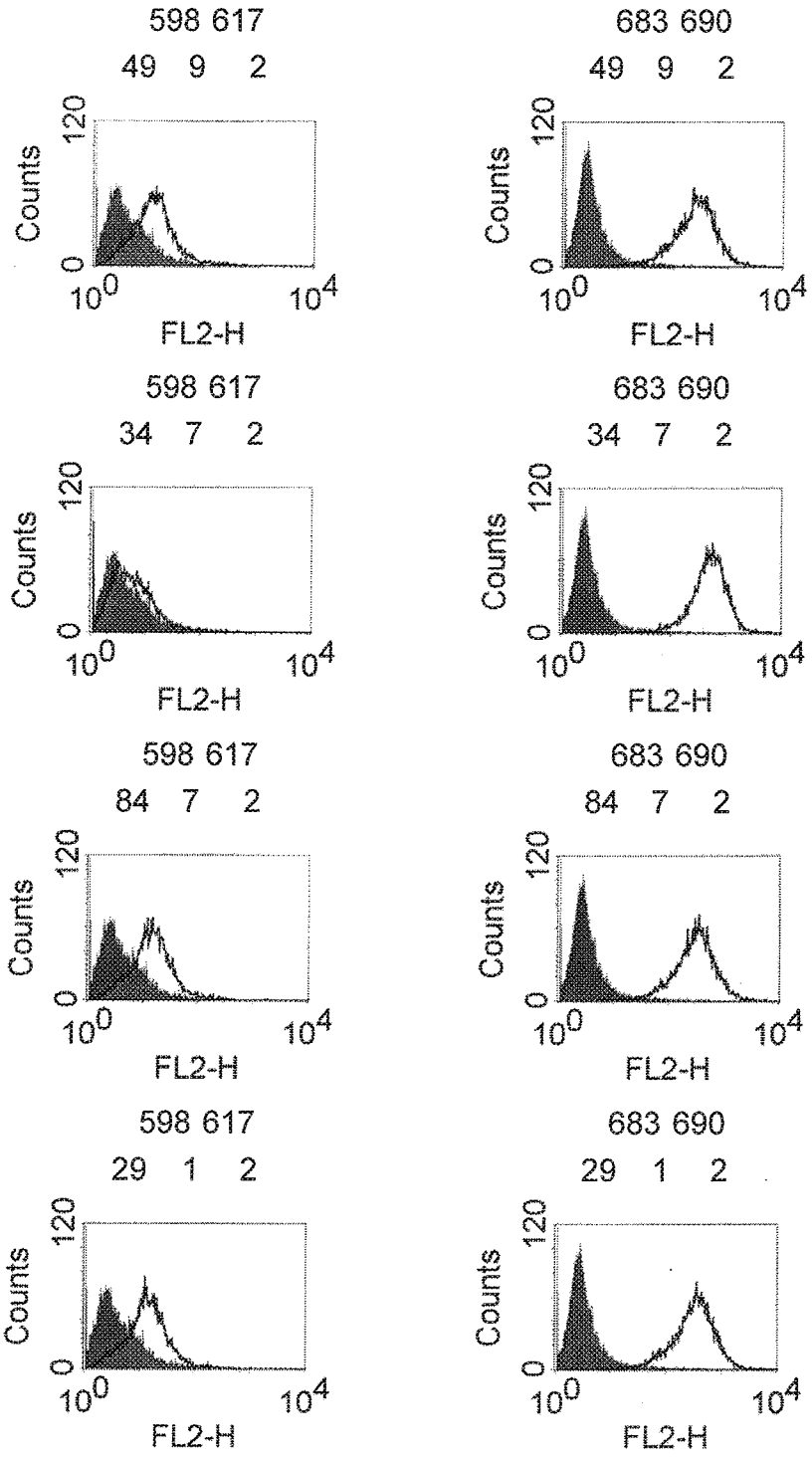

598 617
49 9 2
683 690
49 9 2
598 617
34 7 2
683 690
34 7 2
598 617
84 7 2
683 690
84 7 2
598 617
29 1 2
683 690
29 1 2
Counts
120
0
10^0
10^4
FL2-H

Figure 53c

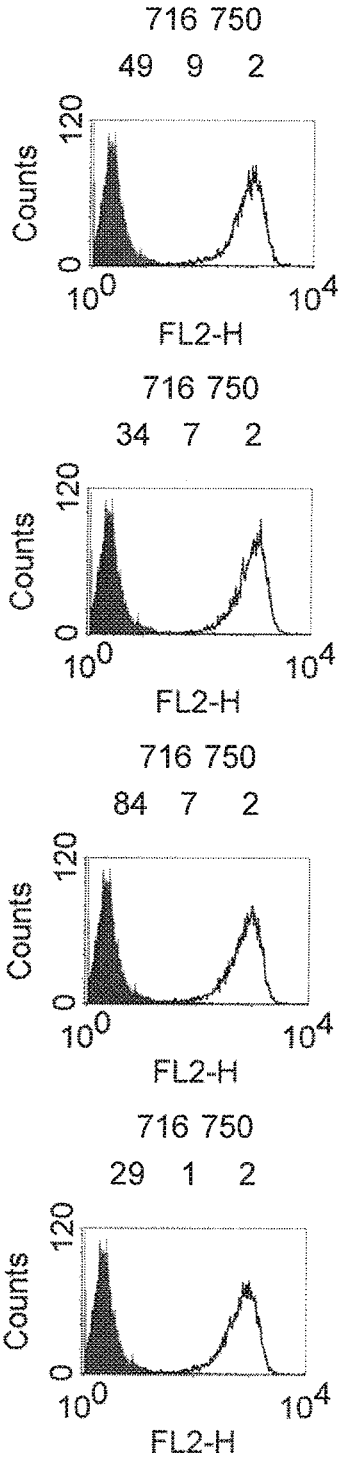

716 750
49 9 2
Counts
120
0
10^0
10^4
FL2-H
716 750
34 7 2
Counts
120
0
10^0
10^4
FL2-H
716 750
84 7 2
Counts
120
0
10^0
10^4
FL2-H
716 750
29 1 2
Counts
120
0
10^0
10^4
FL2-H

Figure 53d

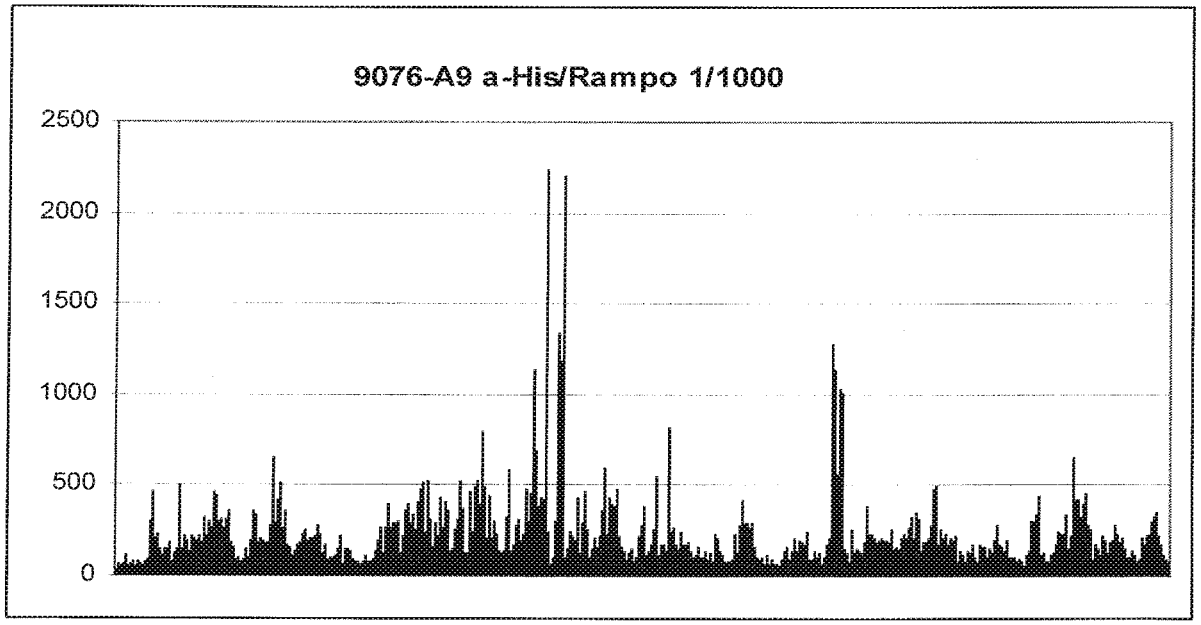


Figure 54

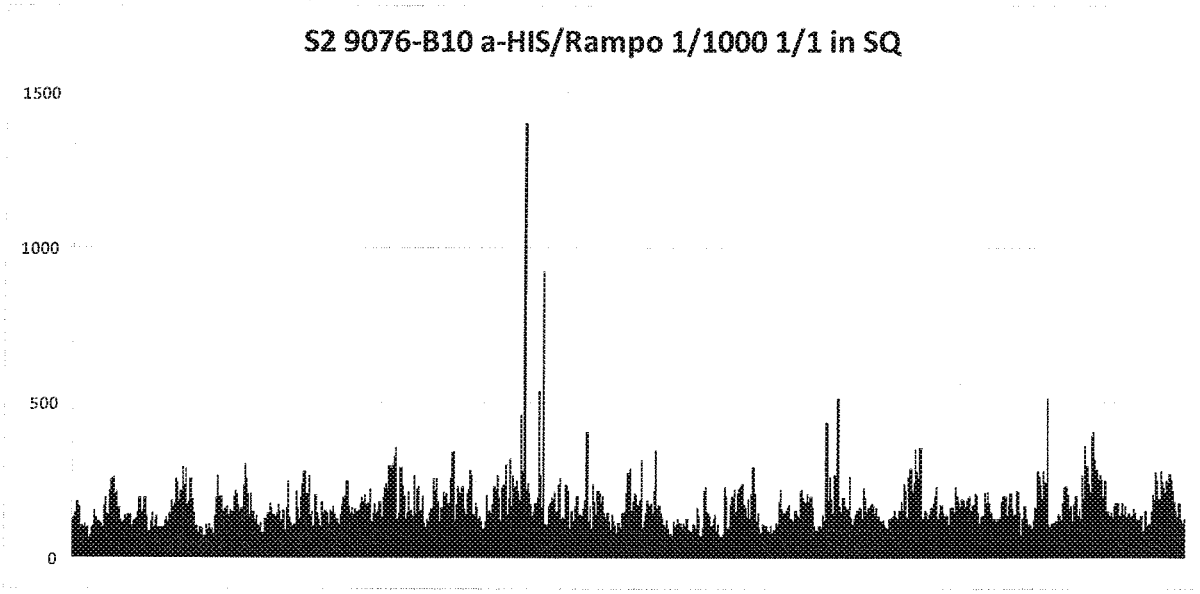


Figure 55

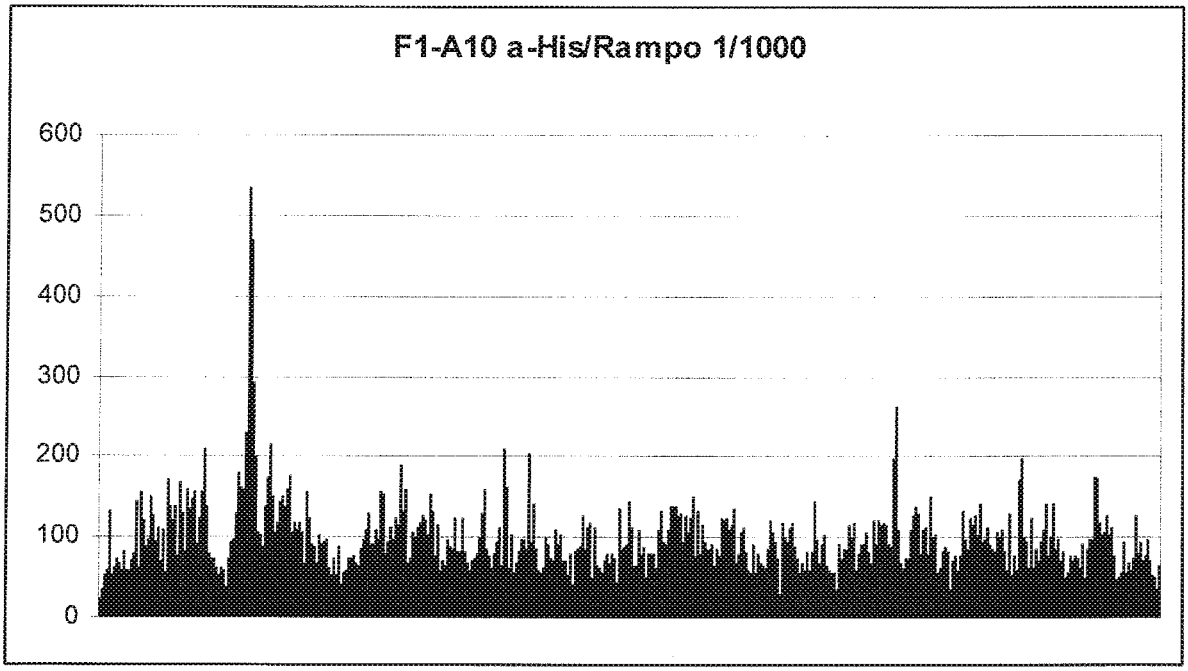


Figure 56

Figure 57

