



US 20220175899A1

(19) **United States**(12) **Patent Application Publication**
NAKAUCHI et al.(10) **Pub. No.: US 2022/0175899 A1**(43) **Pub. Date: Jun. 9, 2022**(54) **CYTOTOXIC T LYMPHOCYTES SPECIFIC
FOR MUTATED FORMS OF EPIDERMAL
GROWTH FACTOR RECEPTOR FOR USE IN
TREATING CANCER***C12N 5/074* (2006.01)*A61P 35/00* (2006.01)(52) **U.S. Cl.**CPC *A61K 39/001104* (2018.08); *C12N 5/0638*(2013.01); *A61P 35/00* (2018.01); *A61K**39/001154* (2018.08); *C12N 5/0696* (2013.01)(71) Applicant: **The Board of Trustees of the Leland
Stanford Junior University, Stanford,
CA (US)**(72) Inventors: **Hiromitsu NAKAUCHI, Woodside,
CA (US); Tohinobu NISHIMURA,
Stanford, CA (US)**(57) **ABSTRACT**

Compositions, methods, and kits are provided for producing rejuvenated cytotoxic T cells (CTLs) specific for mutated neo-antigen epitopes expressed on cancerous cells, including epidermal growth factor receptor (EGFR) and KRAS neo-antigen epitopes. Antigen-specific CTLs are rejuvenated by reprogramming them into induced pluripotent stem cells (IPSCs) using Yamanaka factors and redifferentiating them back into CTLs while expanding their numbers. After redifferentiation, the IPSC-derived rejuvenated CTLs retain the antigen specificity of the original CTLs from which they were derived, but have the advantage of having longer telomeres and higher proliferative activity than the original CTLs. Pharmaceutical compositions comprising such IPSC-derived rejuvenated CTLs are useful for treating cancers expressing the mutated neo-antigen epitopes recognized by the original CTLs.

Specification includes a Sequence Listing.(21) Appl. No.: **17/601,282**(22) PCT Filed: **Apr. 7, 2020**(86) PCT No.: **PCT/US2020/027020**

§ 371 (c)(1),

(2) Date: **Oct. 4, 2021****Related U.S. Application Data**

(60) Provisional application No. 62/832,626, filed on Apr. 11, 2019.

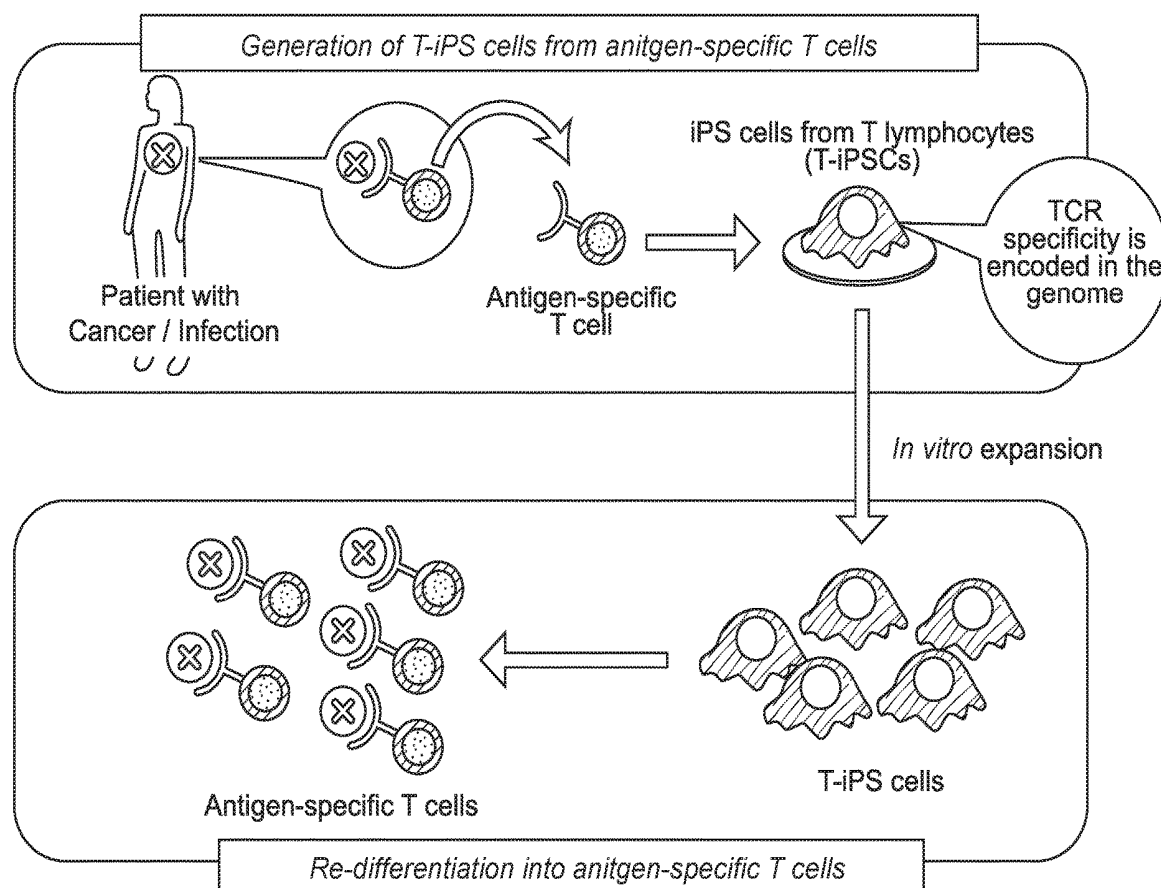
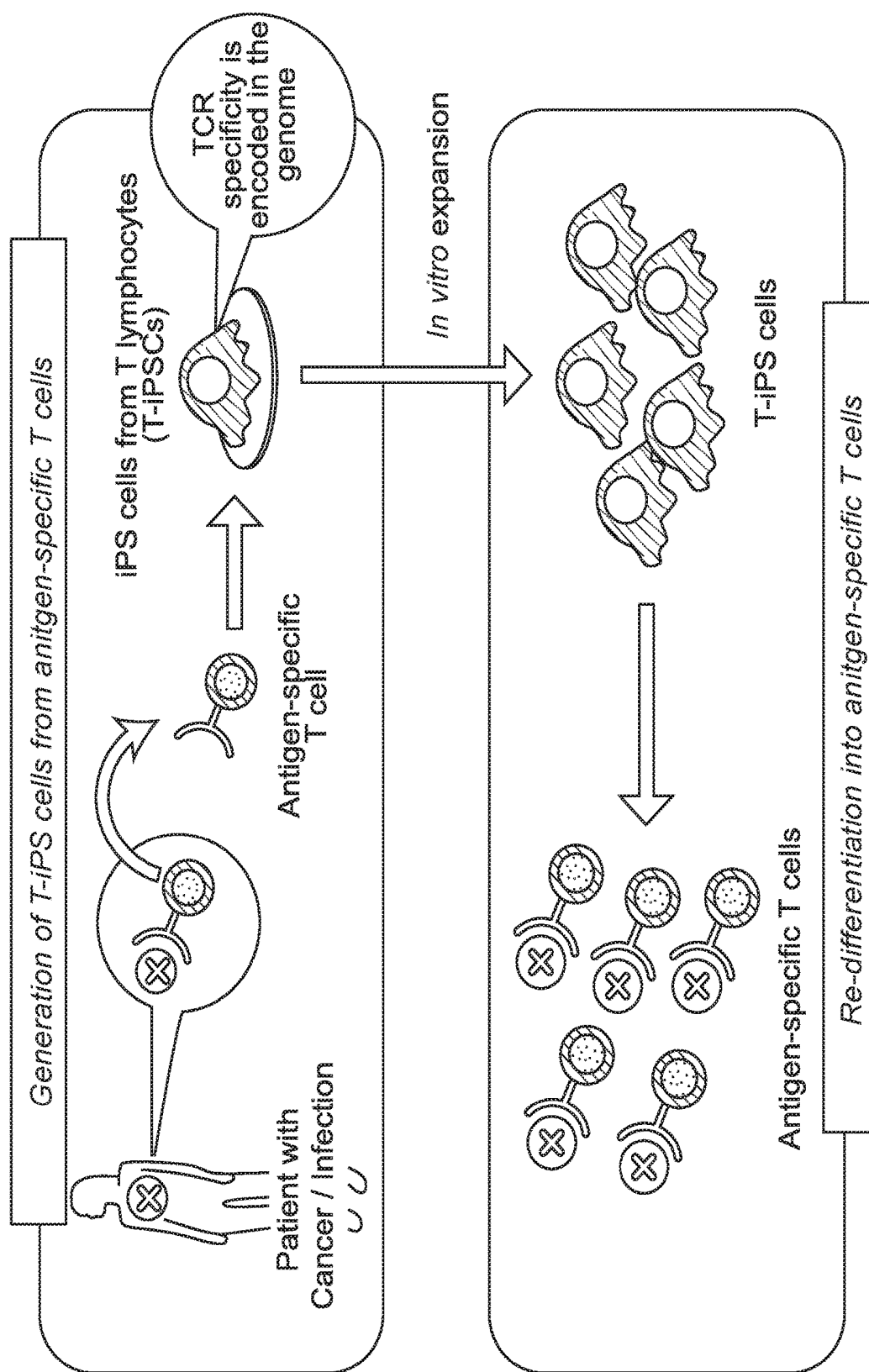
Publication Classification(51) **Int. Cl.***A61K 39/00* (2006.01)*C12N 5/0783* (2006.01)

FIG. 1



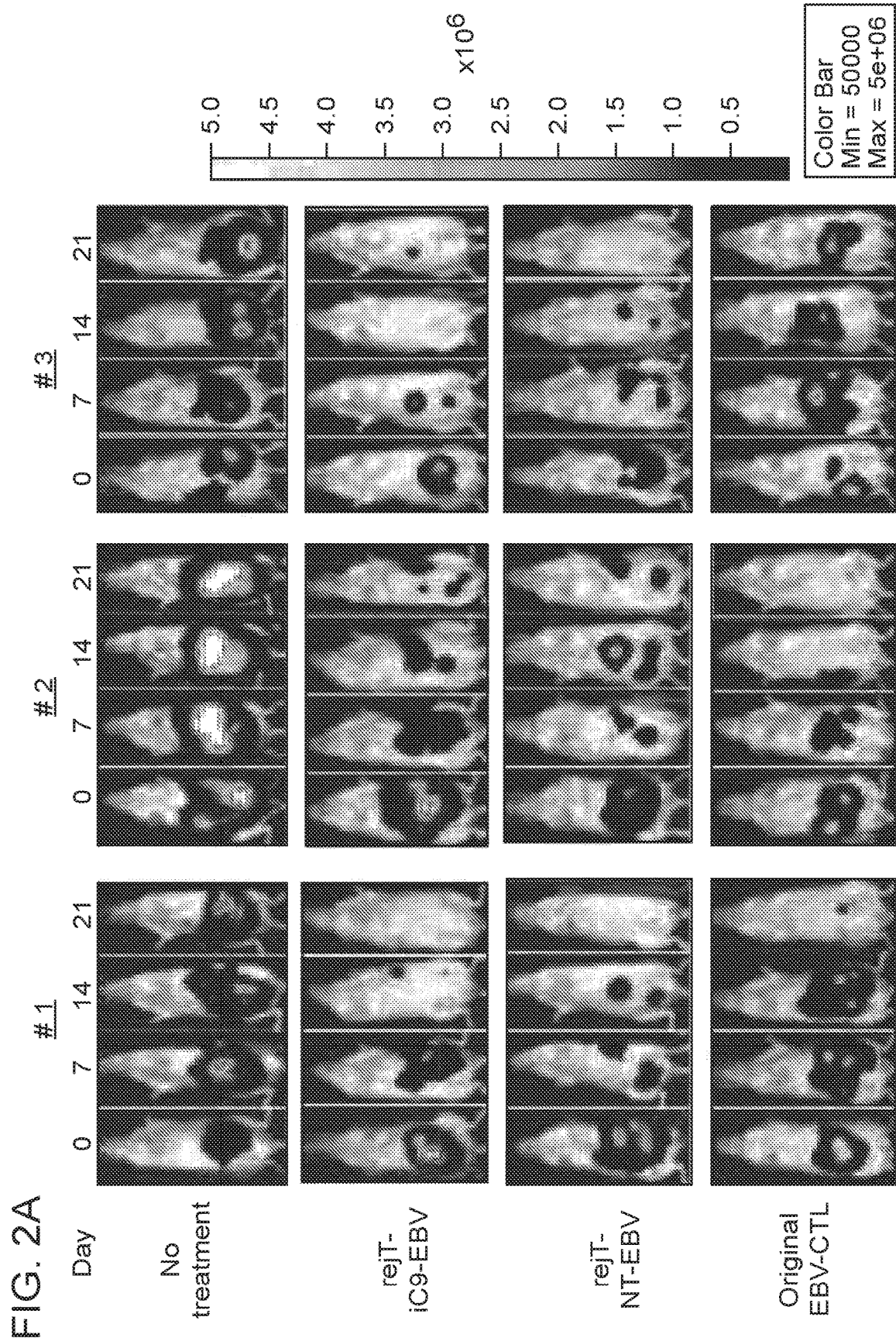


FIG. 2B

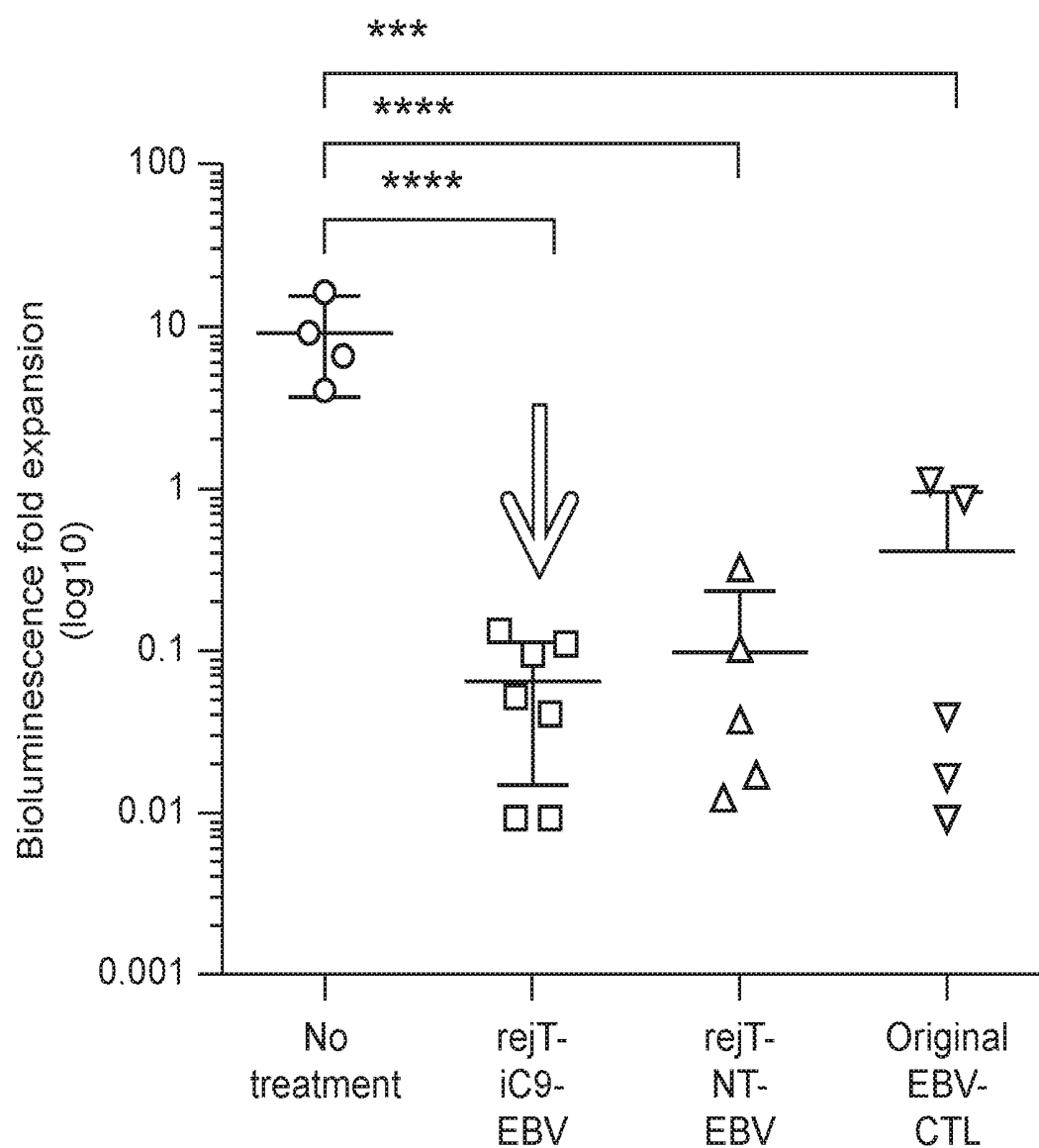


FIG. 3A

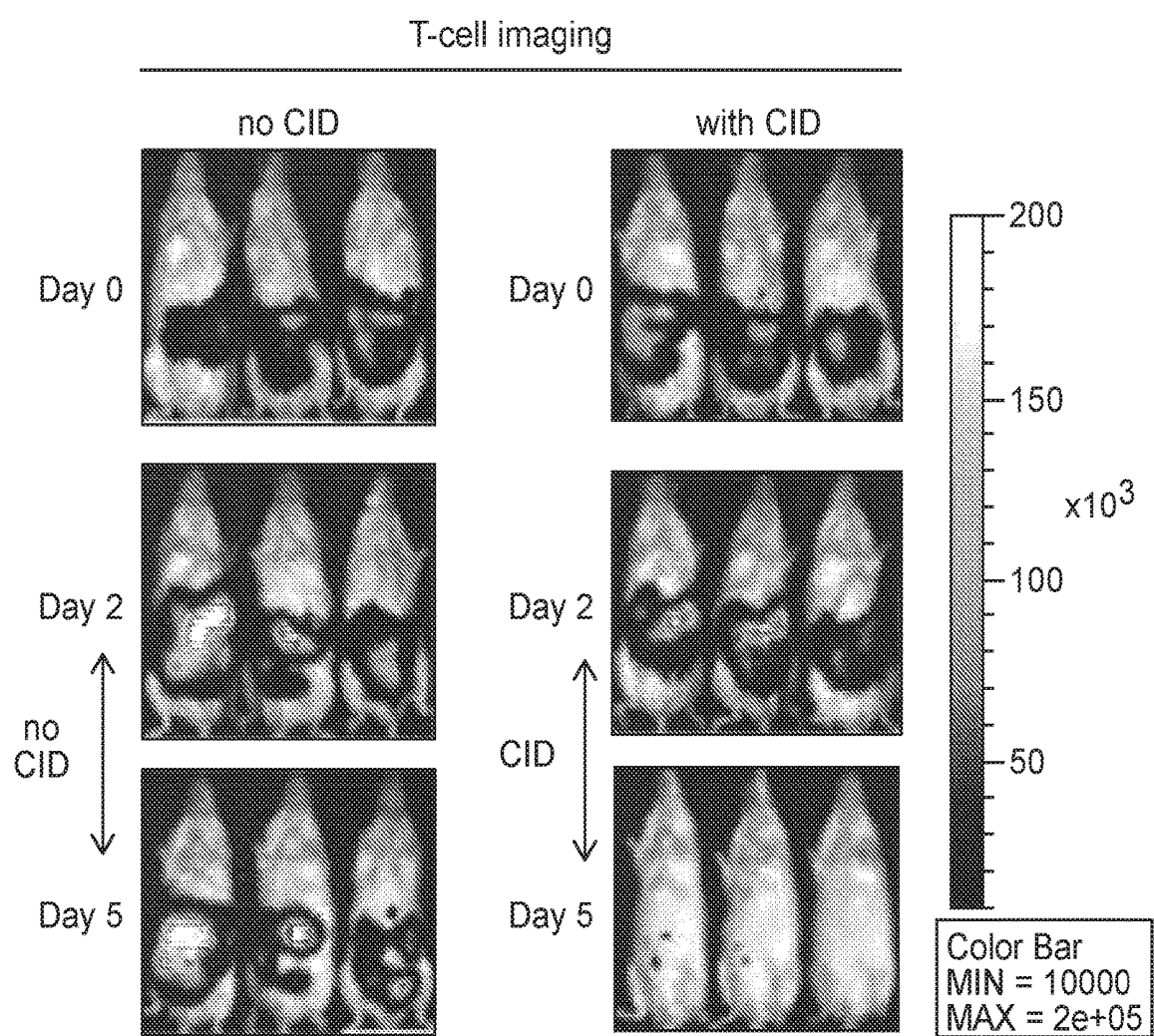


FIG. 3B

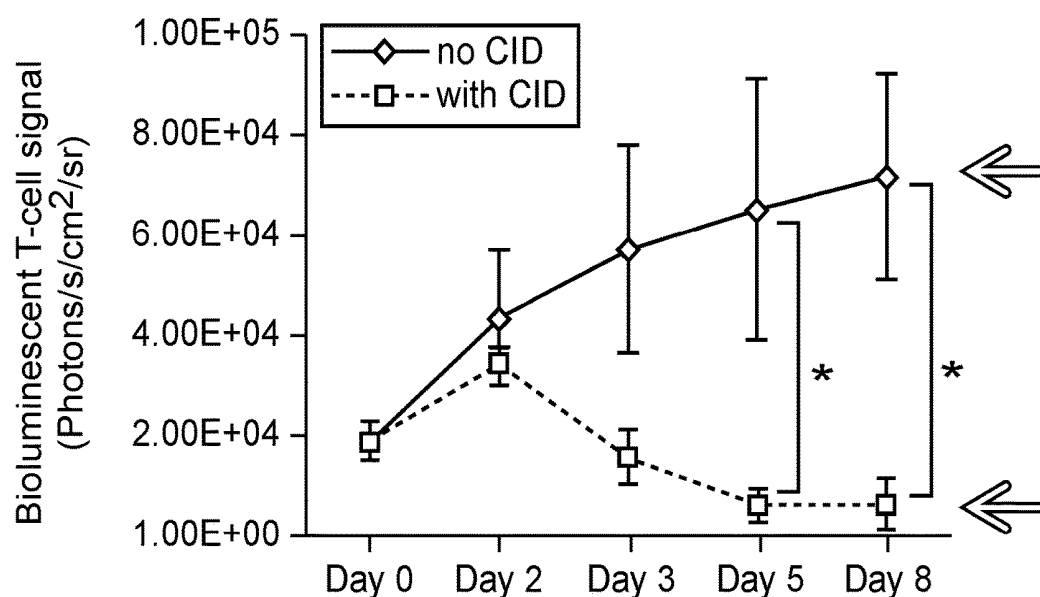


FIG. 4

EGFR/KRAS neo-antigen candidates

<u>Driver Gene</u>	<u>Mutation</u>	<u>Peptide ID</u>	<u>Sequence</u>
EGFR	C797S	CS9.3	QLMPFGSLL
	C797S	CS11.6	LMPFGSLLDYV
KRAS	G12D	GD10.3	KLVVVGADGV
	G12V	GD10.3	KLVVVGAVGV
	G12C	GC10.3	KLVVVGACGV

EGFR C797S ➡ T cell expansion [Ongoing], Target cell line [Ready]

KRAS G12D ➡ T cell expansion [Ongoing], Tumor xenograft [AML; Ready]

KRAS G12V ➡ Using nude mouse as recipient to overcome
angiogenesis problem in tumor
AML experiment is ongoing

KRAS G12C ➡ Ag-specific T cell cloning [Ongoing],
Tumor xenograft [Ongoing]

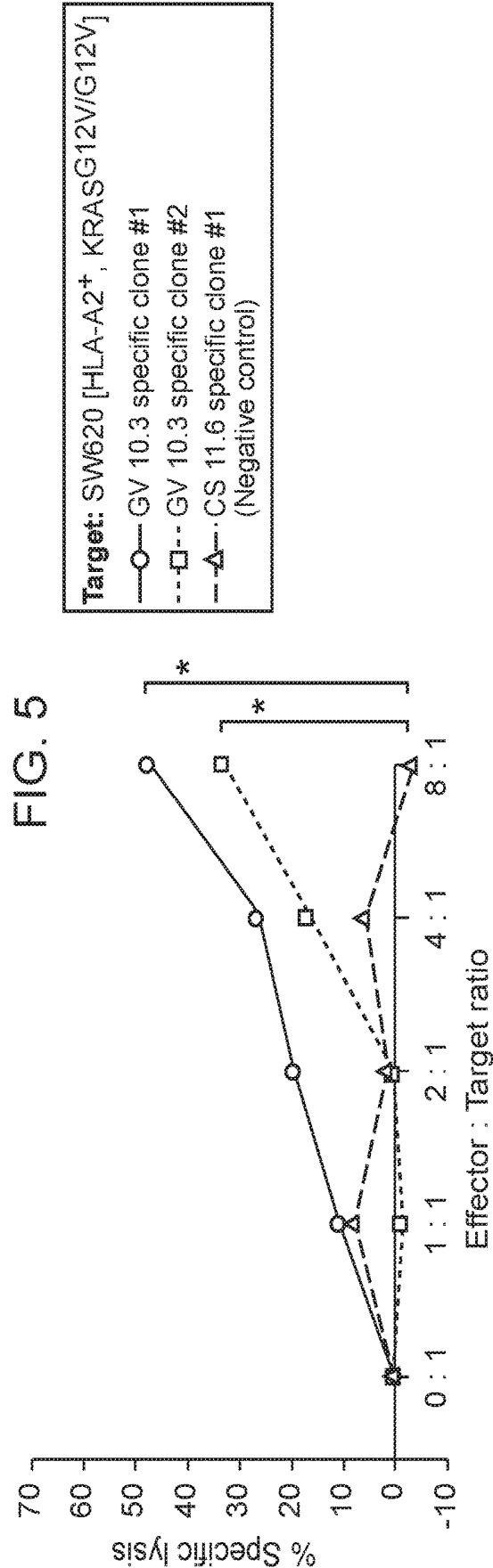


FIG. 6A

Isolation of rare neoantigen-reactive T cells from peripheral

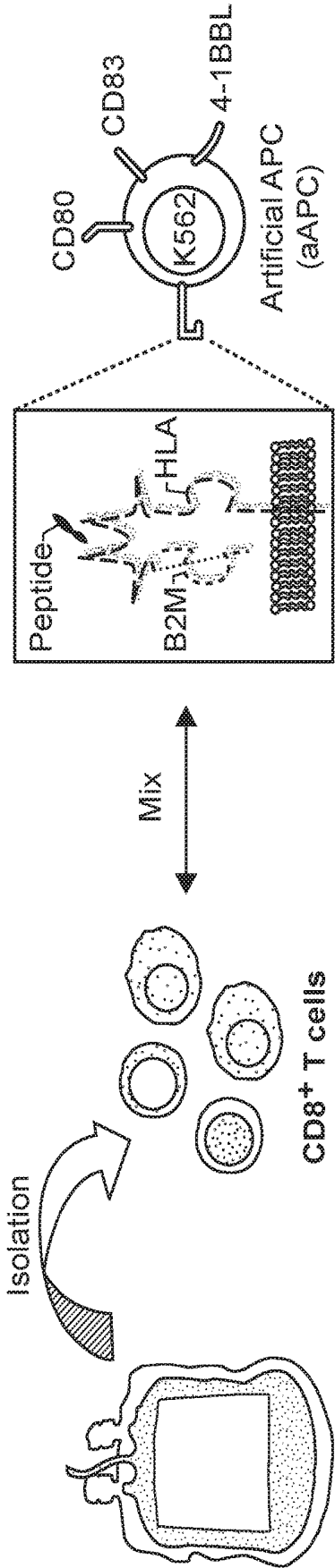
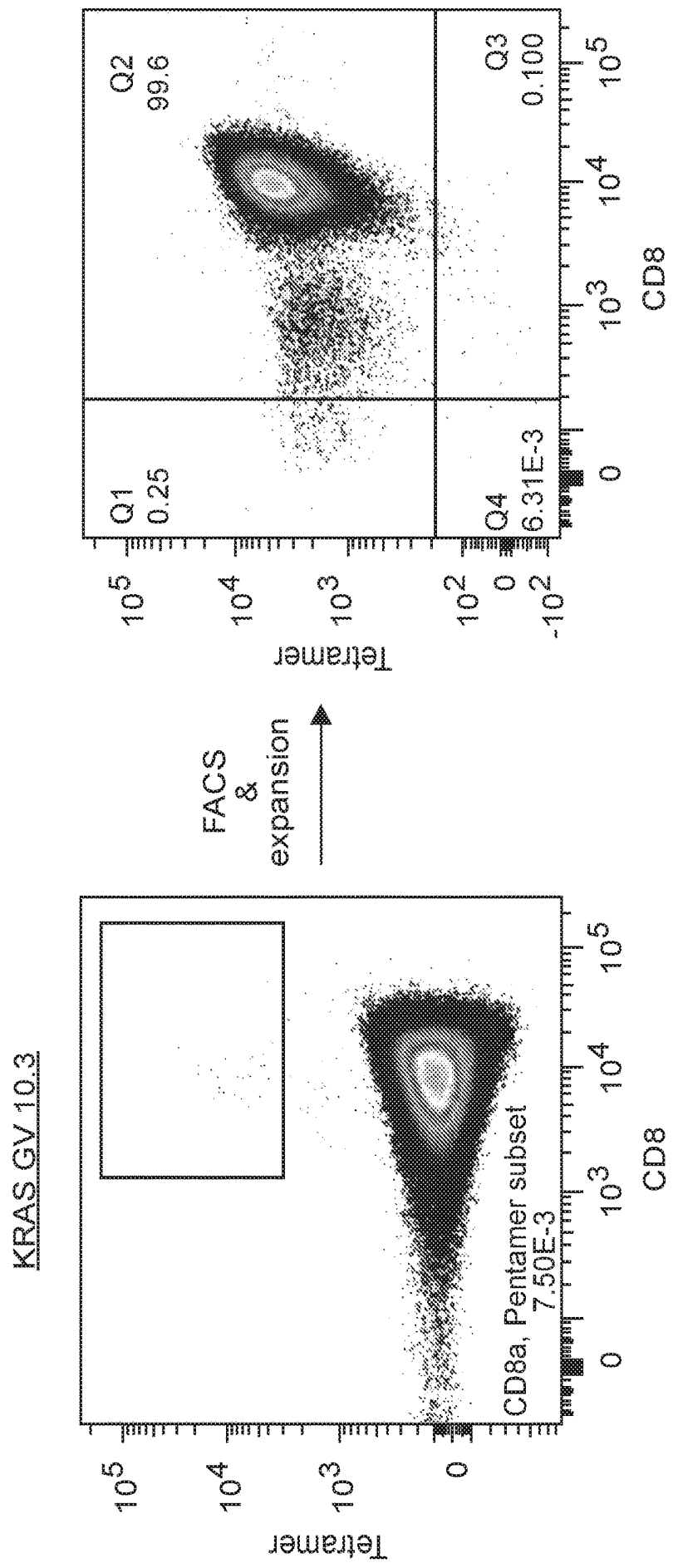


FIG. 6B



CYTOTOXIC T LYMPHOCYTES SPECIFIC FOR MUTATED FORMS OF EPIDERMAL GROWTH FACTOR RECEPTOR FOR USE IN TREATING CANCER

BACKGROUND

[0001] Lung cancer is the leading cause of cancer-related deaths worldwide. Overexpression of epidermal growth factor receptor (EGFR) is observed in various malignancies, including lung cancer. EGFR activation induces many intracellular signaling pathways, such as those involving mitogen-activated protein kinase (MAPK), phosphatidylinositol 3-kinase (PI3K), and signal transducer and activator of transcription (STAT) family members (West et al. (2009) *J. Thorac. Oncol.* 4:s1029-s1039). EGFR activation triggers many intracellular signaling pathways, such as those involving mitogen-activated protein kinase (MAPK), phosphatidylinositol 3-kinase (PI3K), and signal transducer and activator of transcription (STAT), which cause tumor cell proliferation and promote tumor survival (West et al., supra; Jackman et al. (2009) *Clin. Cancer Res.* 15:5267-5273).

[0002] The EGFR pathway is an appropriate target for cancer therapy. Several agents that block this pathway have been developed and have become the standard of care, first-line treatment for lung cancer patients. EGFR-tyrosine kinase inhibitors (EGFR-TKIs), such as gefitinib and erlotinib, have demonstrated remarkable clinical activity against non-small cell lung cancer (NSCLC) that harbors activating EGFR mutations. However, patients frequently develop acquired resistance to EGFR-TKI therapy. Replacement of a threonine with a methionine at codon 790 of EGFR (EGFR T790M) is the most common acquired resistance mutation, and is present in ~50% of cases of TKI resistance (Gao et al. (2016) *Expert Rev. Anticancer Ther.* 16(4):383-390, Noda et al. (2016) *Expert Rev. Respir. Med.* 10(5):547-556, van der Wekken et al. (2016) *Crit. Rev. Oncol. Hematol.* 100:107-116, Villadolid et al. (2015) *Transl. Lung Cancer Res.* 4(5):576-583, Black et al. (2015) *R I Med J* (2013) 98(10):25-28). Studies have found when T790M is introduced in vitro into sequences containing wild-type EGFR, an exon 19 deletion-EGFR, or L858R-EGFR, the resulting proteins are significantly more resistant to gefitinib in the constructs containing T790M. These specific mutation sequences are becoming the biosignatures of relapsed cancers (Berman et al. (2016) *Transl. Lung Cancer Res.* 2016 February; 5(1):138-142). New treatment strategies for NSCLC patients harboring the EGFR T790M mutation are needed.

[0003] Cancer Immunotherapy is a new class of cancer treatment, with unique characteristics that distinguish it from other kinds of cancer therapies. It exploits the fact that cancer cells often have subtly different antigens/molecules that the immune system can detect. Immunotherapy is used to provoke the immune system into attacking tumor cells with these antigens/molecules as targets. Major advantages of cancer immunotherapy over other therapeutic approaches are its high specificity and low toxicity against normal tissues. Adoptive T-cell immunotherapy is a form of cellular immunotherapy that involves transfusion of patients with functional T-cells. This is a potential therapeutic strategy for combating various types of cancer. Recent reports indicate that tumor-reactive T cells recognize various mutated epitopes suggesting that these are potentially immunogenic and, as tumor signatures, might serve as immunotherapeutic targets (Simon et al. (2015) *Oncoimmunology* 5 (1):

e1104448, Hasegawa et al. (2015) *PLoS One* 10(12)). The effectiveness of adoptive immunotherapy, however, is often hampered by exhaustion of antigen-specific T cells during ex vivo expansion.

SUMMARY

[0004] Compositions, methods, and kits are provided for producing rejuvenated cytotoxic T cells (CTLs) specific for mutated neo-antigen epitopes expressed on cancerous cells, including epidermal growth factor receptor (EGFR) and KRAS neo-antigen epitopes. Antigen-specific CTLs are rejuvenated by reprogramming them into induced pluripotent stem cells (IPSCs) using Yamanaka factors and redifferentiating them back into CTLs while expanding their numbers. After redifferentiation, the IPSC-derived rejuvenated CTLs retain the antigen specificity of the original CTLs from which they were derived, but have the advantage of having longer telomeres and higher proliferative activity than the original CTLs. Pharmaceutical compositions comprising such IPSC-derived rejuvenated CTLs are useful for treating cancers expressing the mutated neo-antigen epitopes recognized by the original CTLs.

[0005] In one aspect, a method of cellular immunotherapy is provided for treating a subject for a cancer expressing a mutated epidermal growth factor receptor (EGFR) or KRAS neo-antigen epitope. In certain embodiments, the method comprises: a) eliciting an antigen-specific cytotoxic T cell response by contacting CTLs with an antigen presenting cell presenting at its surface an immunogenic peptide comprising the mutated EGFR or KRAS neo-antigen epitope in a complex with major histocompatibility complex (MHC); b) isolating CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; c) generating induced pluripotent stem cells (IPSC) from the CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; d) differentiating the IPSCs into rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; and e) administering a therapeutically effective amount of the rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope to the subject.

[0006] In certain embodiments, the neo-antigen epitope is a mutated EGFR neo-antigen comprising a mutation selected from the group consisting of a C797S mutation, a T790M mutation, an L858R mutation, and a deletion. In other embodiments, the neo-antigen epitope is a mutated KRAS neo-antigen comprising a mutation selected from the group consisting of a G12D mutation, a G12V mutation, and a G12C mutation.

[0007] In certain embodiments, the immunogenic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5, or a sequence displaying at least about 70-100% sequence identity thereto, including any percent identity within this range, such as 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or 100% sequence identity thereto, wherein the immunogenic peptide comprises the mutated EGFR or KRAS neo-antigen epitope.

[0008] In certain embodiments, the CTLs are contacted with the antigen presenting cell in vivo, ex vivo, or in vitro. The CTLs specific for the mutated EGFR or KRAS neo-antigen epitope may be isolated, for example, from tumor infiltrating lymphocytes or peripheral blood mononuclear cells.

[0009] In certain embodiments, the CTLs are provided in a biological sample. The biological sample may be collected from the subject to be treated or a donor. In certain embodiments, the biological sample is blood, a tumor biopsy, a cancerous tissue sample, or a malignant effusion fluid sample. In one embodiment, the cancerous tissue sample is a lung cancer tissue sample.

[0010] The CTLs may be autologous or allogeneic. In one embodiment, the CTLs are obtained from a donor that is human leukocyte antigen (HLA)-matched with the subject undergoing the cellular immunotherapy.

[0011] In certain embodiments, the antigen presenting cell is a dendritic cell or a macrophage. In other embodiments, the antigen presenting cell is a cancerous cell expressing the mutated epidermal growth factor receptor (EGFR) or KRAS neo-antigen epitope. In further embodiments, an artificial antigen presenting cell is used such as, but not limited to, an MHC multimer, a cellular artificial antigen presenting cell (e.g., fibroblasts or other cells genetically modified to express MHC and other CTL stimulating proteins, or an acellular antigen presenting cell (e.g., biocompatible particle such as a microparticle or nanoparticle carrying CTL stimulating proteins).

[0012] In certain embodiments, the rejuvenated CTLs express CD8.

[0013] In certain embodiments, the rejuvenated CTLs are expanded in vitro before being administered to the subject.

[0014] In certain embodiments, the therapeutically effective amount of the rejuvenated CTLs is provided in a composition. The composition may further comprise a pharmaceutically acceptable excipient. In some embodiments, the composition further comprises an adjuvant. In another embodiment, the composition further comprises an anti-cancer therapeutic agent.

[0015] In certain embodiments, the subject has lung cancer (e.g., non-small cell lung carcinoma).

[0016] In certain embodiments, multiple cycles of treatment are administered to the subject for a time period sufficient to effect at least a partial tumor response, or more preferably, a complete tumor response.

[0017] In certain embodiments, the cancer expresses a major histocompatibility complex (MHC) carrying a peptide comprising the mutated EGFR or KRAS neo-antigen epitope.

[0018] In certain embodiments, the method further comprises introducing a suicide gene into the rejuvenated CTLs. For example, a nucleic acid encoding an inducible caspase-9 may be introduced into the rejuvenated CTLs, wherein induction of expression of the caspase-9 results in apoptosis of the rejuvenated CTLs.

[0019] In another aspect, a method is provided for producing an induced pluripotent stem cell (IPSC)-derived rejuvenated cytotoxic T cell (CTL) specific for a mutated EGFR or KRAS neo-antigen epitope. In certain embodiments, the method comprises: a) obtaining a biological sample comprising cytotoxic T cells (CTLs); b) eliciting an antigen-specific cytotoxic T cell response by contacting cytotoxic T cells (CTLs) with an antigen presenting cell presenting at its surface an immunogenic peptide comprising a mutated EGFR or KRAS neo-antigen epitope in a complex with major histocompatibility complex; c) isolating a CTL specific for the mutated EGFR or KRAS neo-antigen epitope; d) generating an induced pluripotent stem cell (IPSO) from the CTL specific for the mutated EGFR or

KRAS neo-antigen epitope; and e) differentiating the IPSO into a rejuvenated CTL specific for the mutated EGFR or KRAS neo-antigen epitope.

[0020] In another aspect, a composition is provided comprising an IPSO-derived rejuvenated CTL specific for a mutated EGFR or KRAS neo-antigen epitope described herein. The composition may further comprise a pharmaceutically acceptable excipient. In another embodiment, the composition further comprises an adjuvant. In a further embodiment, the composition further comprises one or more other anti-cancer therapeutic agents such as, but not limited to, chemotherapeutic agents, immunotherapeutic agents, or biologic agents.

[0021] In another aspect, kits are provided for practicing the methods described herein. In certain embodiments, a kit may comprise IPSO-derived rejuvenated CTLs specific for a mutated EGFR or KRAS neo-antigen epitope or reagents for preparing them. The kit may further comprise instructions for use, including instructions on methods of preparing the IPSO-derived rejuvenated CTLs and/or methods of using them in immunotherapy for treating cancer as described herein.

[0022] In another aspect, an immunogenic peptide is provided comprising an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5, or a sequence displaying at least about 70-100% sequence identity thereto, including any percent identity within this range, such as 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or 100% sequence identity thereto, wherein the immunogenic peptide comprises the mutated EGFR or KRAS neo-antigen epitope.

[0023] In another aspect, a composition is provided comprising an immunogenic peptide described herein. The composition may further comprise a pharmaceutically acceptable excipient. In another embodiment, the composition further comprises an adjuvant. In a further embodiment, the composition further comprises one or more other anti-cancer therapeutic agents such as, but not limited to, chemotherapeutic agents, immunotherapeutic agents, or biologic agents.

[0024] In another aspect, an isolated antigen presenting cell is provided comprising a MHC carrying an immunogenic peptide described herein.

[0025] In another aspect, a method of cellular immunotherapy is provided for treating a subject for a cancer expressing a mutated EGFR or KRAS neo-antigen epitope. In certain embodiments, the method comprises: a) obtaining a biological sample comprising cytotoxic T cells (CTLs) from the subject; b) isolating CTLs specific for the mutated EGFR or KRAS neo-antigen epitope from the subject; c) generating induced pluripotent stem cells (IPSCs) from the CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; d) differentiating the IPSCs into rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; and e) administering a therapeutically effective amount of the rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope to the subject.

[0026] In another aspect, a method of cellular immunotherapy for treating cancer in a subject is provided, the method comprising eliciting an antigen-specific cytotoxic T cell (CTL) response by administering an immunogenic peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5 to the subject.

[0027] In another aspect, a method of cellular immunotherapy for treating cancer in a subject, the method com-

prising: a) eliciting an antigen-specific cytotoxic T cell (CTL) response by administering an immunogenic peptide comprising a mutated epidermal growth factor receptor (EGFR) or KRAS neo-antigen epitope to the subject; b) obtaining a biological sample comprising CTLs from the subject; c) isolating CTLs specific for the mutated EGFR or KRAS neo-antigen epitope from the biological sample; d) generating induced pluripotent stem cells (iPSCs) from the CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; e) differentiating the iPSCs into rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; and f) administering a therapeutically effective amount of the rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope to the subject.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The invention is best understood from the following detailed description when read in conjunction with the accompanying drawings. The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee. It is emphasized that, according to common practice, the various features of the drawings are not to-scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity. Included in the drawings are the following figures.

[0029] FIG. 1 shows a schematic of the strategy for rejuvenation of antigen-specific T cells using iPSC technology. T-iPS cells were generated from antigen-specific T cells, expanded in vitro, and re-differentiated into antigen-specific T cells.

[0030] FIGS. 2A and 2B show the efficacy of EBV-CTL. FIG. 2A shows light emission monitored as indicator of tumor growth in mice. Around 5 days after tumor inoculation, mice were divided into a control and three experimental groups, and then treated with rejT-iC9-EBV, rejT-NTEBV or original EBVCTL. FIG. 2B shows a graph showing that tumor signals progressively increased in mice without treatment, whereas tumor signals declined in mice treated with original EBVCTL. iC9-iPS derived-EBV CTLs also suppressed tumor signals equal to or greater than the original EBVCTL.

[0031] FIG. 3A shows in vivo bioluminescent imaging of rejT-iC9-EBV expressing Ffluc. NOD-Scid mice inoculated intraperitoneally with EBC-LCL cells and with rejT-iC9-EBV cells received three doses of CID (50 mg) intraperitoneally (n=4). Comparison mice received no CID (n=3). Images of three representative mice from each group are shown. FIG. 3B shows a plot of the bioluminescent T cell signal versus time for the NOD-Scid mice that received the CID and the comparison mice that received no CID.

[0032] FIG. 4 shows EGFR/KRAS neo-antigen candidates.

[0033] FIG. 5 shows results of cytotoxicity assays of CTLs specific for mutated KRAS G12V antigens. The % specific lysis for KRASG12V mutated clones at various effector:target ratios is shown.

[0034] FIGS. 6A and 6B show schematics of the strategy for isolating rare neoantigen-reactive T cells from peripheral blood. FIG. 6A shows isolation of CD8+CTLs, which are mixed with an artificial antigen presenting cell presenting a neo-antigen peptide. FIG. 6B shows FACS isolation and expansion of the neo-antigen-specific CTLs.

DETAILED DESCRIPTION OF EMBODIMENTS

[0035] Compositions, methods, and kits are provided for producing iPSC-derived rejuvenated CTLs specific for mutated neo-antigen epitopes expressed on cancerous cells, including EGFR and KRAS neo-antigen epitopes. Also provided are pharmaceutical compositions comprising such IPSO-derived rejuvenated CTLs and methods of using them for treating cancers expressing the mutated neo-antigen epitopes.

[0036] Before the present compositions, methods, and kits are described, it is to be understood that this invention is not limited to particular method or composition described, as such may, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting, since the scope of the present invention will be limited only by the appended claims.

[0037] Where a range of values is provided, it is understood that each intervening value, to the tenth of the unit of the lower limit unless the context clearly dictates otherwise, between the upper and lower limits of that range is also specifically disclosed. Each smaller range between any stated value or intervening value in a stated range and any other stated or intervening value in that stated range is encompassed within the invention. The upper and lower limits of these smaller ranges may independently be included or excluded in the range, and each range where either, neither or both limits are included in the smaller ranges is also encompassed within the invention, subject to any specifically excluded limit in the stated range. Where the stated range includes one or both of the limits, ranges excluding either or both of those included limits are also included in the invention.

[0038] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although any methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, some potential and preferred methods and materials are now described. All publications mentioned herein are incorporated herein by reference to disclose and describe the methods and/or materials in connection with which the publications are cited. It is understood that the present disclosure supersedes any disclosure of an incorporated publication to the extent there is a contradiction.

[0039] As will be apparent to those of skill in the art upon reading this disclosure, each of the individual embodiments described and illustrated herein has discrete components and features which may be readily separated from or combined with the features of any of the other several embodiments without departing from the scope or spirit of the present invention. Any recited method can be carried out in the order of events recited or in any other order which is logically possible.

[0040] It must be noted that as used herein and in the appended claims, the singular forms “a”, “an”, and “the” include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to “a cell” includes a plurality of such cells and reference to “the peptide” includes reference to one or more peptides and equivalents thereof, e.g. polypeptides, known to those skilled in the art, and so forth.

[0041] The publications discussed herein are provided solely for their disclosure prior to the filing date of the present application. Nothing herein is to be construed as an admission that the present invention is not entitled to ante-date such publication by virtue of prior invention. Further, the dates of publication provided may be different from the actual publication dates which may need to be independently confirmed.

[0042] Biological sample. The term “sample” with respect to an individual encompasses any sample comprising CTLs such as blood and other liquid samples of biological origin, solid tissue samples such as a biopsy specimen or cancerous tissue from a surgically resected tumor, malignant effusion fluid samples, or tissue cultures or cells derived or isolated therefrom, and the progeny thereof. The definition also includes samples that have been manipulated in any way after their procurement, such as by treatment with reagents; washed; or enrichment for certain cell populations, such as cancer cells. The definition also includes samples that have been enriched for particular types of molecules, e.g., nucleic acids, polypeptides, etc.

[0043] The term “biological sample” encompasses a clinical sample. The types of “biological samples” include, but are not limited to: tissue obtained by surgical resection, tissue obtained by biopsy, cells in culture, cell supernatants, cell lysates, tissue samples, organs, bone marrow, blood, plasma, serum, fine needle aspirate, lymph node aspirate, cystic aspirate, a paracentesis sample, a thoracentesis sample, and the like.

[0044] The terms “obtained” or “obtaining” as used herein can also include the physical extraction or isolation of a biological sample (e.g., comprising CTLs) from a subject. Accordingly, a biological sample can be isolated from a subject (and thus “obtained”) by the same person or same entity that subsequently produces IPSO-derived rejuvenated CTLs from the CTLs in the sample. When a biological sample is “extracted” or “isolated” from a first party or entity and then transferred (e.g., delivered, mailed, etc.) to a second party, the sample was “obtained” by the first party (and also “isolated” by the first party), and then subsequently “obtained” (but not “isolated”) by the second party. Accordingly, in some embodiments, the step of obtaining does not comprise the step of isolating a biological sample.

[0045] In some embodiments, the step of obtaining comprises the step of isolating a biological sample (e.g., a pre-treatment biological sample, a post-treatment biological sample, etc.). Methods and protocols for isolating various biological samples (e.g., a blood sample, a serum sample, a plasma sample, a biopsy sample, an aspirate, etc.) will be known to one of ordinary skill in the art and any convenient method may be used to isolate a biological sample.

[0046] By “immunogenic fragment” is meant a fragment of an immunogen which includes one or more epitopes that can stimulate an immune response, including an antigen-specific cytotoxic T cell response. Immunogenic peptides will typically range between 2 to 15 amino acids in length, including any length within this range such as 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 amino acids in length. In some embodiments, the immunogenic peptide is at least 2, at least 3, at least 5, at least 7, at least 9, at least 10, at least 11, or at least 12 amino acids in length.

[0047] As used herein, the term “epitope” generally refers to the site on an antigen which is recognized by a T-cell receptor (e.g., on a CTL) and/or an antibody. The epitope

may be contained in a short peptide derived from a protein antigen or part of a protein antigen. Several different epitopes may be carried by a single antigenic molecule. The term “epitope” may also include modified amino acids. Epitopic determinants usually consist of chemically active surface groupings of molecules such as amino acids or sugar side chains and usually have specific three-dimensional structural characteristics, as well as specific charge characteristics.

[0048] An immunogenic fragment can be generated from knowledge of the amino acid and corresponding DNA sequences of an antigen (e.g., EGFR or KRAS), as well as from the nature of particular amino acids (e.g., size, charge, etc.) and the codon dictionary, without undue experimentation. See, e.g., Ivan Roitt, *Essential Immunology*, 1988; Kendrew, *supra*; Janis Kuby, *Immunology*, 1992 e.g., pp. 79-81. Some guidelines in determining whether a protein will stimulate a response, include: Peptide length—typically the peptide is about 8 or 9 amino acids long to fit into a MHC class I complex and about 13-25 amino acids long to fit into a class II MHC complex. Peptides may be longer than these lengths. For example, a longer peptide may be needed if it is partially degraded in cells. The peptide may contain an appropriate anchor motif which will enable it to bind to various class I or class II molecules with high enough specificity to generate an immune response (See Bocchia, M. et al, Specific Binding of Leukemia Oncogene Fusion Protein Peptides to HLA Class I Molecules, *Blood* 85:2680-2684; Englehard, V H, Structure of peptides associated with class I and class II MHC molecules *Ann. Rev. Immunol.* 12:181 (1994)).

[0049] The terms “immunogenic” protein or peptide refer to an antigen having an amino acid sequence which elicits an immunological response, including an antigen-specific cytotoxic T cell response. An “immunogenic” protein or peptide, as used herein, includes the full-length sequence of the protein in question, including the precursor and mature forms, analogs thereof, or immunogenic fragments thereof.

[0050] As used herein, the term “CTL epitope” refers generally to those features of a peptide structure which are capable of inducing a CTL response.

[0051] An “immunological response” to an antigen or composition is the development in a subject of a humoral and/or a cellular immune response to an antigen present in the composition of interest. For purposes of the present invention, a “humoral immune response” refers to an immune response mediated by antibody molecules, while a “cellular immune response” is one mediated by T-lymphocytes and/or other white blood cells. One important aspect of cellular immunity involves an antigen-specific response by cytotoxic T cells (CTLs). CTLs have specificity for peptide antigens that are presented in association with proteins encoded by the major histocompatibility complex (MHC) and expressed on the surfaces of cells. CTLs help induce and promote the destruction or lysis of cancerous cells, infected cells, or damaged cells. Another aspect of cellular immunity involves an antigen-specific response by helper T-cells. Helper T-cells act to help stimulate the function, and focus the activity of, nonspecific effector cells against cells displaying peptide antigens in association with MHC molecules on their surface. A “cellular immune response” also refers to the production of cytokines, chemokines and other

such molecules produced by activated T-cells and/or other white blood cells, including those derived from CD4+ and CD8+ T-cells.

[0052] The ability of a particular antigen to stimulate a cell-mediated immunological response may be determined by a number of assays, such as by lymphoproliferation (lymphocyte activation) assays, CTL cytotoxic cell assays (e.g., the interferon- γ (IFN- γ) enzyme-linked immune spot (ELISPOT) assay for measuring IFN- γ secretion from activated CTLs, the calcein release assay for measuring CTL cytotoxicity using calcein to label target cells, intracellular cytokine staining, granzyme B release assay, chromium release assay, JAM test, CD107a mobilization assay, caspase 3 assay, flow cytometric CTL assay) or by assaying for T-lymphocytes specific for the antigen in a sensitized subject. Such assays are well known in the art. See, e.g., Erickson et al., *J. Immunol.* (1993) 151:4189-4199; Doe et al., *Eur. J. Immunol.* (1994) 24:2369-2376. Methods of measuring a cell-mediated immune response include measurement of intracellular cytokines or cytokine secretion by T-cell populations, or by measurement of epitope specific T-cells (e.g., by the tetramer technique) (reviewed by Malysguine et al. (2012) *Cells* 1(2):111-126, Shafer-Weaver et al. (2003) *J. Transl. Med.* 1(1):14, Takagi et al. (2017) *Biochem. Biophys. Res. Commun.* 492(1):27-32, Jerome et al. (2003) *Apoptosis* 8(6):563-571, Hermans et al. (2004) *J. Immunol. Methods* 1; 285(1):25-40, van Baalen et al. (2008) *Cytometry A* 73(11):1058-1065, McMichael and O'Callaghan (1998) *J. Exp. Med.* 187(9):1367-1371, Mcheyzer-Williams et al. (1996) *Immunol. Rev.* 150:5-21, Lalvani et al. (1997) *J. Exp. Med.* 186:859-865; herein incorporated by reference.

[0053] The terms “treatment”, “treating”, “treat” and the like are used herein to generally refer to obtaining a desired pharmacologic and/or physiologic effect. The effect can be prophylactic in terms of completely or partially preventing a disease or symptom(s) thereof and/or may be therapeutic in terms of a partial or complete stabilization or cure for a disease and/or adverse effect attributable to the disease. The term “treatment” encompasses any treatment of a disease in a mammal, particularly a human, and includes: (a) preventing the disease and/or symptom(s) from occurring in a subject who may be predisposed to the disease or symptom but has not yet been diagnosed as having it; (b) inhibiting the disease and/or symptom(s), i.e., arresting their development; or (c) relieving the disease symptom(s), i.e., causing regression of the disease and/or symptom(s). Those in need of treatment include those already inflicted (e.g., those with cancer) as well as those in which prevention is desired (e.g., those with increased susceptibility to cancer, those suspected of having cancer, etc.).

[0054] A therapeutic treatment is one in which the subject is inflicted prior to administration and a prophylactic treatment is one in which the subject is not inflicted prior to administration. In some embodiments, the subject has an increased likelihood of becoming inflicted or is suspected of being inflicted prior to treatment. In some embodiments, the subject is suspected of having an increased likelihood of becoming inflicted.

[0055] “Pharmaceutically acceptable excipient or carrier” refers to an excipient that may optionally be included in the compositions of the invention and that causes no significant adverse toxicological effects to the patient.

[0056] “Pharmaceutically acceptable salt” includes, but is not limited to, amino acid salts, salts prepared with inorganic acids, such as chloride, sulfate, phosphate, diphosphate, bromide, and nitrate salts, or salts prepared from the corresponding inorganic acid form of any of the preceding, e.g., hydrochloride, etc., or salts prepared with an organic acid, such as malate, maleate, fumarate, tartrate, succinate, ethylsuccinate, citrate, acetate, lactate, methanesulfonate, benzoate, ascorbate, para-toluenesulfonate, palmoate, salicylate and stearate, as well as estolate, gluceptate and lactobionate salts. Similarly, salts containing pharmaceutically acceptable cations include, but are not limited to, sodium, potassium, calcium, aluminum, lithium, and ammonium (including substituted ammonium).

[0057] The terms “tumor,” “cancer” and “neoplasia” are used interchangeably and refer to a cell or population of cells whose growth, proliferation or survival is greater than growth, proliferation or survival of a normal counterpart cell, e.g. a cell proliferative, hyperproliferative or differentiative disorder. Typically, the growth is uncontrolled. The term “malignancy” refers to invasion of nearby tissue. The term “metastasis” or a secondary, recurring or recurrent tumor, cancer or neoplasia refers to spread or dissemination of a tumor, cancer or neoplasia to other sites, locations or regions within the subject, in which the sites, locations or regions are distinct from the primary tumor or cancer. Neoplasia, tumors and cancers include benign, malignant, metastatic and non-metastatic types, and include any stage (I, II, III, IV or V) or grade (G1, G2, G3, etc.) of neoplasia, tumor, or cancer, or a neoplasia, tumor, cancer or metastasis that is progressing, worsening, stabilized or in remission. In particular, the terms “tumor,” “cancer” and “neoplasia” include carcinomas, such as squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma, anaplastic carcinoma, large cell carcinoma, and small cell carcinoma. These terms include, but are not limited to, lung cancer, including non-small-cell lung carcinoma (e.g., adenocarcinoma, squamous-cell carcinoma and large-cell carcinoma) and small-cell lung carcinoma, breast cancer, prostate cancer, ovarian cancer, testicular cancer, colon cancer, pancreatic cancer, gastric cancer, hepatic cancer, leukemia, lymphoma, adrenal cancer, thyroid cancer, pituitary cancer, renal cancer, brain cancer, skin cancer, head cancer, neck cancer, oral cavity cancer, tongue cancer, and throat cancer.

[0058] By “anti-tumor activity” is intended a reduction in the rate of cell proliferation, and hence a decline in growth rate of an existing tumor or in a tumor that arises during therapy, and/or destruction of existing neoplastic (tumor) cells or newly formed neoplastic cells, and hence a decrease in the overall size of a tumor during therapy. Such activity can be assessed using animal models.

[0059] The term “tumor response” as used herein means a reduction or elimination of all measurable lesions. The criteria for tumor response are based on the WHO Reporting Criteria [WHO Offset Publication, 48-World Health Organization, Geneva, Switzerland, (1979)]. Ideally, all uni- or bidimensionally measurable lesions should be measured at each assessment. When multiple lesions are present in any organ, such measurements may not be possible and, under such circumstances, up to 6 representative lesions should be selected, if available.

[0060] The term “complete response” (CR) as used herein means a complete disappearance of all clinically detectable malignant disease, determined by 2 assessments at least 4 weeks apart.

[0061] The term “partial response” (PR) as used herein means a 50% or greater reduction from baseline in the sum of the products of the longest perpendicular diameters of all measurable disease without progression of evaluable disease and without evidence of any new lesions as determined by at least two consecutive assessments at least four weeks apart. Assessments should show a partial decrease in the size of lytic lesions, recalcifications of lytic lesions, or decreased density of blastic lesions.

[0062] “Substantially purified” generally refers to isolation of a substance (compound, polynucleotide, protein, polypeptide, polypeptide composition) such that the substance comprises the majority percent of the sample in which it resides. Typically in a sample, a substantially purified component comprises 50%, preferably 80%-85%, more preferably 90-95% of the sample. Techniques for purifying polynucleotides and polypeptides of interest are well-known in the art and include, for example, ion-exchange chromatography, affinity chromatography and sedimentation according to density.

[0063] The terms “recipient”, “individual”, “subject”, “host”, and “patient”, are used interchangeably herein and refer to any mammalian subject for whom diagnosis, treatment, or therapy is desired, particularly humans. “Mammal” for purposes of treatment refers to any animal classified as a mammal, including humans, domestic and farm animals, and zoo, sports, or pet animals, such as dogs, horses, cats, cows, sheep, goats, pigs, etc. Preferably, the mammal is human.

[0064] The terms “specific binding,” “specifically binds,” and the like, refer to non-covalent or covalent preferential binding to a molecule relative to other molecules or moieties in a solution or reaction mixture (e.g., specific binding to a particular peptide or epitope relative to other available peptides, such as binding of a CTL T cell receptor to an immunogenic peptide or CTL epitope presented by MHC on an antigen presenting cell). In some embodiments, the affinity of one molecule for another molecule to which it specifically binds is characterized by a K_D (dissociation constant) of 10^{-5} M or less (e.g., 10^{-6} M or less, 10^{-7} M or less, 10^{-8} M or less, 10^{-9} M or less, 10^{-10} M or less, 10^{-11} M or less, 10^{-12} M or less, 10^{-13} M or less, 10^{-14} M or less, 10^{-15} M or less, or 10^{-16} M or less). “Affinity” refers to the strength of binding, increased binding affinity being correlated with a lower K_D .

[0065] The term “antibody” is used in the broadest sense and specifically covers monoclonal antibodies (including full length monoclonal antibodies), polyclonal antibodies, multispecific antibodies (e.g., bispecific antibodies), and antibody fragments so long as they exhibit the desired biological activity. “Antibodies” (Abs) and “immunoglobulins” (Igs) are glycoproteins having the same structural characteristics. While antibodies exhibit binding specificity to a specific antigen, immunoglobulins include both antibodies and other antibody-like molecules which lack antigen specificity. Polypeptides of the latter kind are, for example, produced at low levels by the lymph system and at increased levels by myelomas.

[0066] “Antibody fragment”, and all grammatical variants thereof, as used herein are defined as a portion of an intact

antibody comprising the antigen binding site or variable region of the intact antibody, wherein the portion is free of the constant heavy chain domains (i.e. CH2, CH3, and CH4, depending on antibody isotype) of the Fc region of the intact antibody. Examples of antibody fragments include Fab, Fab', Fab'-SH, F(ab')2, and Fv fragments; diabodies; any antibody fragment that is a polypeptide having a primary structure consisting of one uninterrupted sequence of contiguous amino acid residues (referred to herein as a “single-chain antibody fragment” or “single chain polypeptide”), including without limitation (1) single-chain Fv (scFv) molecules (2) single chain polypeptides containing only one light chain variable domain, or a fragment thereof that contains the three CDRs of the light chain variable domain, without an associated heavy chain moiety (3) single chain polypeptides containing only one heavy chain variable region, or a fragment thereof containing the three CDRs of the heavy chain variable region, without an associated light chain moiety and (4) nanobodies comprising single Ig domains from non-human species or other specific single-domain binding modules; and multispecific or multivalent structures formed from antibody fragments. In an antibody fragment comprising one or more heavy chains, the heavy chain(s) can contain any constant domain sequence (e.g. CH1 in the IgG isotype) found in a non-Fc region of an intact antibody, and/or can contain any hinge region sequence found in an intact antibody, and/or can contain a leucine zipper sequence fused to or situated in the hinge region sequence or the constant domain sequence of the heavy chain(s).

Methods

[0067] Compositions, methods, and kits are provided for producing rejuvenated cytotoxic T cells (CTLs) specific for mutated neo-antigen epitopes expressed on cancerous cells, including epidermal growth factor receptor (EGFR) and KRAS neo-antigen epitopes. Antigen-specific CTLs are rejuvenated by reprogramming them into induced pluripotent stem cells (IPSCs) using Yamanaka factors and redifferentiating them back into CTLs while expanding their numbers. After redifferentiation, the IPSC-derived rejuvenated CTLs retain the antigen specificity of the original CTLs from which they were derived, but have the advantage of having longer telomeres and higher proliferative activity than the original CTLs. Pharmaceutical compositions comprising such IPSC-derived rejuvenated CTLs are useful for treating cancers expressing the mutated neo-antigen epitopes recognized by the original CTLs.

[0068] Immunogenic peptides comprising mutated neo-antigen epitopes may be used to elicit antigen-specific CTLs from either healthy individuals or from cancer patients. CTL responses are induced by contacting CTLs with an antigen presenting cell presenting at its surface the immunogenic peptide comprising the mutated neo-antigen epitope in a complex with major histocompatibility complex (MHC). At least one round of stimulation of the CTLs with the immunogenic peptide will be performed to generate a CTL response in order to provide antigen-specific CTLs that recognize a mutated neo-antigen epitope. In some embodiments, multiple rounds of stimulation of the CTLs with the immunogenic peptide may be performed to generate a CTL response capable of producing sufficient antigen-specific CTLs for processing to produce IPSC-derived rejuvenated antigen-specific CTLs for immunotherapy, as described further below. In certain embodiments, at least 2, at least 3, at

least 4, at least 5, at least 6, at least 7, or at least 8 rounds or more of stimulation of the CTLs with an immunogenic peptide are performed.

[0069] Stimulation of CTLs with an immunogenic peptide (in the presence of an antigen presenting cell) can be performed *in vivo*, *ex vivo*, or *in vitro*. For example, the immunogenic peptide can be administered to a subject to elicit a CTL response followed by collection of a biological sample from the subject comprising antigen-specific CTLs recognizing mutated neo-antigen epitopes. The biological sample may be any sample containing CTLs specific for the mutated neo-antigen epitope such as a blood sample, a sample of peripheral blood mononuclear cell (PBMCs), cancerous tissue in which the CTLs have infiltrated, or a malignant effusion fluid sample. The CTLs can be isolated from a bodily fluid (e.g., blood) or tissue and cultured.

[0070] Alternatively, a biological sample comprising CTLs can be collected from a subject and treated with an immunogenic peptide in the presence of an antigen-presenting cell *ex vivo* or *in vitro* to generate antigen-specific CTLs. Examples of suitable antigen presenting cells that can present an immunogenic peptide to CTLs include dendritic cells, macrophages, and activated B cells. Alternately, artificial antigen presenting cells may be used, such as soluble MHC-multimers or cellular or acellular artificial antigen presenting cells. MHC-multimers typically range in size from dimers to octamers (tetramers commonly used) and can be used to display class I or class II MHC (Hadrup et al. (2009) *Nature Methods* 6:520-526, Nepom et al. (2003) *Antigen* 106:1-4, Bakker et al. (2005) *Current Opinion in Immunology* 17:428-433). Cellular artificial antigen presenting cells may include cells that have been genetically modified to express T-cell co-stimulatory molecules, MHC alleles and/or cytokines. For example, artificial antigen presenting cells have been generated from fibroblasts modified to express HLA molecules, the co-stimulatory signal, B7.1, and the cell adhesion molecules, ICAM-1 and LFA-3 (Latouche et al. (2000) *Nature Biotechnology* 18 (4):405-409). Acellular antigen presenting cells comprise biocompatible particles such as microparticles or nanoparticles that carry T cell activating proteins on their surface (Sunshine et al. (2014) *Biomaterials* 35 (1): 269-277), Perica et al. (2014) *Nanomedicine: Nanotechnology, Biology and Medicine* 10 (1):119-129). For a review of artificial antigen presenting cells, see, e.g., Oelke et al. (2004) *Clin. Immunol.* 110(3):243-251, Wang et al. (2017) *Theranostics* 7(14): 3504-3516, Butler et al. (2014) *Immunol Rev.* 257(1):191-209, Eggermont et al. (2014) *Trends Biotechnol.* 32(9): 4564-4565, Sunshine et al. (2013) *Nanomedicine (Lond)* 8(7):1173-1189, and Rhodes et al. (2018) *Mol. Immunol.* 98:13-18; herein incorporated by reference.

[0071] Typically, the immunogenic peptide is at a concentration ranging from about 10 µg/ml to about 40 µg/ml in the biological sample. The immunogenic peptide may be pre-incubated with the antigen presenting cells for periods ranging from 1 to 18 hours prior to stimulation of the CTLs. Culture media may be supplemented with interleukin 2 (IL-2) and interleukin 15 (IL-15) during intervals between stimulations to induce amino acid uptake and protein synthesis in antigen-activated T cells to promote growth and proliferation of antigen-specific CTLs. The antigen-specific CTLs can subsequently be isolated from biological samples, reprogrammed into induced pluripotent stem cells, and

redifferentiated into IPSO-derived rejuvenated CTLs that are specific for the mutated neo-antigen epitope recognized by the original CTLs.

[0072] Neoantigens include tumor-associated antigens that are not present in the normal human genome. Immunogenic peptides may include mutated epitopes of neoantigens that are expressed by cancerous cells from any form of cancer including malignant, metastatic and non-metastatic types of cancer, at any stage (I, II, III, IV or V) or grade (G1, G2, G3, etc.), including carcinomas, such as squamous cell carcinoma, adenocarcinoma, adenosquamous carcinoma, anaplastic carcinoma, large cell carcinoma, and small cell carcinoma. In certain embodiments, immunogenic peptides include mutated epitopes of neoantigens expressed by lung cancer, including non-small-cell lung carcinoma (e.g., adenocarcinoma, squamous-cell carcinoma and large-cell carcinoma) and small-cell lung carcinoma, breast cancer, prostate cancer, ovarian cancer, testicular cancer, colon cancer, pancreatic cancer, gastric cancer, hepatic cancer, leukemia, lymphoma, adrenal cancer, thyroid cancer, pituitary cancer, renal cancer, brain cancer, skin cancer, head cancer, neck cancer, oral cavity cancer, tongue cancer, and throat cancer.

[0073] An immunogenic peptide comprising a mutated neoantigen CTL epitope can be designed based on knowledge of the amino acid sequence of the mutated neoantigen of interest (e.g., expressed by a cancer in a patient undergoing treatment). Typically, the immunogenic peptide will range in size from 8-12 amino acids in length (i.e., in order to fit into the MHC class I complex for presentation to CTLs), though immunogenic peptides may be longer, particularly if the immunogenic peptide is degraded in cells or the biological sample. The immunogenic peptide may further contain an appropriate anchor motif which will enable it to bind to various MHC class I or class II molecules with high enough specificity to generate an immune response (See Bocchia, M. et al, *Specific Binding of Leukemia Oncogene Fusion Protein Peptides to HLA Class I Molecules*, *Blood* 85:2680-2684; Englehard, V H, *Structure of peptides associated with class I and class II MHC molecules* *Ann. Rev. Immunol.* 12:181 (1994)). The sequence of a neoantigen of interest can be compared to published structures of peptides associated with MHC molecules. Representative MHC binding peptides can be found in a number of databases including, the MHCBN, JenPep, MHCPEP, and SYFPEITHI databases. In addition, epitope prediction software can be used for prediction of MHC binding peptides and CTL epitopes for various MHC alleles. For example, nHLAPred (crdd.osdd.net/raghava/nhlaped/) uses artificial neural networks (ANNs) and quantitative matrices (QM) for prediction of MHC binding peptides and CTL epitopes for various MHC alleles. ProPred (crdd.osdd.net/raghava/propred/) identifies MHC Class-I binding regions in antigens for MHC Class-I alleles. BIMAS (bimas.cit.nih.gov/molbio/hla_bind/), Lefranc et al. (2003) *Leukemia* 17:260-266) predicts MHC-binding peptides based on their predicted half-time of dissociation from MHC class I alleles. RANK-PEP ranks peptides based on their sequences according to their similarity to peptides known to bind to a given MHC molecule. PREDEP (margalit.huji.ac.il/Teppred/mhc-bind/) is a structure-based algorithm for prediction of MHC class I epitopes. MMBPred (crdd.osdd.net/raghava/mmbpred/) predicts mutated MHC class-I binding peptides in antigenic proteins for MHC class I alleles.

[0074] In certain embodiments, the immunogenic peptide comprises a mutated EGFR neo-antigen epitope comprising a mutation selected from the group consisting of a C797S mutation, a T790M mutation, an L858R mutation, and a deletion. In other embodiments, the immunogenic peptide comprises a mutated KRAS neo-antigen epitope comprising a mutation selected from the group consisting of a G12D mutation, a G12V mutation, and a G12C mutation. In certain embodiments, the immunogenic peptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5, or a sequence displaying at least about 70-100% sequence identity thereto, including any percent identity within this range, such as 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100% sequence identity thereto, wherein the immunogenic peptide comprises a mutated EGFR or KRAS neo-antigen epitope.

[0075] The ability of a particular immunogenic peptide to stimulate a CTL cell-mediated immunological response may be determined by a number of assays, such as by lymphoproliferation (lymphocyte activation) assays, CTL cytotoxic cell assays (e.g., the interferon- γ (IFN- γ) enzyme-linked immune spot (ELISPOT) assay for measuring IFN- γ secretion from activated CTLs, the calcein release assay for measuring CTL cytotoxicity using calcein to label target cells, intracellular cytokine staining, granzyme B release assay, chromium release assay, JAM test, CD107a mobilization assay, caspase 3 assay, flow cytometric CTL assay) or by assaying for CTLs specific for the antigen in a sensitized subject. Such assays are well known in the art. See, e.g., Erickson et al., *J. Immunol.* (1993) 151:4189-4199; Doe et al., *Eur. J. Immunol.* (1994) 24:2369-2376. Methods of measuring a cell-mediated immune response include measurement of intracellular cytokines or cytokine secretion by T-cell populations, or by measurement of epitope specific T-cells (e.g., by the tetramer technique) (reviewed by Malysguine et al. (2012) *Cells* 1(2):111-126, Shafer-Weaver et al. (2003) *J. Transl. Med.* 1(1):14, Takagi et al. (2017) *Biochem Biophys Res Commun.* 492(1):27-32, Jerome et al. (2003) *Apoptosis* 8(6):563-571, Hermans et al. (2004) *J. Immunol. Methods* 1; 285(1):25-40, van Baalen et al. (2008) *Cytometry A* 73(11):1058-1065, McMichael and O'Callaghan (1998) *J. Exp. Med.* 187(9):1367-1371, McHeyzer-Williams et al. (1996) *Immunol. Rev.* 150:5-21, Lalvani et al. (1997) *J. Exp. Med.* 186:859-865; herein incorporated by reference.

[0076] The antigen-specific CTLs can optionally be purified before or after reprogramming and redifferentiation by any method known in the art, including, but not limited to, density gradient centrifugation (e.g., Ficoll Hypaque, percoll, iodoxanol and sodium metrizoate), immunoselection (positive selection or negative selection for surface markers) with immunomagnetic beads or immunoaffinity columns, or fluorescence-activated cell sorting (FACS). See, e.g., *Cytotoxic T-Cells, Methods and Protocols* (E. Ranieri, ed., Humana Press, 2014), Thiery et al. (2010) *Curr. Protoc. Cell Biol.* Chapter 3:Unit 3.37, and Oelke et al. (2000) *Clin. Cancer Res.* 6(5):1997-2005; herein incorporated by reference.

Reprogramming Antigen-Specific Cytotoxic T Cells

[0077] Rejuvenated antigen-specific CTLs can be generated by reprogramming the original CTLs obtained from a subject into pluripotent stem cells followed by redifferentiation.

CTLs are induced into forming pluripotent stem cells, for example, by treating them with reprogramming factors such as Yamanaka factors, including but not limited to, OCT3, OCT4, SOX2, KLF4, c-MYC, NANOG, and LIN28 (see, e.g., Nishimura et al. (2013) *Cell Stem Cell* 12:114-126, Takayama et al. (2010) *J. Exp. Med.* 207:2817-2830, and U.S. Pat. No. 9,206,394; herein incorporated by reference in their entireties). After in vitro expansion, the CTL-derived iPSCs can be redifferentiated into hematopoietic cells by culturing the iPSCs in the presence of VEGF, SCF, and FLT-3L. The hematopoietic cells can subsequently be redifferentiated into CTLs expressing a desired T cell receptor by culturing in the presence of FLT-3L and IL-7. After such redifferentiation, the CTLs are now rejuvenated (i.e., iPSC-derived rejuvenated CTLs have longer telomeres and higher proliferative activity than the original CTLs while retaining the specificity for neo-antigen epitopes recognized by the original CTLs). For redifferentiation protocols, see, e.g., Nishimura et al., supra; Takayama et al., supra; Timmermans et al. (2009) *J. Immunol.* 182:6879-6888, and Ikawa et al. (2010) *Science* 329:93-96; herein incorporated by reference in their entireties.

[0078] Methods for "introducing a cell reprogramming factor into CTLs are not limited in particular, and known procedures can be selected and used as appropriate. For example, when a cell reprogramming factor as described above is introduced into CTLs of the above-mentioned type in the form of proteins, such methods include ones using protein introducing reagents, fusion proteins with protein transfer domains (PTDs), electroporation, and microinjection. When a cell reprogramming factor as described above is introduced into CTLs of the above-mentioned type in the form of nucleic acids encoding the cell reprogramming factor, a nucleic acid(s), such as cDNA(s), encoding the cell reprogramming factor can be inserted in an appropriate expression vector comprising a promoter that functions in CTLs, which then can be introduced into CTLs by procedures such as infection, lipofection, liposomes, electroporation, calcium phosphate coprecipitation, DEAE-dextran, microinjection, and electroporation.

[0079] Examples of an "expression vector" include viral vectors, such as lentiviruses, retroviruses, adenoviruses, adeno-associated viruses, and herpes viruses; and expression plasmids for animal cells. For example, retroviral or Sendai virus (SeV) vectors are commonly used to introduce a nucleic acid(s) encoding a cell reprogramming factor as described above into CTLs.

[0080] In addition, a suicide gene may be introduced into the IPSO-derived rejuvenated CTLs, for example, to improve their safety by allowing their destruction at will. Suicide genes can be used to selectively kill cells by inducing apoptosis or converting a nontoxic drug to a toxic compound in the CTLs. Examples include suicide genes encoding caspases, thymidine kinases, cytosine deaminases, intracellular antibodies, telomerases, and DNases. See, e.g., Jones et al. (2014) *Front. Pharmacol.* 5:254, Mitsui et al. (2017) *Mol. Ther. Methods Clin. Dev.* 5:51-58, Greco et al. (2015) *Front. Pharmacol.* 6:95; herein incorporated by reference. In some cases, the suicide gene is expressed from an inducible promoter to provide a "safety switch" (i.e., kill cells by inducing the suicide gene). For example, an inducible caspase-9 suicide gene system can be incorporated into IPSO-derived rejuvenated CTLs as a "safety switch" (see, e.g., Straathof et al. (2005) *Blood* 105(11):4247-4254;

Thomis et al. (2001) *Blood* 97(5):1249-1257; Tey et al. (2007) *Biol. Blood Marrow Transplant.* 13(8):913-24; herein incorporated by reference.). In some embodiments, a suicide gene is selected that expresses a human protein to minimize immune reactions in human patients treated with the CTLs.

Pharmaceutical Compositions and Cellular Immunotherapy with Rejuvenated CTLs

[0081] Pharmaceutical compositions can be prepared by formulating the IPSO-derived rejuvenated CTLs produced by the methods described herein into dosage forms by known pharmaceutical methods. For example, a pharmaceutical composition comprising IPSC-derived rejuvenated CTLs can be formulated for parenteral administration, as capsules, liquids, film-coated preparations, suspensions, emulsions, and injections (such as venous injections, drip injections, and the like).

[0082] In formulation into these dosage forms, the IPSO-derived rejuvenated CTLs can be combined as appropriate, with pharmaceutically acceptable carriers or media, in particular, sterile water and physiological saline, vegetable oils, resolvers, bases, emulsifiers, suspending agents, surfactants, stabilizers, vehicles, antiseptics, binders, diluents, tonicity agents, soothing agents, bulking agents, disintegrants, buffering agents, coating agents, lubricants, coloring agents, solution adjuvants, or other additives. The IPSO-derived rejuvenated CTLs may be also used in combination with known pharmaceutical compositions, immunostimulants, anti-cancer agents, or other therapeutic agents.

[0083] In some embodiments, the pharmaceutical composition comprising the IPSO-derived rejuvenated CTLs is a sustained-release formulation, or a formulation that is administered using a sustained-release device. Such devices are well known in the art, and include, for example, transdermal patches, and miniature implantable pumps that can provide for delivery of the IPSO-derived rejuvenated CTLs over time in a continuous, steady-state fashion at a variety of doses to achieve a sustained-release effect with a non-sustained-release pharmaceutical composition.

[0084] Usually, but not always, the subject who receives the IPSO-derived rejuvenated CTLs (i.e., the recipient) is also the subject from whom the original CTLs (i.e., before rejuvenation) are harvested or obtained, which provides the advantage that the cells are autologous. However, CTLs can be obtained from another subject (i.e., donor), a culture of cells from a donor, or from established cell culture lines and rejuvenated according to the methods described herein. CTLs may be obtained from the same or a different species than the subject to be treated, but preferably are of the same species, and more preferably of the same immunological profile as the subject. Such cells can be obtained, for example, from a biological sample comprising CTLs from a close relative or matched donor, then reprogrammed into induced pluripotent stem cells (iPSCs) using Yamanaka factors and redifferentiated into the IPSO-derived rejuvenated CTLs and administered to a subject in need of treatment for cancer.

[0085] In certain embodiments, the IPSC-derived rejuvenated CTLs administered to a subject are autologous or allogeneic. The patients or subjects who donate or receive the CTLs are typically mammalian, and usually human. However, this need not always be the case, as veterinary applications are also contemplated.

[0086] At least one therapeutically effective dose of the IPSC-derived rejuvenated CTLs will be administered. By “therapeutically effective dose or amount” of the IPSC-derived rejuvenated CTLs is intended an amount that when administered brings about a positive therapeutic response with respect to treatment of an individual for cancer. Of particular interest is an amount of the IPSC-derived rejuvenated CTLs that provides an anti-tumor effect, as defined herein. By “positive therapeutic response” is intended the individual undergoing the treatment according to the invention exhibits an improvement in one or more symptoms of the cancer for which the individual is undergoing therapy.

[0087] Thus, for example, a “positive therapeutic response” would be an improvement in the disease in association with the therapy, and/or an improvement in one or more symptoms of the disease in association with the therapy. Therefore, for example, a positive therapeutic response would refer to one or more of the following improvements in the disease: (1) reduction in tumor size; (2) reduction in the number of cancer cells; (3) inhibition (i.e., slowing to some extent, preferably halting) of tumor growth; (4) inhibition (i.e., slowing to some extent, preferably halting) of cancer cell infiltration into peripheral organs; (5) inhibition (i.e., slowing to some extent, preferably halting) of tumor metastasis; and (6) some extent of relief from one or more symptoms associated with the cancer. Such therapeutic responses may be further characterized as to degree of improvement. Thus, for example, an improvement may be characterized as a complete response. By “complete response” is documentation of the disappearance of all symptoms and signs of all measurable or evaluable disease confirmed by physical examination, laboratory, nuclear and radiographic studies (i.e., CT (computer tomography) and/or MRI (magnetic resonance imaging)), and other non-invasive procedures repeated for all initial abnormalities or sites positive at the time of entry into the study. Alternatively, an improvement in the disease may be categorized as being a partial response. By “partial response” is intended a reduction of greater than 50% in the sum of the products of the perpendicular diameters of all measurable lesions when compared with pretreatment measurements (for patients with evaluable response only, partial response does not apply).

[0088] The pharmaceutical compositions comprising the IPSC-derived rejuvenated CTLs may be administered using any route of administration in accordance with any medically acceptable method known in the art. Suitable routes of administration include parenteral administration, such as intravenous (IV), intraarterial, infusion, subcutaneous (SC), intraperitoneal (IP), intramuscular (IM), pulmonary, nasal, topical, or transdermal. In some embodiments, the pharmaceutical composition comprising the IPSC-derived rejuvenated CTLs is administered locally to the site of a tumor or cancerous cells.

[0089] Factors influencing the respective amount of the various compositions to be administered include, but are not limited to, the mode of administration, the frequency of administration, the particular type of cancer undergoing therapy, the severity of the disease, the history of the disease, whether the individual is undergoing concurrent therapy with another therapeutic agent, and the age, height, weight, health, and physical condition of the individual undergoing therapy. Generally, a higher dosage is preferred with increasing weight of the subject undergoing therapy.

[0090] In certain embodiments, multiple therapeutically effective doses of the IPSC-derived rejuvenated CTLs will be administered for a time period sufficient to effect at least a partial tumor response and more preferably a complete tumor response. Where a subject undergoing immunotherapy exhibits a partial response, or a relapse following a prolonged period of remission, subsequent courses of immunotherapy may be needed to achieve complete remission of the disease. Thus, subsequent to a period of time off from a first treatment period, a subject may receive one or more additional treatment periods comprising immunotherapy with IPSC-derived rejuvenated CTLs. Such a period of time off between treatment periods is referred to herein as a time period of discontinuance. It is recognized that the length of the time period of discontinuance is dependent upon the degree of tumor response (i.e., complete versus partial) achieved with any prior treatment periods of immunotherapy with the IPSC-derived rejuvenated CTLs or other therapeutic agents.

Kits

[0091] Also provided are kits for practicing the methods described herein. In certain embodiments, the kit comprises IPSC-derived rejuvenated CTLs specific for a mutated EGFR or KRAS neo-antigen epitope or reagents for preparing them. For example, the kit may comprise an immunogenic peptide comprising a mutated EGFR or KRAS neo-antigen epitope, an antigen presenting cell (e.g., dendritic cell, macrophage, or cellular or acellular artificial antigen presenting cell (e.g., MHC multimer)), agents for isolating CTLs (e.g., immunomagnetic beads or immunoaffinity columns), reprogramming factors (e.g., Yamanaka factors such as OCT3, OCT4, SOX2, KLF4, c-MYC, NANOG, and LIN28), redifferentiation factors (e.g., VEGF, SCF, FLT-3L, and IL-7), and culture media. Alternatively, the kit may comprise IPSC-derived rejuvenated CTLs specific for a mutated EGFR or KRAS neo-antigen epitope in a pharmaceutical composition suitable for use in treatment.

[0092] In certain embodiments, the kit comprises an immunogenic peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5, or a sequence displaying at least about 70-100% sequence identity thereto, including any percent identity within this range, such as 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or 100% sequence identity thereto, wherein the immunogenic peptide comprises a mutated EGFR or KRAS neo-antigen epitope.

[0093] Kits may comprise one or more containers of the compositions described herein. Suitable containers for the compositions include, for example, bottles, vials, syringes, and test tubes. Containers can be formed from a variety of materials, including glass or plastic. A container may have a sterile access port (for example, the container may be an intravenous solution bag or a vial having a stopper pierceable by a hypodermic injection needle). The kit can further comprise a container comprising a pharmaceutically-acceptable buffer, such as phosphate-buffered saline, Ringer's solution, or dextrose solution. It can also contain other materials useful to the end-user, including other pharmaceutically acceptable formulating solutions such as buffers, diluents, filters, needles, and syringes or other delivery device. The kit may also provide a delivery device pre-filled with the IPSC-derived rejuvenated CTLs.

[0094] In addition to the above components, the subject kits may further include (in certain embodiments) instructions for practicing the subject methods. These instructions may be present in the subject kits in a variety of forms, one or more of which may be present in the kit. One form in which these instructions may be present is as printed information on a suitable medium or substrate, e.g., a piece or pieces of paper on which the information is printed, in the packaging of the kit, in a package insert, and the like. Yet another form of these instructions is a computer readable medium, e.g., diskette, compact disk (CD), DVD, Blu-ray, flash drive, and the like, on which the information has been recorded. Yet another form of these instructions that may be present is a website address which may be used via the internet to access the information at a removed site.

Utility

[0095] The IPSC-derived rejuvenated CTLs, produced by the methods described herein, are useful in cellular immunotherapy for treating cancer, particularly cancers expressing mutated EGFR or KRAS neo-antigen epitopes.

[0096] The term "cancer", as used herein, refers to a variety of conditions caused by the abnormal, uncontrolled growth of cells. Cells capable of causing cancer, referred to as "cancer cells", possess characteristic properties such as uncontrolled proliferation, immortality, metastatic potential, rapid growth and proliferation rate, and/or certain typical morphological features. A cancer can be detected in any of a number of ways, including, but not limited to, detecting the presence of a tumor or tumors (e.g., by clinical or radiological means), examining cells within a tumor or from another biological sample (e.g., from a tissue biopsy), measuring blood markers indicative of cancer, and detecting a genotype indicative of a cancer. However, a negative result in one or more of the above detection methods does not necessarily indicate the absence of cancer, e.g., a patient who has exhibited a complete response to a cancer treatment may still have a cancer, as evidenced by a subsequent relapse.

[0097] The term "cancer" as used herein includes carcinomas, (e.g., carcinoma in situ, invasive carcinoma, metastatic carcinoma) and pre-malignant conditions, i.e. neomorphic changes independent of their histological origin. The term "cancer" is not limited to any stage, grade, histomorphological feature, invasiveness, aggressiveness or malignancy of an affected tissue or cell aggregation. In particular stage 0 cancer, stage I cancer, stage II cancer, stage III cancer, stage IV cancer, grade I cancer, grade II cancer, grade III cancer, malignant cancer and primary carcinomas are included.

[0098] Cancers and cancer cells that can be treated with IPSC-derived rejuvenated CTLs include, but are not limited to, hematological cancers, including leukemia, lymphoma and myeloma, and solid cancers, including for example tumors of the brain (glioblastomas, medulloblastoma, astrocytoma, oligodendroglioma, ependymomas), carcinomas, e.g. carcinoma of the lung, liver, thyroid, bone, adrenal, spleen, kidney, lymph node, small intestine, pancreas, colon, stomach, breast, endometrium, prostate, testicle, ovary, skin, head and neck, and esophagus; sarcomas, melanomas; myelomas; etc.

[0099] In particular, lung cancer may be responsive to treatment with IPSC-derived rejuvenated CTLs specific for mutated EGFR or KRAS neo-antigen epitopes including,

without limitation, non-small-cell lung carcinoma (e.g., adenocarcinoma, squamous-cell carcinoma and large-cell carcinoma) and small-cell lung cancer. In an embodiment, the lung cancer is non-small cell lung carcinoma (NSCLC). In certain embodiments, the NSCLC comprises a mutated EGFR neo-antigen comprising a mutation selected from the group consisting of a C797S mutation, a T790M mutation, an L858R mutation, and a deletion. In other embodiments, the NSCLC comprises a mutated KRAS neo-antigen comprising a mutation selected from the group consisting of a G12D mutation, a G12V mutation, and a G12C mutation.

[0100] It will be apparent to one of ordinary skill in the art that various changes and modifications can be made without departing from the spirit or scope of the invention.

EXPERIMENTAL

[0101] The following examples are put forth so as to provide those of ordinary skill in the art with a complete disclosure and description of how to make and use the present invention, and are not intended to limit the scope of what the inventors regard as their invention nor are they intended to represent that the experiments below are all or the only experiments performed. Efforts have been made to ensure accuracy with respect to numbers used (e.g. amounts, temperature, etc.) but some experimental errors and deviations should be accounted for. Unless indicated otherwise, parts are parts by weight, molecular weight is weight average molecular weight, temperature is in degrees Centigrade, and pressure is at or near atmospheric.

[0102] All publications and patent applications cited in this specification are herein incorporated by reference as if each individual publication or patent application were specifically and individually indicated to be incorporated by reference.

[0103] The present invention has been described in terms of particular embodiments found or proposed by the present inventor to comprise preferred modes for the practice of the invention. It will be appreciated by those of skill in the art that, in light of the present disclosure, numerous modifications and changes can be made in the particular embodiments exemplified without departing from the intended scope of the invention. For example, due to codon redundancy, changes can be made in the underlying DNA sequence without affecting the protein sequence. Moreover, due to biological functional equivalency considerations, changes can be made in protein structure without affecting the biological action in kind or amount. All such modifications are intended to be included within the scope of the appended claims.

Example 1

Introduction

[0104] The discovery of iPSC technology created promising new avenues for treatment^{2,3,4,5,6,7}. Human iPSCs are a potential source of stem cells for transfusion therapies. The development of widely varying reprogramming methods has enabled us nowadays to obtain iPSCs from even a small number of antigen-specific T cells of patient origin. As these T cell-derived iPSCs (T-iPSCs) carry TCR gene rearrangements in their genomic DNA, they are likely useful for producing antigen-specific T cells and for studying T cell development. T cell immunotherapy is potentially an effective

therapeutic strategy against many types of cancers and viral infections. If antigen-specific T cells tailored against diseases and for patients can be easily obtained, T cell immunotherapy should become a popular choice of therapy. However, use of T cell immunotherapy is restricted by HLA alleles. In addition, expansion of CTLs ex vivo has hitherto resulted in production of CTLs with short telomeres and an “exhausted” phenotype. Our laboratory developed an in vitro way to reprogram antigen-specific CTLs to T-iPSCs for expansion and then to guide them sequentially to yield T-lineage cells and mature CD8 single-positive T cells. These CD8+ T cells generated in vitro display antigen-specific cytotoxicity and enhanced proliferative capacity with longer telomeres. Since these T cells originate from a patient’s own CTLs, HLA restriction is not an issue. This novel technique thus provides approaches to generate rejuvenated antigen-specific T cells in unlimited numbers. This discovery should resolve issues related to T cell adoptive immunotherapy both qualitatively and quantitatively.

[0105] T lymphocytes play a central role in acquired immunity and control systemic immunity against internal and external pathogens. CTLs and helper lymphocytes are important components of the immune system in the fight against cancers^{9,10}. These T lymphocytes start to exert their proliferative functions when, via TCRs, they recognize antigens in an HLA-restricted and antigen-specific manner. Adoptive T cell immunotherapy that exploits these features is evolving as a technology with the potential of providing ways safely and effectively to target pathogens for destruction. The greatest advantages of adoptive T cell immunotherapy lie in specific recognition of target cells and in long-term immunological surveillance by long-lived native T lymphocytes.

[0106] In fact, successful treatment of cancers with allogeneic T lymphocytes is a direct proof that human T-cell immunity has the potential to eradicate cancers. However, the effectiveness of adoptive T-cell immunotherapy is often hampered by insufficient recognition of cancer antigens (principally self-antigens), on cancer cells. It is also true that continuous exposure to cancer/self-antigens drives T lymphocytes into a highly exhausted state, with loss of potential for long-term survival, proliferation, and killing functions¹⁰. Several researchers have endeavored to develop clinical protocols for expanding antigen-responding T cells, i.e., tumor-infiltrating lymphocytes, from the few native T cell pools remaining in the patient. Highly expanded T cells in such protocols have not proved fully effective so far because of functional losses incurred during ex vivo manipulation. To overcome these obstacles in cell-based immunotherapy, we endeavored to generate iPSCs from a single T cell of a cancer patient. iPSCs have a capacity for unlimited self-renewal while maintaining pluripotency⁹. Unlike other somatic cell-derived iPSCs, T-iPSCs have properly rearranged TCRs even after having undergone nuclear reprogramming.

Example 2

Rejuvenation of Antigen-Specific Cytotoxic T Cells

[0107] We have recently developed a novel system in which antigen-specific cytotoxic T cells (CTLs) can be rejuvenated by reprogramming them into induced pluripotent stem cells (iPSCs) and redifferentiating them while expanding their numbers, yielding abundant rejuvenated T

cells (rejT cells) (Generation of rejuvenated antigen-specific T cells by reprogramming to pluripotency and redifferentiation. 2013 Jan. 3; 12(1):114-26. Cell Stem Cell). This unique technique has been deployed in vivo with a safeguard system as a model of iPSC-derived, rejCTL therapy (A safeguard system for induced pluripotent stem cell-derived rejuvenated T cell therapy. 2015 Oct. 13; 5(4):597-608. Stem Cell Report). The purpose of this innovative method, the first exploration of the concept of a “kill switch”, is to ensure that using iPSC-based therapy in humans is safe.

[0108] Adoptive T-cell immunotherapy has shown promise in treating melanoma and other cancers; however, cytotoxic T-cells can become exhausted, with loss of efficacy during ex vivo expansion. To overcome this obstacle, we have developed a novel system in which antigen-specific T cells are reprogrammed to pluripotent stem cells (T-iPSCs) using Yamanaka factors. After expansion, these T-iPSCs are redifferentiated to functional T cells. They retain their original antigen specificity. These newly redifferentiated T cells display a naïve T cell phenotype, with longer telomeres and higher proliferative activity. These iPSCs generated from human T lymphocytes (T-iPSCs) retain their T-cell receptor (TCR) specificity in the genome as encoded by rearranged TCR alpha and beta genes^{16,17,18}. Because T-iPS cells have unlimited self-renewal capacity, they can be expanded ex vivo. When these T-iPS cells are re-differentiated into CD3+ TCR, they are newly generated T cells with original antigen specificity but longer telomeres^{11,8}. We have demonstrated killing activity and specificity of these “rejuvenated” T cells in vivo. In fact, rejCTL cells show more robust biological activity than the original T cells.

[0109] This unique approach differs from chimeric antigen receptor T-cell (CART) immunotherapy. It uses T cell receptors to recognize non-self-antigens/epitopes expressed inside tumor cells; therefore, this form of immunotherapy using rejCTL cells is restricted by the HLA type. The advantages include that 1) once a iPS cell line is established, T-iPSCs can be generated indefinitely from them, producing young and active T cells without limitation; 2) T-iPSCs can be frozen for future use in patients with the same HLA type and mutation profile; 3) a safeguard system using inducible caspase 9 (iCas9) can be activated to eliminate all T-iPSC-derived cells in case of immunotherapy-associated complications; 4) it offers the opportunity to search for yet unknown cancer epitopes by searching T-iPSC libraries generated from tumor-infiltrating T cells. Application of this technology in lung cancer treatment will open a novel avenue for translational cancer therapies.

[0110] T cells are superior to antibodies in that they can recognize antigenic epitopes inside target cells, epitopes that are presented utilizing the MHC-based system. A disadvantage is perhaps that their ability to recognize antigens is restricted by the MHC allotype. This MHC-based restriction has been an issue in T cell immunotherapy. However, the issue has been addressed by the recent development of iPSC technology enabling the generation of iPSCs from a patient's own T cells. Utilizing this technology, we have developed a system to rejuvenate exhausted CTLs through reprogramming and redifferentiation. This should permit novel adoptive immunotherapies for cancer and viral infections.

[0111] In addition, a safeguard system using iCas9 engineered iPSCs can be applied to any first-in-man study using iPSC- or embryonic stem cell (ESC)-derived cells. Patients'

tumor infiltrating T cells can be used to make T-iPSC libraries, followed by clonal redifferentiation of CTLs to search for novel cancer epitopes. This approach may serve to identify yet unknown targets for future use in cancer immunotherapy.

Example 3

Antigen-Specific Cytotoxic T Cells Targeting Mutated Epitopes of EGFR

Introduction

[0112] Mutation-associated epitopes of the receptor tyrosine kinase, EGFR, are commonly present in lung and other forms of cancer. In lung cancer, mutations that activate epidermal growth factor receptor (EGFR) are often found in exons 18 to 21 of EGFR, the portion of the gene that encodes the tyrosine kinase domain of EGFR protein. Exon 19 deletions and exon 21 point mutations account for around 90% of all EGFR mutations in advanced NSCLC. EGFR tyrosine kinase inhibitors (TKIs), such as gefitinib and erlotinib, show therapeutic efficacy against NSCLC when such EGFR mutations are present. However, patients frequently develop resistance to EGFR-TKIs with a secondary mutation, a threonine to methionine change at codon 790 of EGFR (EGFR T790M). This is the major mechanism of EGFR-TKI resistance. It causes cancer relapse. Secondary mutations that occur in EGFR are the main mechanism of resistance to tyrosine kinase inhibitors (TKI) active against primarily mutations of EGFR. Mutations in EGFR are often found in cancers arising outside the lung, such as in the pancreas or breast. Without being bound by theory, we propose that T-cell based immunotherapy will not only work effectively against lung cancer but also other solid tumors having the same EGFR mutations. In addition, this approach can also be applied to mutations in other genes associated with cancer (MET, IGF-1R, etc.). Collectively, development of rejuvenated T-iPSCs for lung cancer immunotherapy may have a broad impact on future iPSC-mediated clinical therapy of cancer.

Peptide Prediction and Synthesis, Based on HLA Alleles, of the Peptides Representing EGFR Mutations and Selection of Those with Highest Affinity by Peptide Binding Assay.

[0113] We use the epitope prediction software, BIMAS (bimas.cit.nih.gov/molbio/hla_bind/), to predict peptides that can bind to various HLA alleles^{10,11,12}.

Generation of Rejuvenated, iC9-Implemented CTLs In Vitro.

[0114] The entire process of generating rejCTLs can be divided into the following steps: A) Induction of CTLs specific to EGFR epitopes carrying mutations (e.g., T790M, deletion and L858R) that were selected by the in-silicon approach. Peripheral-blood mononuclear cells (PBMCs) contain some mutant EGFR-specific T cells. Because mutant EGFR-specific T cells also infiltrate into primary lung cancer tissue, they can be isolated from such tissue and cultured. Selected peptides are used to treat the original T cells. Peptide-specific responsive T cells are selected using tetramer and FACS isolation. B) Generation of T-iPSCs from EGFR mutation-specific CTLs and implementation of a iC9 based safeguard system¹. The CTLs generated in A) are reprogrammed into T-iPSCs using Sendai virus. The iC9 system is implemented in the T-iPSCs. C) Redifferentiation of CTLs from T-iPSCs. After in vitro expansion, T-iPSCs are

redifferentiated into abundant rejCTLs carrying inducible iC9. Antigen specificity, killing activity, and proliferation activity are assayed in vitro. Evaluation of the Therapeutic Efficacy of the Series of rejCTLs Recognizing Different Mutant EGFR Epitopes. [0115] Infusion of patient rejCTLs into tumor-grafted mice and evaluation of tumor regression (speed and completeness). The rejCTLs are injected intraperitoneally into patient tumor-grafted mice. Control CTLs, as originally isolated, are injected into xenografted mice to permit comparisons. Tumor sizes are monitored after rejCTL cell injection¹. Timely imaging is used to document changes in the tumor in vivo. The most efficient epitopes for EGFR mutant NSCLCs will demonstrate changes in tumor size in vivo.

Example 4

Antigen-Specific Cytotoxic T Cells Targeting NSCLC Mutated Tumor Epitopes

[0116] The immunogenicity of EGFR and Ras mutations found in NSCLC in association with various HLA alleles are evaluated, and CTLs specific to the mutation sequences are generated. By reprogramming and redifferentiating these NSCLC-specific CTLs, rejCTLs are obtained. In the pres-

ence of certain human leukocyte antigen (HLA) alleles, a mutated protein such as that in EGFR T790M-harboring cancer cells is presented as a tumor-specific antigen and is targeted by activated immune cells. We screen various EGFR and KRas mutations (Table 1) and assess their binding affinity to various HLA alleles; the immunogenicity of the mutation-derived peptide sequences with particular HLA molecules is tested in vitro, using transporter associated with antigen processing (TAP)-deficient cell lines.

TABLE 1			
EGFR/KRAS Neo-Antigen Candidates			
Driver Gene	Mutation ID	Peptide	Peptide Sequence
EGFR	C797S	CS9.3	QLMPFGSLL (SEQ ID NO: 1)
	C797S	CS11.6	LMPFGSLLDYV (SEQ ID NO: 2)
KRAS	G12D	GD10.3	KLVVVGADGV (SEQ ID NO: 3)
	G12V	GV10.3	KLVVVGAVGV (SEQ ID NO: 4)
	G12C	GC10.3	KLVVVGACGV (SEQ ID NO: 5)

TABLE 2			
CDR1	CDR2	CDR3	Frequency
TCRalphaDSVNN Donor Y (SEQ ID NO: 6) (CS9.3)	IPSGT (SEQ ID NO: 66)	AVDNYGQNFV (SEQ ID NO: 130)	770758
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVGNYGQNFV (SEQ ID NO: 131)	2095
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDSYGQNFV (SEQ ID NO: 132)	1969
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AADNYGQNFV (SEQ ID NO: 133)	1942
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDDYGQNFV (SEQ ID NO: 134)	1404
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTFTGGNKL (SEQ ID NO: 135)	1129
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVNNYGQNFV (SEQ ID NO: 136)	736
TISGNEY (SEQ ID NO: 8)	GLKNN (SEQ ID NO: 68)	IVNWGSNSGYALN (SEQ ID NO: 137)	338
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AEDNYGQNFV (SEQ ID NO: 138)	228
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVVNYGQNFV (SEQ ID NO: 139)	218
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDIYGQNFV (SEQ ID NO: 140)	214
SSVPPY (SEQ ID NO: 9)	YTSAATLV (SEQ ID NO: 69)	AVSEMNYGGSQGNLI (SEQ ID NO: 141)	213
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVEGYKLS (SEQ ID NO: 142)	208
VSPFSN (SEQ ID NO: 10)	MTFSENT (SEQ ID NO: 70)	VAMNRDDKII (SEQ ID NO: 143)	158

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVENYGQNFV (SEQ ID NO: 144)	120
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ATVSTSGTYKYI (SEQ ID NO: 145)	109
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSDTGFQKLV (SEQ ID NO: 146)	102
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDYYGQNFV (SEQ ID NO: 147)	95
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVYNYGQNFV (SEQ ID NO: 148)	71
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AGDNYGQNFV (SEQ ID NO: 149)	69
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDTYGQNFV (SEQ ID NO: 150)	52
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVANYGQNFV (SEQ ID NO: 151)	50
SSNFYA (SEQ ID NO: 12)	MTLNGDE (SEQ ID NO: 72)	AFMSGYSTLT (SEQ ID NO: 152)	41
DRGSQS (SEQ ID NO: 13)	IYSNGD (SEQ ID NO: 73)	AVNLGGGGADGLT (SEQ ID NO: 153)	41
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVEGYSGAGSYQLT (SEQ ID NO: 154)	39
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDHYGQNFV (SEQ ID NO: 155)	35
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVEPHNARLM (SEQ ID NO: 156)	33
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDKYGQNFV (SEQ ID NO: 157)	27
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	AYRSAVTGNQFY (SEQ ID NO: 158)	23
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVHNYGQNFV (SEQ ID NO: 159)	21
TSGFNG (SEQ ID NO: 15)	NVLDGL (SEQ ID NO: 75)	AVDLNSGYSTLT (SEQ ID NO: 160)	17
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSDPGDEKLT (SEQ ID NO: 161)	15
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ATVQNTGTASKLT (SEQ ID NO: 162)	13
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALGTEMTRS (SEQ ID NO: 163)	11
TRDTTTY (SEQ ID NO: 17)	RNSFDEQN (SEQ ID NO: 77)	ALSDSEGAQKLV (SEQ ID NO: 164)	10
DRGSQS (SEQ ID NO: 13)	IYSNGD (SEQ ID NO: 73)	AVDGQKLL (SEQ ID NO: 165)	10
TSDPSYG (SEQ ID NO: 18)	QGSYDQQN (SEQ ID NO: 82)	AMREGGDDKII (SEQ ID NO: 166)	9
TISGNEY (SEQ ID NO: 8)	GLKNN (SEQ ID NO: 68)	IVRVASGGGADGLT (SEQ ID NO: 167)	8
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALRRLQNY (SEQ ID NO: 168)	8

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVLPQGGSEKLV (SEQ ID NO: 169)	8
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNRGQNFV (SEQ ID NO: 170)	8
TSGFYG (SEQ ID NO: 19)	DALDGL (SEQ ID NO: 83)	ALYNFNKIFY (SEQ ID NO: 171)	7
SIFNT (SEQ ID NO: 20)	LYKAGEL (SEQ ID NO: 84)	AGQLTLATQAN* (SEQ ID NO: 172)	7
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDSCGQNFV (SEQ ID NO: 173)	7
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AGITMVRIL (SEQ ID NO: 174)	7
YSGSPE (SEQ ID NO: 21)	HISR (SEQ ID NO: 95)	AQGLALATQAN* (SEQ ID NO: 175)	6
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	ACFNSNSGYALN (SEQ ID NO: 176)	6
TSDPSYG (SEQ ID NO: 18)	QGSYDQQN (SEQ ID NO: 82)	AMRASGGYQKVT (SEQ ID NO: 177)	6
SSYSPS (SEQ ID NO: 22)	YTSAATLV (SEQ ID NO: 69)	VVSRIMEEAKSIS (SEQ ID NO: 178)	6
SSVPPY (SEQ ID NO: 9)	YTTGATLV (SEQ ID NO: 96)	AVSGYNDMR (SEQ ID NO: 179)	6
NSAFQY (SEQ ID NO: 23)	TYSSGN (SEQ ID NO: 97)	AVGTGANNLF (SEQ ID NO: 180)	6
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AG*WSEFC (SEQ ID NO: 181)	6
DSASNY (SEQ ID NO: 24)	IRSNVGE (SEQ ID NO: 80)	AASIMTC (SEQ ID NO: 182)	6
TSDPSYG (SEQ ID NO: 18)	QGSYDQQN (SEQ ID NO: 82)	AMDVYNQGGKLI (SEQ ID NO: 183)	5
SSYSPS (SEQ ID NO: 22)	YTSAATLV (SEQ ID NO: 69)	VVSGVGQNFV (SEQ ID NO: 184)	5
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNCGQNFV (SEQ ID NO: 185)	5
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDDHGQNFV (SEQ ID NO: 186)	5
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AMDNYGQNFV (SEQ ID NO: 187)	5
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTFAGGGNKLT (SEQ ID NO: 188)	4
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVAFGGGGNKLT (SEQ ID NO: 189)	4
SSVPPY (SEQ ID NO: 9)	YTSAATLV (SEQ ID NO: 69)	AVSLNDYKLS (SEQ ID NO: 190)	4
NSASDY (SEQ ID NO: 25)	IRSNMDK (SEQ ID NO: 98)	AEISYSSASKII (SEQ ID NO: 191)	4
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	TVDNYGQNFV (SEQ ID NO: 192)	4
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNYSQNFV (SEQ ID NO: 193)	4

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNHGQNFV (SEQ ID NO: 194)	4
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	AYRSHDMR (SEQ ID NO: 195)	3
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	AYGGGSEKLV (SEQ ID NO: 196)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTSTGGGNKLT (SEQ ID NO: 197)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTLTGGGNKLT (SEQ ID NO: 198)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSEMNYGGSQGNLI (SEQ ID NO: 141)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSARQLT (SEQ ID NO: 199)	3
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVNSYGQNFV (SEQ ID NO: 200)	3
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVNDYGQNFV (SEQ ID NO: 201)	3
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AAVNYGQNFV (SEQ ID NO: 202)	3
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AANNYGQNFV (SEQ ID NO: 203)	3
YGGTVN (SEQ ID NO: 26)	YFSGDPLV (SEQ ID NO: 99)	AVNRNTGNQFY (SEQ ID NO: 204)	2
VSPFSN (SEQ ID NO: 10)	MTFSENT (SEQ ID NO: 70)	VVSAKEAKEIS (SEQ ID NO: 205)	2
VSPFSN (SEQ ID NO: 10)	MTFSENT (SEQ ID NO: 70)	VVSAEGRQRLNPGEAI (SEQ ID NO: 206)	2
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ATGSNDYKLS (SEQ ID NO: 207)	2
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ATDGRGSYIPT (SEQ ID NO: 208)	2
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ATDEDSSYKLI (SEQ ID NO: 209)	2
TSGFNG (SEQ ID NO: 15)	NVLDGL (SEQ ID NO: 75)	AVSDSNYQLI (SEQ ID NO: 210)	2
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	AYRSAGGATNKLI (SEQ ID NO: 211)	2
TSENNYY (SEQ ID NO: 31)	QEAYKQQN (SEQ ID NO: 74)	AFMKHSGVNDMR (SEQ ID NO: 212)	2
TISGNEY (SEQ ID NO: 8)	GLKNN (SEQ ID NO: 68)	IVSWGNSNGYALN (SEQ ID NO: 213)	2
TISGNEY (SEQ ID NO: 8)	GLKNN (SEQ ID NO: 68)	ICSGNTPLV (SEQ ID NO: 214)	2
TISGNEY (SEQ ID NO: 8)	GLKNN (SEQ ID NO: 68)	IANWGSNSGYALN (SEQ ID NO: 215)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTYTGGGNKLT (SEQ ID NO: 216)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTFMGGGNKLT (SEQ ID NO: 217)	2

TABLE 2-continued

	CDR1	CDR2	CDR3	Frequency
	SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTFKGGGNKLT (SEQ ID NO: 218)	2
	SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSDRGETSW (SEQ ID NO: 219)	2
	SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSDAGFQKLV (SEQ ID NO: 220)	2
	SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AATFTGGGNKLT (SEQ ID NO: 221)	2
	SSVPPY (SEQ ID NO: 9)	Y TSAATLV (SEQ ID NO: 69)	AVSGMNYGGSQGNLI (SEQ ID NO: 222)	2
	NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYTGRRLT (SEQ ID NO: 223)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	VVDNYGQNFV (SEQ ID NO: 224)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	VADNYGQNFV (SEQ ID NO: 225)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	TADNYGQNFV (SEQ ID NO: 226)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	CG* LWSEFC (SEQ ID NO: 227)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AWITMVRIL (SEQ ID NO: 228)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVSNYGQNFV (SEQ ID NO: 229)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVSNDYKLS (SEQ ID NO: 230)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDS*GQNFV (SEQ ID NO: 231)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNYVRIL (SEQ ID NO: 232)	2
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNHSQNFV (SEQ ID NO: 233)	2
	DRVSQS (SEQ ID NO: 32)	IYSNGD (SEQ ID NO: 73)	AVFGSNTGKLI (SEQ ID NO: 234)	2
	ATGYPS (SEQ ID NO: 33)	ATKADDK (SEQ ID NO: 100)	ALRSNDYKLS (SEQ ID NO: 235)	2
			AVRIAFWGLPESY (SEQ ID NO: 236)	2
TCRbeta Donor Y (CS9.3)	SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGYEQY (SEQ ID NO: 237)	570775
	SGHDT (SEQ ID NO: 35)	YYEEEEE (SEQ ID NO: 102)	ASSLGQGH*SF (SEQ ID NO: 238)	21232
	SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSSGANVLT (SEQ ID NO: 239)	15824
	SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSSAGYEQY (SEQ ID NO: 240)	1390
	SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGCEQY (SEQ ID NO: 241)	1191
	SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTSWGVSYNEQF (SEQ ID NO: 242)	1176

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLASYEQY (SEQ ID NO: 243)	1036
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGHEQY (SEQ ID NO: 244)	1003
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNEQF (SEQ ID NO: 245)	612
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLTGYEQY (SEQ ID NO: 246)	546
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SANLAKSSYNEQF (SEQ ID NO: 247)	265
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SAPRDPDADTQY (SEQ ID NO: 248)	231
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWDRTGEVEQY (SEQ ID NO: 249)	186
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASS*AGYEQY (SEQ ID NO: 250)	174
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	AAAWPATSS (SEQ ID NO: 251)	151
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSMAGYEQY (SEQ ID NO: 252)	140
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWSFHPGLAAYNEQF (SEQ ID NO: 253)	108
SGHDN (SEQ ID NO: 41)	FVKESK (SEQ ID NO: 105)	ASSQLRGGSPH (SEQ ID NO: 254)	100
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSGQGSNTEAF (SEQ ID NO: 255)	98
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGQGRH*SF (SEQ ID NO: 256)	89
SGHVS (SEQ ID NO: 43)	FNYEAQ (SEQ ID NO: 106)	ASSLAEDTQY (SEQ ID NO: 257)	81
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSWAGYEQY (SEQ ID NO: 258)	70
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGRGKH*SF (SEQ ID NO: 259)	70
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGFEQY (SEQ ID NO: 260)	68
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAG*EQY (SEQ ID NO: 261)	59
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGQGKR*SF (SEQ ID NO: 262)	58
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGQGEH*SF (SEQ ID NO: 263)	57
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AYSTGYFGYT (SEQ ID NO: 264)	54
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVGGSSGANVLT (SEQ ID NO: 265)	49
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSVAGYEQY (SEQ ID NO: 266)	49
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSPGANVLT (SEQ ID NO: 267)	47

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSSGQGKH*SF (SEQ ID NO: 268)	47
SNHLY (SEQ ID NO: 44)	FYNNEI (SEQ ID NO: 94)	ASSESRYGRDSTDQY (SEQ ID NO: 269)	39
MNHEY (SEQ ID NO: 42)	SVGEGT (SEQ ID NO: 91)	ASSYSYSTGPELNTEAF (SEQ ID NO: 270)	38
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGPSGANVLT (SEQ ID NO: 271)	36
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGNEQY (SEQ ID NO: 272)	34
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAAYEQY (SEQ ID NO: 273)	33
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLSFDSEQY (SEQ ID NO: 274)	32
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLSQGKH*SF (SEQ ID NO: 275)	32
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSFAGYEYQY (SEQ ID NO: 276)	31
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SARQGLTEAF (SEQ ID NO: 277)	27
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWSVLYGTEY (SEQ ID NO: 278)	27
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGSEQY (SEQ ID NO: 279)	26
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGDPLGPTS* (SEQ ID NO: 280)	24
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLSGYEQY (SEQ ID NO: 281)	24
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEEGSSGANVLT (SEQ ID NO: 282)	22
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLPGYEYQY (SEQ ID NO: 283)	21
LNHNV (SEQ ID NO: 45)	YYDKDF (SEQ ID NO: 107)	ATSREGTGENIQY (SEQ ID NO: 284)	21
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSFSIRASYEQY (SEQ ID NO: 285)	19
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGDEYQY (SEQ ID NO: 286)	17
		ASSVASTGELF (SEQ ID NO: 287)	16
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGRGNTEAF (SEQ ID NO: 288)	15
SGHAT (SEQ ID NO: 46)	FQNNGV (SEQ ID NO: 108)	ASSPIRREGEYQY (SEQ ID NO: 289)	15
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASFVYSAGDSYNEQF (SEQ ID NO: 290)	15
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SARNRVYEYQY (SEQ ID NO: 291)	15
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGQGNTTEAF (SEQ ID NO: 292)	14

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSPPGENEQY (SEQ ID NO: 293)	12
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASTDTDLGEQY (SEQ ID NO: 294)	12
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVERGSSGANVLT (SEQ ID NO: 295)	11
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGQGKH*SF (SEQ ID NO: 238)	11
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	ASSLGQGNH*SF (SEQ ID NO: 296)	11
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	ASSLARGNTEAF (SEQ ID NO: 297)	11
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	AAAWARGNTEAF (SEQ ID NO: 298)	11
ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	ALSDSGTIYEQY (SEQ ID NO: 299)	11
WSHSY (SEQ ID NO: 49)	SAAADI (SEQ ID NO: 111)	ASSVPLEGGSGPQDTQY (SEQ ID NO: 300)	10
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	ASSLGQGKY*SF (SEQ ID NO: 301)	10
LGHNT (SEQ ID NO: 50)	FRNRAP (SEQ ID NO: 112)	ASGLYNRGNEQF (SEQ ID NO: 302)	10
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSSGPTS* (SEQ ID NO: 303)	9
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASGLAGYEQY (SEQ ID NO: 304)	9
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSRTRYTDTQY (SEQ ID NO: 305)	9
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASNLAGYEQY (SEQ ID NO: 306)	8
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASASWGVSYNEQF (SEQ ID NO: 307)	8
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	ASSLGQGETLKL (SEQ ID NO: 308)	8
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVVGGSSGANVLT (SEQ ID NO: 309)	7
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVGANVAGGKETQY (SEQ ID NO: 310)	7
		ASSVTGTVNTEAF (SEQ ID NO: 311)	7
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVKGGSSGANVLT (SEQ ID NO: 312)	6
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSTGANVLT (SEQ ID NO: 313)	6
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 113)	ASSLGQGIH*SF (SEQ ID NO: 314)	6
SGHDT (SEQ ID NO: 35)	YYEEEE (SEQ ID NO: 102)	ASSLGQGKL*SF (SEQ ID NO: 315)	6
SGHDN (SEQ ID NO: 41)	FVKESK (SEQ ID NO: 105)	ASSQDIEV*EAF (SEQ ID NO: 316)	6

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
LGHDT (SEQ ID NO: 51)	YNNKEL (SEQ ID NO: 114)	ASSLRLNTEAF (SEQ ID NO: 317)	6
		ASSVEAGVSGNTIY (SEQ ID NO: 318)	6
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVVRQGHYEAF (SEQ ID NO: 319)	5
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSFGANVLT (SEQ ID NO: 320)	5
SNHLY (SEQ ID NO: 44)	FYNNEI (SEQ ID NO: 94)	ASSPGRILDTQY (SEQ ID NO: 321)	5
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLADYEQY (SEQ ID NO: 322)	5
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSGGLNQPOH (SEQ ID NO: 323)	5
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASKVQGS EDTQY (SEQ ID NO: 324)	5
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPGGFGNEQF (SEQ ID NO: 325)	5
SNHLY (SEQ ID NO: 44)	FYNNEI (SEQ ID NO: 94)	ASSGAGQGSSYEQY (SEQ ID NO: 326)	4
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGQGEH*SF (SEQ ID NO: 263)	4
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLASCEQY (SEQ ID NO: 327)	4
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGYRQY (SEQ ID NO: 328)	4
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGYKQY (SEQ ID NO: 329)	4
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTSWASPTMSS (SEQ ID NO: 330)	4
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTSRGVSYNEQF (SEQ ID NO: 331)	4
SGHDT (SEQ ID NO: 35)	YYEEEEE (SEQ ID NO: 102)	ASSFGQGKH*SF (SEQ ID NO: 332)	4
SGHDT (SEQ ID NO: 35)	YYEEEEE (SEQ ID NO: 102)	ASS*GQGKH*SF (SEQ ID NO: 333)	4
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLVGHEQY (SEQ ID NO: 334)	3
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGRGKH*SF (SEQ ID NO: 259)	3
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGHGQY (SEQ ID NO: 335)	3
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASNSAGYEQY (SEQ ID NO: 336)	3
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASGSAGYEQY (SEQ ID NO: 337)	3
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTSWGISYNEQF (SEQ ID NO: 338)	3
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTSWGASYNEQF (SEQ ID NO: 339)	3

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTS*GVSYNEQF (SEQ ID NO: 340)	3
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	AGTSWGVSYNEQF (SEQ ID NO: 341)	3
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSVGQGH*SF (SEQ ID NO: 342)	3
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSMGQGH*SF (SEQ ID NO: 343)	3
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLCQGH*SF (SEQ ID NO: 344)	3
MNHNS (SEQ ID NO: 53)	SASEGT (SEQ ID NO: 92)	ASRGLAGFNEQF (SEQ ID NO: 345)	3
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSLMRVGFRTDTQY (SEQ ID NO: 346)	3
MGHRA (SEQ ID NO: 54)	YSYEKL (SEQ ID NO: 116)	ASSQDELARTQY (SEQ ID NO: 347)	3
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASTNSLTSTDTQY (SEQ ID NO: 348)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGLGNEQF (SEQ ID NO: 349)	3
ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	AISRADQETQY (SEQ ID NO: 350)	3
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SARDRGATGELF (SEQ ID NO: 351)	3
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGGSAGANVLT (SEQ ID NO: 352)	2
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SARQGRTEAF (SEQ ID NO: 353)	2
SGHYY (SEQ ID NO: 55)	FNNNVP (SEQ ID NO: 103)	ASTSWGVPYNEQF (SEQ ID NO: 354)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLTSYEYQY (SEQ ID NO: 355)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLTGCEYQY (SEQ ID NO: 356)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGQRKH*SF (SEQ ID NO: 357)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGQGRH*SF (SEQ ID NO: 256)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLGQGRK*SF (SEQ ID NO: 262)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASSLAGYK*Y (SEQ ID NO: 358)	2
SGHNT (SEQ ID NO: 34)	YYREEE (SEQ ID NO: 101)	ASGMAGYEYQY (SEQ ID NO: 359)	2
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSWARGNTEAF (SEQ ID NO: 360)	2
SGHDT (SEQ ID NO: 35)	YEEEE (SEQ ID NO: 102)	ASSLGQETLKL (SEQ ID NO: 361)	2
SEHNR (SEQ ID NO: 56)	FQNEAQ (SEQ ID NO: 117)	ASTLYEKLK (SEQ ID NO: 362)	2

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
PGHNT (SEQ ID NO: 57)	YYREEE (SEQ ID NO: 101)	ASDLAGEYQY (SEQ ID NO: 363)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASVGTGNVDEQY (SEQ ID NO: 364)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGSGNEQF (SEQ ID NO: 365)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFSNEQF (SEQ ID NO: 366)	2
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SANLARSSYNEQF (SEQ ID NO: 367)	2
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SALDLAGSQETQY (SEQ ID NO: 368)	2
TCRalpha DSVNN Donor R (SEQ ID NO: 6) (CS9.3)	IPSGT (SEQ ID NO: 66)	AVELFAAGNKLT (SEQ ID NO: 369)	66076
SVFSS (SEQ ID NO: 58)	VVTGGEV (SEQ ID NO: 118)	AGAVTGQLQQIL (SEQ ID NO: 370)	191
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVGLFAAGNKLT (SEQ ID NO: 371)	184
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELLAAGNKLT (SEQ ID NO: 372)	161
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELSAAGNKLT (SEQ ID NO: 373)	126
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVKLFAGNKLT (SEQ ID NO: 374)	72
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFTAGNKLT (SEQ ID NO: 375)	65
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFATGNKLT (SEQ ID NO: 376)	58
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFVAGNKLT (SEQ ID NO: 377)	42
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFAAGNKL (SEQ ID NO: 378)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVVLFAAGNKLT (SEQ ID NO: 379)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVSYLLQATS* (SEQ ID NO: 380)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AV*LFAAGNKLT (SEQ ID NO: 381)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFASGNKLT (SEQ ID NO: 382)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFAAATS* (SEQ ID NO: 383)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDLFAAGNKLT (SEQ ID NO: 384)	
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFDAGNKLT (SEQ ID NO: 385)	
	IFSNGE (SEQ ID NO: 85)	AASEGNYNVLY (SEQ ID NO: 386)	

TABLE 2-continued

	CDR1	CDR2	CDR3	Frequency
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVEVFAAGNKLT (SEQ ID NO: 387)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFSAGNKLT (SEQ ID NO: 388)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVALFAAGNKLT (SEQ ID NO: 389)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVEIFAAGNKLT (SEQ ID NO: 390)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFPAGNKLT (SEQ ID NO: 391)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFGAGNKLT (SEQ ID NO: 392)	
	DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVELFAEATS* (SEQ ID NO: 393)	
TCRbeta Donor R (CS9.3)	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSSYEYQ (SEQ ID NO: 394)	111183
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQK*TLKL (SEQ ID NO: 395)	7924
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSPYEYQ (SEQ ID NO: 396)	368
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASGLISGSSYEYQ (SEQ ID NO: 397)	312
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLIGGSSYEYQ (SEQ ID NO: 398)	293
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLVSGSSYEYQ (SEQ ID NO: 399)	233
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSPISGSSYEYQ (SEQ ID NO: 400)	230
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGGSYEYQ (SEQ ID NO: 401)	222
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASNLSGSSYEYQ (SEQ ID NO: 402)	98
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSFYEQY (SEQ ID NO: 403)	65
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSTYEYQ (SEQ ID NO: 404)	45
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQK*ALKL (SEQ ID NO: 405)	43
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASRLISGSSYEYQ (SEQ ID NO: 406)	38
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQKWLKL (SEQ ID NO: 407)	33
	MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	AAV**VVAPTSS (SEQ ID NO: 408)	30
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIGGQK*TLKL (SEQ ID NO: 409)	27
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQR*TLKL (SEQ ID NO: 410)	26
	LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGRK*TLKL (SEQ ID NO: 411)	23

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSTEGQK*TLKL (SEQ ID NO: 412)	17
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISVAPTSS (SEQ ID NO: 413)	16
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQE*TLKL (SEQ ID NO: 414)	16
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ARSLISGSSYEQY (SEQ ID NO: 415)	15
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSMEGQK*TLKL (SEQ ID NO: 416)	15
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEBQK*TLKL (SEQ ID NO: 417)	15
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQKRTLKL (SEQ ID NO: 418)	14
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSAYEQY (SEQ ID NO: 419)	13
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASCLISGSSYEQY (SEQ ID NO: 420)	9
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGRSYEQY (SEQ ID NO: 421)	8
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSYYEQY (SEQ ID NO: 422)	6
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQKCTLKL (SEQ ID NO: 423)	6
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLSGSSYEQY (SEQ ID NO: 424)	4
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSSSTSS (SEQ ID NO: 425)	4
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSSREQY (SEQ ID NO: 426)	4
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASILISGSSYEQY (SEQ ID NO: 427)	3
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSKEGQK*TLKL (SEQ ID NO: 428)	3
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASTLISGSSYEQY (SEQ ID NO: 429)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSPISGSPYEQY (SEQ ID NO: 430)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLVSGNSYEQY (SEQ ID NO: 431)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLISGSCYEQY (SEQ ID NO: 432)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASGPISGSSYEQY (SEQ ID NO: 433)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASGLISGGSYEQY (SEQ ID NO: 434)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASGLIGGSSYEQY (SEQ ID NO: 435)	2
LNHDA (SEQ ID NO: 47)	SQVVND (SEQ ID NO: 119)	ASSIEGQK*H*SF (SEQ ID NO: 436)	2

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSREGQK*TLKL (SEQ ID NO: 437)	2
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIKGQK*TLKL (SEQ ID NO: 438)	2
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIEGQKGTLLK (SEQ ID NO: 439)	2
TCRalpha Donor Y (SEQ ID NO: 16) (CS11.6)	IRENEKE (SEQ ID NO: 76)	APPSGSARQLT (SEQ ID NO: 199)	687383
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPPGSARQLT (SEQ ID NO: 440)	2142
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVMNAGKST (SEQ ID NO: 441)	1155
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALPSGSARQLT (SEQ ID NO: 442)	739
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSSARQLT (SEQ ID NO: 443)	652
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	TPPSGSARQLT (SEQ ID NO: 444)	644
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	VPPSGSARQLT (SEQ ID NO: 445)	450
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APSSGSARQLT (SEQ ID NO: 446)	439
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPPGSARQLT (SEQ ID NO: 447)	411
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPTGSARQLT (SEQ ID NO: 448)	258
NSASDY (SEQ ID NO: 25)	IRSNMDK (SEQ ID NO: 98)	AENEDYGQNFV (SEQ ID NO: 449)	142
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSARQL (SEQ ID NO: 450)	123
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSARQLTFGSGTQL TVLPHEIKKRGEVTKGSL L*GIKHCETHGRRKQTH (SEQ ID NO: 451)	81
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	AQPSGSARQLT (SEQ ID NO: 452)	77
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSCSARQLT (SEQ ID NO: 453)	57
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPAGSARQLT (SEQ ID NO: 454)	56
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPYGSARQLT (SEQ ID NO: 455)	34
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	DPPSGSARQLT (SEQ ID NO: 456)	30
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	GPPSGSARQLT (SEQ ID NO: 457)	29
DRGSQS (SEQ ID NO: 13)	IYSNGD (SEQ ID NO: 73)	AVNIGGSQGNLI (SEQ ID NO: 458)	19
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	SPPSGSARQLT (SEQ ID NO: 459)	18

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSRSARQLT (SEQ ID NO: 460)	16
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ARPLVLQGN* (SEQ ID NO: 461)	14
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	PPPSGSARQLT (SEQ ID NO: 462)	13
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSDSARQLT (SEQ ID NO: 463)	7
DRGSQS (SEQ ID NO: 13)	IYSNGD (SEQ ID NO: 73)	AVYSGYSTLT (SEQ ID NO: 464)	7
YGGTVN (SEQ ID NO: 26)	YFSGDPLV (SEQ ID NO: 99)	AVNARDSGTYKYI (SEQ ID NO: 465)	6
NTAFDY (SEQ ID NO: 27)	IRPDVS (SEQ ID NO: 120)	AAPGECWQQP*AD (SEQ ID NO: 466)	6
TSINN (SEQ ID NO: 11)	IRSNERE (SEQ ID NO: 71)	ARTGYSGGADGLT (SEQ ID NO: 467)	4
TSESDYY (SEQ ID NO: 14)	QEAYKQQN (SEQ ID NO: 74)	AYDQGGSEKLV (SEQ ID NO: 468)	4
TSQSYG (SEQ ID NO: 28)	QGSYDEQN (SEQ ID NO: 121)	AMSFRRGGYQKVT (SEQ ID NO: 469)	4
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGPARQLT (SEQ ID NO: 470)	4
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSDPARQLT (SEQ ID NO: 471)	4
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPCGSARQLT (SEQ ID NO: 472)	4
DSAIYN (SEQ ID NO: 29)	IQSSQRE (SEQ ID NO: 122)	AVRPIEHR*PVL (SEQ ID NO: 473)	4
YSGSPE (SEQ ID NO: 21)	HISR (SEQ ID NO: 95)	ALRSGGYQKVT (SEQ ID NO: 474)	3
YGATPY (SEQ ID NO: 30)	YFSGDTLV (SEQ ID NO: 123)	AVGAGGKLI (SEQ ID NO: 475)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVTNAGKST (SEQ ID NO: 476)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVMSAGKST (SEQ ID NO: 477)	3
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVMDAGKST (SEQ ID NO: 478)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	PLVLQGN* (SEQ ID NO: 479)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSARQLTFGSGTQL TVLPHEHIKKRGVTKGSL L*GIKHCETHGRRKQTH (SEQ ID NO: 480)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPPDSARQLT (SEQ ID NO: 481)	3
NSAFQY (SEQ ID NO: 23)	TYSSGN (SEQ ID NO: 97)	AMSLDNYGQNFV (SEQ ID NO: 482)	3
TSENNYY (SEQ ID NO: 31)	QEAYKQQN (SEQ ID NO: 74)	AFILQGAQKLV (SEQ ID NO: 483)	2

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
TRDTYY (SEQ ID NO: 17)	RNSFDEQN (SEQ ID NO: 77)	ALELSGYALN (SEQ ID NO: 484)	2
TISGTDY (SEQ ID NO: 79)	GLTSN (SEQ ID NO: 78)	IWLRLDLKSW (SEQ ID NO: 485)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AYGSSNTGKLI (SEQ ID NO: 486)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSARRQNFV (SEQ ID NO: 487)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVRNAGKST (SEQ ID NO: 488)	2
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AMMNAGKST (SEQ ID NO: 489)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	VPSSGSARQLT (SEQ ID NO: 490)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	TPPPGSARQLT (SEQ ID NO: 491)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	TPLSGSARQLT (SEQ ID NO: 492)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	SALWFCKATD (SEQ ID NO: 493)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ATPPGSARQLT (SEQ ID NO: 494)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ASPPGSARQLT (SEQ ID NO: 495)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APSSAGNNRCLI (SEQ ID NO: 496)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSVLQGN* (SEQ ID NO: 497)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSARQLTFPGSGTQL AVLPEHIKKRGEVTKGSL L*GIKHCDTHGRRKQTH (SEQ ID NO: 498)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGSAGNW (SEQ ID NO: 499)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPSGLARQLT (SEQ ID NO: 500)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPPGSARQL (SEQ ID NO: 501)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APPLGSARQLT (SEQ ID NO: 502)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALPPGSARQLT (SEQ ID NO: 503)	2
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALDLTGNQFY (SEQ ID NO: 504)	2
NSAFQY (SEQ ID NO: 23)	TYSSGN (SEQ ID NO: 97)	AASLSNFGNEKLT (SEQ ID NO: 505)	2
DSVMN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AVDNYGQNFV (SEQ ID NO: 130)	2
DSASNY (SEQ ID NO: 24)	IRSNVGE (SEQ ID NO: 80)	AASFSDQTGANNLF (SEQ ID NO: 506)	2

TABLE 2-continued

	CDR1	CDR2	CDR3	Frequency
TCRbeta Donor Y (CS11.6)	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNEQF (SEQ ID NO: 245)	587843
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPGGFGNEQF (SEQ ID NO: 325)	1829
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGDEQF (SEQ ID NO: 507)	1580
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGLGNEQF (SEQ ID NO: 349)	1481
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGSEQF (SEQ ID NO: 508)	1274
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGSGNEQF (SEQ ID NO: 365)	1083
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFDNEQF (SEQ ID NO: 509)	640
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSLPEGFGNEQF (SEQ ID NO: 510)	491
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPLEGFGNEQF (SEQ ID NO: 511)	451
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPSEGFGNEQF (SEQ ID NO: 512)	381
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGLAMSS (SEQ ID NO: 513)	357
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSHLRVLAMSS (SEQ ID NO: 514)	259
	MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSPPGLGYEQY (SEQ ID NO: 515)	186
	SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSPRGGSYEQY (SEQ ID NO: 516)	173
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGKEQF (SEQ ID NO: 517)	146
	ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	AIRSTASTDTQY (SEQ ID NO: 518)	138
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPHEGFGNEQF (SEQ ID NO: 519)	130
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	AAHHLRVLAMSS (SEQ ID NO: 520)	111
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGYEQF (SEQ ID NO: 521)	83
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSQPEGFGNEQF (SEQ ID NO: 522)	81
	MRHNA (SEQ ID NO: 60)	SNTAGT (SEQ ID NO: 125)	ASRGTSVQQ*AV (SEQ ID NO: 523)	57
	SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASTPSGPSTDTQY (SEQ ID NO: 524)	53
	KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGIEQF (SEQ ID NO: 525)	53
	MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSYSGAGGPWDTQY (SEQ ID NO: 526)	49

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGTEQF (SEQ ID NO: 527)	45
		ASSVEGTGTSIQY (SEQ ID NO: 528)	45
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGHEQF (SEQ ID NO: 529)	37
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPTEGFGNEQF (SEQ ID NO: 530)	26
SGHVS (SEQ ID NO: 43)	FNIEAQ (SEQ ID NO: 106)	ASSLWGTEAF (SEQ ID NO: 531)	18
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSRPEGFGNEQF (SEQ ID NO: 532)	18
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPREGFGNEQF (SEQ ID NO: 533)	18
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSLDRLYTEAF (SEQ ID NO: 534)	12
PRHDT (SEQ ID NO: 61)	FYEKMQ (SEQ ID NO: 126)	ASSFGTGGNTQY (SEQ ID NO: 535)	9
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPAEGFGNEQF (SEQ ID NO: 536)	9
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQPQH (SEQ ID NO: 537)	7
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASRTEAREQY (SEQ ID NO: 538)	6
LGHDT (SEQ ID NO: 51)	YNNKEL (SEQ ID NO: 114)	ASSQPGQYGYT (SEQ ID NO: 539)	6
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGDGQF (SEQ ID NO: 540)	6
SGHDY (SEQ ID NO: 37)	FNNNVP (SEQ ID NO: 103)	ASRLGHQPQH (SEQ ID NO: 541)	5
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPKGFNGEQF (SEQ ID NO: 542)	5
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNRQF (SEQ ID NO: 543)	5
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNEQF (SEQ ID NO: 544)	5
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVGVTGGTITPHEQY (SEQ ID NO: 545)	4
SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSDRDRDG*RARGGEQF (SEQ ID NO: 546)	4
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPKGLGNEQF (SEQ ID NO: 547)	4
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPESLGNEQF (SEQ ID NO: 548)	4
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNKQF (SEQ ID NO: 549)	4
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWRPGYMNTEAF (SEQ ID NO: 550)	4
ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	AISEWASGRPSYEQY (SEQ ID NO: 551)	4

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
		ASSALAGDTYEQY (SEQ ID NO: 552)	4
SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSPRRGSYEQY (SEQ ID NO: 553)	3
SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSPRGAPTSS (SEQ ID NO: 554)	3
MDHEY (SEQ ID NO: 62)	SVGAGI (SEQ ID NO: 88)	ASSYSPGNHQPOH (SEQ ID NO: 555)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPSEGFNEQF (SEQ ID NO: 556)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGLSNEQF (SEQ ID NO: 557)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFSSEQF (SEQ ID NO: 558)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNE*F (SEQ ID NO: 559)	3
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEDFGNEQF (SEQ ID NO: 560)	3
ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	AIRSTASADTQY (SEQ ID NO: 561)	3
SNHLY (SEQ ID NO: 44)	FYNNEI (SEQ ID NO: 94)	ATTRTSGSNEQF (SEQ ID NO: 562)	2
SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSPRGGLLRAV (SEQ ID NO: 563)	2
MNHEY (SEQ ID NO: 42)	SVGEGT (SEQ ID NO: 91)	ASSYGLAHSYEQY (SEQ ID NO: 564)	2
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ATLQGPNEQF (SEQ ID NO: 565)	2
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSSSVLARTEAF (SEQ ID NO: 566)	2
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSIFLGDNTGELF (SEQ ID NO: 567)	2
KGHSR (SEQ ID NO: 63)	LQKENI (SEQ ID NO: 81)	ASLPPEGFGNEQF (SEQ ID NO: 568)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPSEDFGNEQF (SEQ ID NO: 569)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPKSGSNEQF (SEQ ID NO: 570)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPGGFDNEQF (SEQ ID NO: 571)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFSNEQF (SEQ ID NO: 366)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFNNEQF (SEQ ID NO: 572)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGYGQF (SEQ ID NO: 573)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEGFGNGQF (SEQ ID NO: 574)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEDSGNEQF (SEQ ID NO: 575)	2

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPPEDFDNEQF (SEQ ID NO: 576)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPLKGFNEQF (SEQ ID NO: 577)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPLGGFGNEQF (SEQ ID NO: 578)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPLEGFSNEQF (SEQ ID NO: 579)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSPLEDFGNEQF (SEQ ID NO: 580)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASSLPEGFDNEQF (SEQ ID NO: 581)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASPLPEGFGNEQF (SEQ ID NO: 582)	2
KGHSH (SEQ ID NO: 38)	LQKENI (SEQ ID NO: 81)	ASLPPEGFGNEQF (SEQ ID NO: 568)	2
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SVWTDSDTQY (SEQ ID NO: 583)	2
		ASSGSPSGQPQH (SEQ ID NO: 584)	2
		ASLSSPPRPDPWRLIHPS (SEQ ID NO: 585)	2
TCRalpha NYSPAY Donor Y (SEQ ID NO: 16) (GV10.3)	IRENEKE (SEQ ID NO: 76)	APYTGRRALT (SEQ ID NO: 223)	60408
		AASGANTNKVV (SEQ ID NO: 586)	464
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYAGRRAIT (SEQ ID NO: 587)	169
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APCTGRRAIT (SEQ ID NO: 588)	107
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	TPYTGRRAIT (SEQ ID NO: 589)	61
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	VPYTGRRAIT (SEQ ID NO: 590)	59
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYMGRRAIT (SEQ ID NO: 591)	57
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYTGRRAI (SEQ ID NO: 592)	39
SIFNT (SEQ ID NO: 20)	LYKAGEL (SEQ ID NO: 84)	AGQDQDSGYALN (SEQ ID NO: 593)	36
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APTRAGEHL (SEQ ID NO: 594)	16
	IFSNGE (SEQ ID NO: 85)	AASEGNYNVLY (SEQ ID NO: 386)	15
DSVNN (SEQ ID NO: 6)	IPSGT (SEQ ID NO: 66)	AANSNDYKLS (SEQ ID NO: 595)	9
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYPGRRAIT (SEQ ID NO: 596)	7
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYKGRRAIT (SEQ ID NO: 597)	7

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYSGRRALT (SEQ ID NO: 598)	6
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	ALLDSGGGADGLT (SEQ ID NO: 599)	6
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	GPYTGRRALT (SEQ ID NO: 600)	5
		AASGANTNKAV (SEQ ID NO: 601)	5
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APSTGRRALT (SEQ ID NO: 602)	4
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	AP*TGRRALT (SEQ ID NO: 603)	4
SSVSVY (SEQ ID NO: 7)	YLSGSTLV (SEQ ID NO: 67)	AVSAITQGGSEKLV (SEQ ID NO: 604)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	SPYTGRRALT (SEQ ID NO: 605)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	PPYTGRRALT (SEQ ID NO: 606)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	EPYTGRRALT (SEQ ID NO: 607)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APYTAGEHL (SEQ ID NO: 608)	3
DSSSTY (SEQ ID NO: 64)	IFSNDMD (SEQ ID NO: 86)	AGPGG*QL*ID (SEQ ID NO: 609)	3
NYSPAY (SEQ ID NO: 16)	IRENEKE (SEQ ID NO: 76)	APSRAGEHL (SEQ ID NO: 610)	2
DSSSTY (SEQ ID NO: 64)	IFSNDMD (SEQ ID NO: 86)	AERYNTDKLI (SEQ ID NO: 611)	2
		AASGANTNKFV (SEQ ID NO: 612)	2
TCRbeta Donor Y (GV10.3)	SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	72824
		ASSLGQGNEAF (SEQ ID NO: 613)	
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQPQH (SEQ ID NO: 537)	36151
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SAREGSGNEQF (SEQ ID NO: 614)	395
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGDEAF (SEQ ID NO: 615)	276
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGRGNEAF (SEQ ID NO: 616)	263
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGSEAF (SEQ ID NO: 617)	247
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNF (SEQ ID NO: 618)	243
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSSGQGNEAF (SEQ ID NO: 619)	202
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYLGQPQH (SEQ ID NO: 620)	132

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SASSGSTDTQY (SEQ ID NO: 621)	125
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGRPQH (SEQ ID NO: 622)	114
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYSGQPQH (SEQ ID NO: 623)	110
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASGLYFGQPQH (SEQ ID NO: 624)	107
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQPS (SEQ ID NO: 625)	76
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNKAF (SEQ ID NO: 626)	73
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLCFGQPQH (SEQ ID NO: 627)	68
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVAGTYSYNEQF (SEQ ID NO: 628)	66
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SARDQIREQF (SEQ ID NO: 629)	63
MNHEY (SEQ ID NO: 42)	SVGEGT (SEQ ID NO: 91)	ASSDDPRESGANVLT (SEQ ID NO: 630)	51
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASNLGQGNEAF (SEQ ID NO: 631)	45
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLDRGMKL (SEQ ID NO: 632)	44
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVEGTGGLNEQF (SEQ ID NO: 633)	41
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGMKL (SEQ ID NO: 634)	39
MNHNS (SEQ ID NO: 53)	SASEGT (SEQ ID NO: 92)	ASSLGWRGNSYEQY (SEQ ID NO: 635)	39
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASS*GQGNEAF (SEQ ID NO: 636)	34
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASNLYFGQPQH (SEQ ID NO: 637)	33
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQPQ (SEQ ID NO: 638)	31
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFG*PQH (SEQ ID NO: 639)	30
SGHAT (SEQ ID NO: 46)	FQNGV (SEQ ID NO: 108)	ASSLVSGGNEQ (SEQ ID NO: 640)	29
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQSQH (SEQ ID NO: 641)	29
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWEEGEAF (SEQ ID NO: 642)	29
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNEA (SEQ ID NO: 643)	27
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNVAF (SEQ ID NO: 644)	26
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGEAF (SEQ ID NO: 645)	26

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVDLGWEQY (SEQ ID NO: 646)	25
KGHDR (SEQ ID NO: 65)	SFDVKD (SEQ ID NO: 127)	ATSDLTGGNEQF (SEQ ID NO: 647)	24
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVELAGEADTQY (SEQ ID NO: 648)	19
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	AAVYTLGSPS (SEQ ID NO: 649)	18
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSMGQGNEAF (SEQ ID NO: 650)	17
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSYTLGSPS (SEQ ID NO: 651)	17
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGND AF (SEQ ID NO: 652)	16
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGSPS (SEQ ID NO: 653)	16
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SASSGTSGRLYNEQF (SEQ ID NO: 654)	16
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	AAAWDRGMKL (SEQ ID NO: 655)	15
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSWGQGNEAF (SEQ ID NO: 656)	13
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSVGQGNEAF (SEQ ID NO: 657)	13
SEHNR (SEQ ID NO: 56)	FQNEAQ (SEQ ID NO: 117)	ASSLTQETQY (SEQ ID NO: 658)	13
SQVTM (SEQ ID NO: 36)	ANQGSEA (SEQ ID NO: 90)	SVGTSGYEY (SEQ ID NO: 659)	12
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSYFAGPYEQY (SEQ ID NO: 660)	11
GTSNPN (SEQ ID NO: 40)	SVGIG (SEQ ID NO: 104)	AWSEGVGNQPQH (SEQ ID NO: 661)	11
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASS*YFGQPQH (SEQ ID NO: 662)	7
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNAAF (SEQ ID NO: 663)	6
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASILGQGNEAF (SEQ ID NO: 664)	6
SEHNR (SEQ ID NO: 56)	FQNEAQ (SEQ ID NO: 117)	ASSLVGAQGLAGTNNYEQ (SEQ ID NO: 665)	6
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGPPQH (SEQ ID NO: 666)	6
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGLPQH (SEQ ID NO: 667)	6
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGHPQH (SEQ ID NO: 668)	6
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSIYFGQPQH (SEQ ID NO: 669)	6
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASILYFGQPQH (SEQ ID NO: 670)	6

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSPGSAYNEQF (SEQ ID NO: 671)	6
ENHRY (SEQ ID NO: 48)	SYGVKD (SEQ ID NO: 110)	AISESLAGGYNEQF (SEQ ID NO: 672)	6
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASRLGQGNEAF (SEQ ID NO: 673)	5
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSPTLGVDTOY (SEQ ID NO: 674)	5
		ASSVDGGEQPQH (SEQ ID NO: 675)	5
SGHDN (SEQ ID NO: 41)	FVKESK (SEQ ID NO: 105)	ASSQYVEQY (SEQ ID NO: 676)	4
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSQGSDEQY (SEQ ID NO: 677)	4
MDHEN (SEQ ID NO: 52)	SYDVKM (SEQ ID NO: 93)	ASSLTGHREAYNEQF (SEQ ID NO: 678)	4
WSHSY (SEQ ID NO: 49)	SAAADI (SEQ ID NO: 111)	ASSSTGGTSYGYT (SEQ ID NO: 679)	3
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGTEAF (SEQ ID NO: 680)	3
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGN*AF (SEQ ID NO: 681)	3
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGN (SEQ ID NO: 682)	3
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGDGAF (SEQ ID NO: 683)	3
SEHNR (SEQ ID NO: 56)	FQNEAQ (SEQ ID NO: 117)	ASSPRVPGQGTAGNTIY (SEQ ID NO: 684)	3
SEHNR (SEQ ID NO: 56)	FQNEAQ (SEQ ID NO: 117)	ASSLSVSGSELF (SEQ ID NO: 685)	3
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSVYFGQPQH (SEQ ID NO: 686)	3
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQTQH (SEQ ID NO: 687)	3
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGQAQH (SEQ ID NO: 688)	3
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGKPQH (SEQ ID NO: 689)	3
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASRLYFGQPQH (SEQ ID NO: 690)	3
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSLYWVDTOY (SEQ ID NO: 691)	3
MNHEY (SEQ ID NO: 42)	SMNVEV (SEQ ID NO: 115)	ASSLAYTSTEAF (SEQ ID NO: 692)	3
MNHEY (SEQ ID NO: 42)	SMDVEV (SEQ ID NO: 115)	ASSLYQGPNEQF (SEQ ID NO: 693)	3
LNHDA (SEQ ID NO: 47)	SQIVND (SEQ ID NO: 109)	ASSFRQWAGGTDTOY (SEQ ID NO: 694)	3
SGHRS (SEQ ID NO: 59)	YFSETQ (SEQ ID NO: 124)	ASSLVQGTWYEQY (SEQ ID NO: 695)	2

TABLE 2-continued

CDR1	CDR2	CDR3	Frequency
SGHAT (SEQ ID NO: 46)	FQNNGV (SEQ ID NO: 108)	ASSLVGGAYNEQF (SEQ ID NO: 696)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSWDRGMKL (SEQ ID NO: 697)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLVSGGNEQF (SEQ ID NO: 698)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNQAF (SEQ ID NO: 699)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGNEV (SEQ ID NO: 700)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASSLGQGDKAF (SEQ ID NO: 701)	2
SGHAT (SEQ ID NO: 46)	FQDESV (SEQ ID NO: 87)	ASGSGQGNEAF (SEQ ID NO: 702)	2
PRHDT (SEQ ID NO: 61)	FYEKMQ (SEQ ID NO: 126)	ASSSLLASGLHTQY (SEQ ID NO: 703)	2
MNHNS (SEQ ID NO: 53)	SASEGT (SEQ ID NO: 92)	ASSPGWRGNSYEQY (SEQ ID NO: 704)	2
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYSGQPS (SEQ ID NO: 705)	2
MNHEY (SEQ ID NO: 42)	SVGAGI (SEQ ID NO: 88)	ASSLYFGEPQH (SEQ ID NO: 706)	2
LGHDT (SEQ ID NO: 51)	FNNKEL (SEQ ID NO: 128)	ASSQLGQGAGEQY (SEQ ID NO: 707)	2
DFQATT (SEQ ID NO: 39)	SNEGSRA (SEQ ID NO: 129)	SARGGSGNEQF (SEQ ID NO: 708)	2
DFQATT (SEQ ID NO: 39)	SNEGSKA (SEQ ID NO: 89)	SAREGSGDEQF (SEQ ID NO: 709)	2

[0117] We synthesize peptides and test their immunogenicity in vitro by peptide-binding assays. Using positive and negative controls, we select a set of peptides containing EGFR or Ras mutations that can be presented with certain HLA alleles and treat the patients' tumor cells in vitro. The clonal cells that respond to these peptides are expanded. Subsequently, we use fluorescence-activated cell sorting to isolate CD8+ T cells from the treated and expanded human cells. The CTLs that responded to peptide stimulation are then genetically induced to yield iPS cells. These iPS cells are cloned and redifferentiated to T-iPS cells with incorporation of the iCas9 safety switch. Further, these rejCTL cells are expanded in vitro and used to treat xenografts in mice.

Example 5

Safeguard Technology

[0118] The tumorigenic potential of undifferentiated iPSCs is a safety concern that must be addressed before iPS cell-based therapies can be routinely used in clinical settings. Using a mouse model, we recently established a way to manipulate a naturally existing suicide pathway to control whether such cells and their progeny live or die. We found that introducing into the cytotoxic T cells a gene encoding a protein called inducible caspase-9, or iC9, permitted us to

trigger these cells, and not others, to die throughout the body by activating iC9 with a specific chemical, CID. These engineered T cells still recognize the same antigens, and are just as effective against cancer tumors as are their unmodified peers¹. But they can be quickly eliminated with a simple treatment. This is the first time that a "safeguard system" has been incorporated into in vivo cell-based therapy.

[0119] We use this safeguard technology to generate rejuvenated T-iPS cells from lung cancer patients' tissue, blood, or malignant effusion fluid that contain lung cancer specific antigens. In particular, we use specific antigens of the HLA-specific peptide sequences containing alterations in the EGFR protein around mutations (described above). We select clonal T cells that react with these antigens and reprogram them to monoclonal TCR-expressing T-iPSCs with rejuvenated progeny (rejCTLs). We assay the variance of antigen reactivity during the processes of T-iPS generation and T-cell redifferentiation by demonstrating genomic rearrangements in TCR genes. Furthermore, these rejCTLs are infused into mice that harbor lung cancer xenografts to determine the treatment effects.

Example 6

Methods

Statistics

[0120] Statistical analyses is performed using Excel, Prism (Graphpad Software, La Jolla, Calif.), and Statcel 2

(OMS Publishing, Saitama, Japan) programs, applying ANOVA or a paired-sample Student's t-test, with $P < 0.05$ indicative of significance.

Peptide-Binding Assay

[0121] After incubation in culture medium at 26° C. overnight, T2 cells are washed with PBS and suspended in 1 ml Opti-MEM (Invitrogen Life Technologies, Carlsbad, Calif.) with peptide (100 µg/ml), followed by incubation at 26° C. for 3 h and then at 37° C. for 2.5 h. After washing with PBS, HLA expression is measured using a BD FACSCanto II flow cytometer (BD Biosciences, San Jose, Calif.) using a FITC-conjugated HLA-specific monoclonal antibody. Mean fluorescence intensity is analyzed using FlowJo software.

PBMC Collection and Lung Cancer Tissue Collection

[0122] Peripheral blood samples will be collected from lung cancer patients. PBMCs are isolated by density centrifugation and stored frozen in liquid nitrogen until use. Lung cancer tissue is dissociated into primary cancer cells using an established cell isolation protocol with enzymatic digestion to yield single cells. The mixture of cancer cells is then cultured in RPMI-1640 supplemented with 10% FBS.

Generation of DCs

[0123] CD14+ cells are isolated from PBMCs using CD14 microbeads (Miltenyi Biotec GmbH, Bergisch Gladbach, Germany). Immature dendritic cells (DCs) will be generated from CD14+ cells using IL-4 (10 ng/ml; PeproTech, Rocky Hill, N.J.) and granulocyte-macrophage colony-stimulating factor (GM-CSF) (10 ng/ml) in RPMI-1640 supplemented with 10% FBS. Maturation of DCs will be induced by prostaglandin E2 (PGE2) (1 µg/ml) and tumor necrosis factor- α (TNF- α) (10 ng/ml; PeproTech).

Induction of Peptide-Specific CTLs

[0124] CD8+ T cells (2×10^6 cells/well) will be stimulated with peptide-pulsed (10 µg/ml) 100-Gy-irradiated autologous mature DCs (1×10^5 cells/well) in RPMI-1640 containing 10% heat-inactivated human AB serum. After 1 week, these cells will be stimulated twice weekly with peptide-pulsed (10 µg/ml) 200-Gy-irradiated aAPC-A2 cells (1×10^5 cells/well). Supplementation with 10 IU/ml IL-2 and 10 ng/ml IL-15 (PeproTech) are performed at 3- to 4-day intervals between stimulations.

IFN- γ ELISPOT Assay

[0125] Specific secretion of interferon- γ (IFN- γ) from human CTLs in response to stimulator cells are assayed using the IFN- γ enzyme-linked immuno spot (ELISPOT) kit (BD Biosciences, San Jose, Calif.), according to the manufacturer's instructions. Stimulator cells are pulsed with peptide for 2 h at room temperature and then washed three times. Responder cells will be incubated with stimulator cells for 20 h. The resulting spots are counted.

Cytotoxicity Assay

[0126] Cytotoxic capacity are analyzed using the Terascan VPC system (Minerva Tech, Canada). The CTL line is used as the effector cell type. Target cells are labeled in calcein-AM solution for 30 min at 37° C. The labeled cells will then

be co-cultured with the effector cells for 4-6 h. Fluorescence intensity will be measured before and after the culture period, and specific cytotoxic activity will be calculated using the following formula: % cytotoxicity = $\{1 - [(average\ fluorescence\ of\ the\ sample\ wells - average\ fluorescence\ of\ the\ maximal\ release\ control\ wells) / (average\ fluorescence\ of\ the\ minimal\ release\ control\ wells - average\ fluorescence\ of\ the\ maximal\ release\ control\ wells)]\} \times 100$.

Preparation of T-Cells, Infection, and T-iPS Generation

[0127] T cells will be isolated by gating the CD3+CD56- population to avoid contamination by natural killer T cells. T-cell subsets will be separated, using additional gating strategies, into CD4 (CD4+CD8-) and CD8 (CD4CD8+) cohorts. CD4 and/or CD8 cells are further classed as naïve (CD45RA+CD62L+), central memory (CD45RA+CD62L-), effector memory (CD45RA-CD62L-), or terminal effector (CD45RA-CD62L+). Sorted cells, initially cultured in Roswell Park Memorial Institute RPMI medium (GIBCO-Invitrogen, Carlsbad, Calif.) supplemented with 10% fetal bovine serum (GIBCO-Invitrogen), 100 U/ml penicillin, 100 ng/ml streptomycin, 2 mM L-glutamine, and 20 ng/ml human interleukin 2 (hIL-2; Novartis Vaccines & Diagnostics, Emeryville, Calif.), are activated by anti-CD3/CD28-conjugated magnetic beads (Dynabeads® ClinExVivo™ CD3/CD28; Invitrogen) at a 3:1 bead:T cell ratio. We define the date of activation as day 0 in the process of T-iPS cell generation.

[0128] In some experiments, magnetically captured CD3+ cells are separated from PBMCs and stimulated concurrently with anti-CD3/CD28-conjugated magnetic beads. At days 6 and 7, the cells are infected with sendai virus vector carrying iPS-reprogramming factors. Medium for primary T-cell culture are changed every day. At day 8, infected cells are collected and transferred onto irradiated MEF layers at 3×10^5 cells per 6-cm dish. For 4 days thereafter, half-volumes of culture medium are daily replaced with Dulbecco's modified Eagle medium/F12 medium supplemented with 20% Knockout Serum Replacement (GIBCO-Invitrogen), 200 µM L-glutamine (Invitrogen), 1% non-essential amino acids, 10 µM 2-mercaptoethanol, and 5 ng/ml b-FGF as described ("human iPSC medium"). VPA are added at 0.5 mM to human iPS medium before picking up iPS colonies. At day 12, the entire volume of medium is changed to human iPS medium containing VPA. When human ES/iPS-like colonies become identifiable, around day 21, they are mechanically isolated and dissociated into small clumps by pipetting, with reseeded onto fresh MEF layers. Human ES/iPS-like clones are passed onto new MEF layers every 6 days using trypsin solution (0.25% trypsin, 1 mM CaCl₂), and 20% Knockout Serum Replacement in PBS).

Karyotyping

[0129] Chromosomal G-band analyses are conducted in routine fashion (Nihon Gene Research Laboratories, Miyagi, Japan).

Alkaline Phosphatase Staining and Immunocytochemistry

[0130] Human iPS-like colonies fixed in ice-cold fixative solution (90% methanol, 10% formaldehyde) will be stained using a kit (Vector Laboratories, Burlingame, Calif.) according to manufacturer's instructions. For immunocytochemical staining, human iPS-like colonies fixed in 5% paraform-

aldehyde are permeabilized with 0.1% Triton X-100. The pretreated colonies are incubated first with primary antibodies (PE-conjugated anti-SSEA-4, 1:50, FAB1435P, R&D Systems, Minneapolis, Minn.; anti-TRA-160, 1:100, MAB4360, Millipore, Billerica; or anti-TRA-1-81, 1:100, MAB4381, Millipore). The secondary antibody used for TRA-1-60 and TRA-1-81 will be Alexa Fluor 488-conjugated goat anti-mouse antibody (1:500; A11029, Molecular Probes-Invitrogen). Nuclei are counterstained with DAPI; 1:1000 (Roche Diagnostics, Indianapolis, Ind.). Photographs will be taken using a fluorescence microscope.

Teratoma Formation

[0131] Human iPS-like colonies are clumped and injected (1.0×10^6 cells/mouse) into the medulla of the left testis of NOD-SCID mice. Eight weeks after injection, tumors formed in the testis are resected, fixed in 5% paraformaldehyde, and embedded in paraffin. Sections are stained with hematoxylin/eosin technique and examined by light microscopy for evidence of tri-lineage germ layer differentiation.

Pluripotent Genes and T-Cell-Related Genes Expression Analysis

[0132] Using an RNeasy mini kit (Qiagen, Hilden, Germany), total RNA will be extracted from iPS cells (about 50 days after cloning), their progeny cells, and freshly isolated peripheral-blood CD3 T-cells. Total RNA (1 μ g) are reverse transcribed with a PrimeScript III cDNA Synthesis Kit (Invitrogen). PCRs are performed using ExTaq HS (Takara) at 30 cycles for housekeeping genes (GAPDH or ACTB) and at 35 cycles for all pluripotent or T-cell related genes.

Detecting TCR Rearrangement in Genomic DNA of T-iPS Cells

[0133] Genomic DNA are extracted from approximately 5×10^6 T-iPS cells using QIAamp DNA kits (Qiagen). Extracted DNA (40 ng) are used in each PCR to detect TCRG, TCRB and TCRA gene rearrangements. PCRs for detecting TCRG rearrangement are performed. The V, D, and J segments involved in assembled TCRA or TCRB are identified by comparison with published sequences and with the ImMunoGeneTics (IMGT) database (cines.fr/), as well as by using web tools such as v-quest. Gene-segment nomenclature follows IMGT usage.

Induction of T-Lineage Cells from T-iPS Cells

[0134] Briefly, iPS cells are co-cultured on an irradiated OP9 layer for 10 to 14 days in DMEM medium without cytokines. Floating cells packed and transferred onto OP9-DL1 layers (day 0), are co-cultured in α MEM-based medium supplemented with 10 ng/ml of hIL-7 and hFlt-3L for up to day 28. The culture medium is changed every 3 days. T-lineage cells, floating above OP9-DL1 layers and expressing CD45, CD3, and TCR, are sorted by flow cytometry weekly and gene expression analyses will be carried out.

Antitumor Activity in In Vivo Model

[0135] Treatment efficacy is evaluated in SCID mice engrafted with patient NSCLCs. To evaluate the antitumor effects of rejT-iC9-CTLs in SCID mice engrafted with lung cancer, tumor growth is monitored using a bioluminescence system. Once a progressive increase of bioluminescence occurs, mice are treated intraperitoneally with 3 once weekly

doses of rejT-iC9-CTL and control CTLs (10×10^6 CTL/mouse). Tumor burden is monitored by the Xenogen-IVIS imaging system. Mice are injected intraperitoneally with d-luciferin (150 mg/kg) and light output is analyzed using the Xenogen Living Image Software Version 2.50 (Xenogen, Alameda, Calif.).

In Vivo Elimination of iC9-iPSC-Derived CTLs

[0136] To examine whether iC9-iPSC-derived CTLs can be eliminated by this iC9/CID safeguard system in vivo, SCID mice engrafted with lung cancer tissues are treated with CID (50 μ g i.p. daily for three successive days (day 2-day 4). Comparison mice will not receive CID.

Detection of rejT-iC9-CTLs in vivo

[0137] SCID mice inoculated intraperitoneally with iC9-iPSC-derived CTLs labeled with GFP/FFluc are treated with 10×10^6 rejT-iC9- cells on day 0 and day 7. After rejT-iC9- cells are detected in peripheral blood (around 8 days after first rejT-iC9 administration), the mice receive intraperitoneally injected CID, at 50 μ g/mouse, for three successive days. Control mice I receive three doses of PBS. Flow cytometry of peripheral blood is used to identify rejT-iC9- cells (expressing mCherry).

Establishment of NSCLC Cell Lines and Tissues Engraftable into Immunodeficient Mice

[0138] Lung cancer tissue samples are collected from surgically resected tumors. We have an established lung cancer tissue dissociation protocol that can be used to precede primary culture. Whole blood is processed for T cell culture and used for the establishment of NSCLC-specific CTLs. Patient tumor tissue or cells in malignant effusions from cancer patients are used to establish xenografts in SCID mice. Briefly, patient's tumor chunks or malignant-effusion cells are transplanted into SCID mice. Tumor size is measured in these mice to assess the progress of lung cancer in this in vivo model. SCID mice successfully engrafted with tumor will be used for further treatments.

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<211> LENGTH: 5
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<400> SEQUENCE: 61

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Pro Arg His Asp Thr
1 5

<210> SEQ ID NO 62
<211> LENGTH: 5
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<400> SEQUENCE: 62

Met Asp His Glu Tyr
1 5

<210> SEQ ID NO 63
<211> LENGTH: 5
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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 63

Lys Gly His Ser Arg
1 5

<210> SEQ ID NO 64
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 64

Asp Ser Ser Ser Thr Tyr
1 5

<210> SEQ ID NO 65
<211> LENGTH: 5
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 65

Lys Gly His Asp Arg
1 5

<210> SEQ ID NO 66
<211> LENGTH: 5
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 66

Ile Pro Ser Gly Thr
1 5

<210> SEQ ID NO 67
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 67

Tyr Leu Ser Gly Ser Thr Leu Val
1 5

<210> SEQ ID NO 68
<211> LENGTH: 5
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 68

Gly Leu Lys Asn Asn
1 5

<210> SEQ ID NO 69

<211> LENGTH: 8

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 69

Tyr Thr Ser Ala Ala Thr Leu Val
1 5

<210> SEQ ID NO 70

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 70

Met Thr Phe Ser Glu Asn Thr
1 5

<210> SEQ ID NO 71

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 71

Ile Arg Ser Asn Glu Arg Glu
1 5

<210> SEQ ID NO 72

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 72

Met Thr Leu Asn Gly Asp Glu
1 5

<210> SEQ ID NO 73

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 73

Ile Tyr Ser Asn Gly Asp
1 5

<210> SEQ ID NO 74

<211> LENGTH: 8

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 74

Gln Glu Ala Tyr Lys Gln Gln Asn
1 5

<210> SEQ ID NO 75

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 75

Asn Val Leu Asp Gly Leu
1 5

<210> SEQ ID NO 76

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 76

Ile Arg Glu Asn Glu Lys Glu
1 5

<210> SEQ ID NO 77

<211> LENGTH: 8

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 77

Arg Asn Ser Phe Asp Glu Gln Asn
1 5

<210> SEQ ID NO 78

<211> LENGTH: 5

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 78

Gly Leu Thr Ser Asn
1 5

<210> SEQ ID NO 79

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 79

Thr Ile Ser Gly Thr Asp Tyr
1 5

<210> SEQ ID NO 80

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 80

Ile Arg Ser Asn Val Gly Glu
1 5

<210> SEQ ID NO 81

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 81

Leu Gln Lys Glu Asn Ile
1 5

<210> SEQ ID NO 82

<211> LENGTH: 8

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 82

Gln Gly Ser Tyr Asp Gln Gln Asn
1 5

<210> SEQ ID NO 83

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 83

Asp Ala Leu Asp Gly Leu
1 5

<210> SEQ ID NO 84

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 84

Leu Tyr Lys Ala Gly Glu Leu
1 5

<210> SEQ ID NO 85

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 85

Ile Phe Ser Asn Gly Glu
1 5

<210> SEQ ID NO 86

<211> LENGTH: 7

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 86

Ile Phe Ser Asn Met Asp Met
1 5

<210> SEQ ID NO 87

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 87

Phe Gln Asp Glu Ser Val
1 5

<210> SEQ ID NO 88

<211> LENGTH: 6

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 88

Ser Val Gly Ala Gly Ile
1 5

<210> SEQ ID NO 89

<211> LENGTH: 7

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 89

Ser Asn Glu Gly Ser Lys Ala
1 5

<210> SEQ ID NO 90
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 90

Ala Asn Gln Gly Ser Glu Ala
1 5

<210> SEQ ID NO 91
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 91

Ser Val Gly Glu Gly Thr
1 5

<210> SEQ ID NO 92
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 92

Ser Ala Ser Glu Gly Thr
1 5

<210> SEQ ID NO 93
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 93

Ser Tyr Asp Val Lys Met
1 5

<210> SEQ ID NO 94
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 94

Phe Tyr Asn Asn Glu Ile
1 5

<210> SEQ ID NO 95
<211> LENGTH: 4
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 95

His Ile Ser Arg
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<210> SEQ ID NO 96

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<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 96

Tyr Thr Thr Gly Ala Thr Leu Val
1 5

<210> SEQ ID NO 97
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 97

Thr Tyr Ser Ser Gly Asn
1 5

<210> SEQ ID NO 98
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 98

Ile Arg Ser Asn Met Asp Lys
1 5

<210> SEQ ID NO 99
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 99

Tyr Phe Ser Gly Asp Pro Leu Val
1 5

<210> SEQ ID NO 100
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 100

Ala Thr Lys Ala Asp Asp Lys
1 5

<210> SEQ ID NO 101
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 101

Tyr Tyr Arg Glu Glu Glu
1 5

<210> SEQ ID NO 102
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 102

Tyr Tyr Glu Glu Glu Glu
1 5

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<210> SEQ ID NO 103
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 103

Phe Asn Asn Asn Val Pro
1 5

<210> SEQ ID NO 104
<211> LENGTH: 5
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 104

Ser Val Gly Ile Gly
1 5

<210> SEQ ID NO 105
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 105

Phe Val Lys Glu Ser Lys
1 5

<210> SEQ ID NO 106
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 106

Phe Asn Tyr Glu Ala Gln
1 5

<210> SEQ ID NO 107
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 107

Tyr Tyr Asp Lys Asp Phe
1 5

<210> SEQ ID NO 108
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 108

Phe Gln Asn Asn Gly Val
1 5

<210> SEQ ID NO 109
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 109

Ser Gln Ile Val Asn Asp
1 5

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<210> SEQ ID NO 110
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 110

Ser Tyr Gly Val Lys Asp
1 5

<210> SEQ ID NO 111
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 111

Ser Ala Ala Ala Asp Ile
1 5

<210> SEQ ID NO 112
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 112

Phe Arg Asn Arg Ala Pro
1 5

<210> SEQ ID NO 113
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 113

Tyr Tyr Gly Glu Glu Glu
1 5

<210> SEQ ID NO 114
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 114

Tyr Asn Asn Lys Glu Leu
1 5

<210> SEQ ID NO 115
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 115

Ser Met Asn Val Glu Val
1 5

<210> SEQ ID NO 116
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 116

Tyr Ser Tyr Glu Lys Leu
1 5

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<210> SEQ ID NO 117
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 117

Phe Gln Asn Glu Ala Gln
1 5

<210> SEQ ID NO 118
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 118

Val Val Thr Gly Gly Glu Val
1 5

<210> SEQ ID NO 119
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 119

Ser Gln Val Val Asn Asp
1 5

<210> SEQ ID NO 120
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 120

Ile Arg Pro Asp Val Ser
1 5

<210> SEQ ID NO 121
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 121

Gln Gly Ser Tyr Asp Glu Gln Asn
1 5

<210> SEQ ID NO 122
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 122

Ile Gln Ser Ser Gln Arg Glu
1 5

<210> SEQ ID NO 123
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 123

Tyr Phe Ser Gly Asp Thr Leu Val

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1 5

<210> SEQ ID NO 124
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 124

Tyr Phe Ser Glu Thr Gln
1 5

<210> SEQ ID NO 125
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 125

Ser Asn Thr Ala Gly Thr
1 5

<210> SEQ ID NO 126
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 126

Phe Tyr Glu Lys Met Gln
1 5

<210> SEQ ID NO 127
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 127

Ser Phe Asp Val Lys Asp
1 5

<210> SEQ ID NO 128
<211> LENGTH: 6
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 128

Phe Asn Asn Lys Glu Leu
1 5

<210> SEQ ID NO 129
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 129

Ser Asn Glu Gly Ser Arg Ala
1 5

<210> SEQ ID NO 130
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 130

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Ala	Val	Asp	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 131
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 131

Ala	Val	Gly	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 132
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 132

Ala	Val	Asp	Ser	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 133
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 133

Ala	Ala	Asp	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 134
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 134

Ala	Val	Asp	Asp	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 135
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 135

Ala	Val	Thr	Phe	Thr	Gly	Gly	Gly	Asn	Lys	Leu	Thr
1				5							10

<210> SEQ ID NO 136
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 136

Ala	Val	Asn	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1			5						10

<210> SEQ ID NO 137
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 137

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Ile Val Asn Trp Gly Ser Asn Ser Gly Tyr Ala Leu Asn
1 5 10

<210> SEQ ID NO 138
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 138

Ala Glu Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 139
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 139

Ala Val Val Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 140
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 140

Ala Val Asp Ile Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 141
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 141

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

<210> SEQ ID NO 142
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 142

Ala Val Glu Gly Tyr Lys Leu Ser
1 5

<210> SEQ ID NO 143
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 143

Val Ala Met Asn Arg Asp Asp Lys Ile Ile
1 5 10

<210> SEQ ID NO 144
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 144

Ala Val Glu Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 145

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 145

Ala Thr Val Ser Thr Ser Gly Thr Tyr Lys Tyr Ile
1 5 10

<210> SEQ ID NO 146

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 146

Ala Val Ser Asp Thr Gly Phe Gln Lys Leu Val
1 5 10

<210> SEQ ID NO 147

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 147

Ala Val Asp Tyr Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 148

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 148

Ala Val Tyr Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 149

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 149

Ala Gly Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 150

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 150

Ala Val Asp Thr Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 151

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 151

Ala Val Ala Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 152

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 152

Ala Phe Met Ser Gly Tyr Ser Thr Leu Thr
1 5 10

<210> SEQ ID NO 153

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 153

Ala Val Asn Leu Gly Gly Gly Ala Asp Gly Leu Thr
1 5 10

<210> SEQ ID NO 154

<211> LENGTH: 14

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 154

Ala Val Glu Gly Tyr Ser Gly Ala Gly Ser Tyr Gln Leu Thr
1 5 10

<210> SEQ ID NO 155

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 155

Ala Val Asp His Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 156

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 156

Ala Val Glu Pro His Asn Ala Arg Leu Met
1 5 10

<210> SEQ ID NO 157

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 157

Ala Val Asp Lys Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 158

<211> LENGTH: 12

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 158

Ala Tyr Arg Ser Ala Val Thr Gly Asn Gln Phe Tyr
1 5 10

<210> SEQ ID NO 159

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 159

Ala Val His Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 160

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 160

Ala Val Asp Leu Asn Ser Gly Tyr Ser Thr Leu Thr
1 5 10

<210> SEQ ID NO 161

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 161

Ala Val Ser Asp Pro Gly Asp Glu Lys Leu Thr
1 5 10

<210> SEQ ID NO 162

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 162

Ala Thr Val Gln Asn Thr Gly Thr Ala Ser Lys Leu Thr
1 5 10

<210> SEQ ID NO 163

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 163

Ala Leu Gly Thr Glu Met Thr Arg Ser
1 5

<210> SEQ ID NO 164

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 164

Ala Leu Ser Asp Ser Glu Gly Ala Gln Lys Leu Val
1 5 10

<210> SEQ ID NO 165

<211> LENGTH: 8

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 165

Ala Val Asp Gly Gln Lys Leu Leu
1 5

<210> SEQ ID NO 166
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 166

Ala Met Arg Glu Gly Gly Asp Asp Lys Ile Ile
1 5 10

<210> SEQ ID NO 167
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 167

Ile Val Arg Val Ala Ser Gly Gly Gly Ala Asp Gly Leu Thr
1 5 10

<210> SEQ ID NO 168
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 168

Ala Leu Arg Arg Leu Gln Asn Tyr
1 5

<210> SEQ ID NO 169
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 169

Ala Val Leu Pro Gln Gly Gly Ser Glu Lys Leu Val
1 5 10

<210> SEQ ID NO 170
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 170

Ala Val Asp Asn Arg Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 171
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 171

Ala Leu Tyr Asn Phe Asn Lys Phe Tyr
1 5

<210> SEQ ID NO 172

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<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 172

Ala Gly Gln Leu Thr Leu Ala Thr Gln Ala Asn
1 5 10

<210> SEQ ID NO 173
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 173

Ala Val Asp Ser Cys Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 174
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 174

Ala Gly Ile Thr Met Val Arg Ile Leu
1 5

<210> SEQ ID NO 175
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 175

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

<210> SEQ ID NO 176
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 176

Ala Cys Phe Asn Ser Asn Ser Gly Tyr Ala Leu Asn
1 5 10

<210> SEQ ID NO 177
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 177

Ala Met Arg Ala Ser Gly Gly Tyr Gln Lys Val Thr
1 5 10

<210> SEQ ID NO 178
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 178

Val Val Ser Arg Ile Met Glu Glu Ala Lys Glu Ile Ser
1 5 10

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<210> SEQ ID NO 179
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 179

Ala Val Ser Gly Tyr Asn Asn Asp Met Arg
1 5 10

<210> SEQ ID NO 180
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 180

Ala Val Gly Thr Gly Ala Asn Asn Leu Phe
1 5 10

<210> SEQ ID NO 181
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 181

Ala Gly Leu Trp Ser Glu Phe Cys
1 5

<210> SEQ ID NO 182
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 182

Ala Ala Ser Ile Met Thr Cys
1 5

<210> SEQ ID NO 183
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 183

Ala Met Asp Val Tyr Asn Gln Gly Gly Lys Leu Ile
1 5 10

<210> SEQ ID NO 184
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 184

Val Val Ser Gly Val Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 185
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 185

Ala Val Asp Asn Cys Gly Gln Asn Phe Val
1 5 10

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<210> SEQ ID NO 186
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 186

Ala Val Asp Asp His Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 187
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 187

Ala Met Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 188
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 188

Ala Val Thr Phe Ala Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 189
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 189

Ala Val Ala Phe Thr Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 190
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 190

Ala Val Ser Leu Asn Asp Tyr Lys Leu Ser
1 5 10

<210> SEQ ID NO 191
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 191

Ala Glu Ile Ser Tyr Ser Ser Ala Ser Lys Ile Ile
1 5 10

<210> SEQ ID NO 192
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 192

Thr Val Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

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<210> SEQ ID NO 193
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 193

Ala Val Asp Asn Tyr Ser Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 194
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 194

Ala Val Asp Asn His Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 195
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 195

Ala Tyr Arg Ser His Asp Met Arg
1 5

<210> SEQ ID NO 196
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 196

Ala Tyr Gly Gly Gly Ser Glu Lys Leu Val
1 5 10

<210> SEQ ID NO 197
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 197

Ala Val Thr Ser Thr Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 198
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 198

Ala Val Thr Leu Thr Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 199
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 199

Ala Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr

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1	5	10
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<210> SEQ ID NO 200
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 200

Ala	Val	Asn	Ser	Tyr	Gly	Gln	Asn	Phe	Val
1				5					10

<210> SEQ ID NO 201
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 201

Ala	Val	Asn	Asp	Tyr	Gly	Gln	Asn	Phe	Val
1				5					10

<210> SEQ ID NO 202
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 202

Ala	Ala	Val	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1				5					10

<210> SEQ ID NO 203
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 203

Ala	Ala	Asn	Asn	Tyr	Gly	Gln	Asn	Phe	Val
1				5					10

<210> SEQ ID NO 204
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 204

Ala	Val	Asn	Arg	Asn	Thr	Gly	Asn	Gln	Phe	Tyr
1				5						10

<210> SEQ ID NO 205
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 205

Val	Val	Ser	Ala	Lys	Glu	Ala	Lys	Glu	Ile	Ser
1				5						10

<210> SEQ ID NO 206
<211> LENGTH: 16
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 206

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

<210> SEQ ID NO 207
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 207

Ala	Thr	Gly	Ser	Asn	Asp	Tyr	Lys	Leu	Ser
1				5				10	

<210> SEQ ID NO 208
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 208

Ala	Thr	Asp	Gly	Arg	Gly	Ser	Tyr	Ile	Pro	Thr
1			5					10		

<210> SEQ ID NO 209
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 209

Ala	Thr	Asp	Glu	Asp	Ser	Ser	Tyr	Lys	Leu	Ile
1			5					10		

<210> SEQ ID NO 210
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 210

Ala	Val	Ser	Asp	Ser	Asn	Tyr	Gln	Leu	Ile
1			5					10	

<210> SEQ ID NO 211
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 211

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

<210> SEQ ID NO 212
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 212

Ala	Phe	Met	Lys	His	Ser	Gly	Val	Asn	Asp	Met	Arg
1				5				10			

<210> SEQ ID NO 213
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 213

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Ile Val Ser Trp Gly Ser Asn Ser Gly Tyr Ala Leu Asn
1 5 10

<210> SEQ ID NO 214
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 214

Ile Cys Ser Gly Asn Thr Pro Leu Val
1 5

<210> SEQ ID NO 215
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 215

Ile Ala Asn Trp Gly Ser Asn Ser Gly Tyr Ala Leu Asn
1 5 10

<210> SEQ ID NO 216
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 216

Ala Val Thr Tyr Thr Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 217
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 217

Ala Val Thr Phe Met Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 218
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 218

Ala Val Thr Phe Lys Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 219
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 219

Ala Val Ser Asp Arg Gly Glu Thr Ser Trp
1 5 10

<210> SEQ ID NO 220
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 220

Ala Val Ser Asp Ala Gly Phe Gln Lys Leu Val
1 5 10

<210> SEQ ID NO 221

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 221

Ala Ala Thr Phe Thr Gly Gly Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 222

<211> LENGTH: 15

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 222

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

<210> SEQ ID NO 223

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 223

Ala Pro Tyr Thr Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 224

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 224

Val Val Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 225

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 225

Val Ala Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 226

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 226

Thr Ala Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 227

<211> LENGTH: 8

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 227

Cys Gly Leu Trp Ser Glu Phe Cys
1 5

<210> SEQ ID NO 228

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 228

Ala Trp Ile Thr Met Val Arg Ile Leu
1 5

<210> SEQ ID NO 229

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 229

Ala Val Ser Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 230

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 230

Ala Val Ser Asn Asp Tyr Lys Leu Ser
1 5

<210> SEQ ID NO 231

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 231

Ala Val Asp Ser Gly Gln Asn Phe Val
1 5

<210> SEQ ID NO 232

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 232

Ala Val Asp Asn Tyr Val Arg Ile Leu
1 5

<210> SEQ ID NO 233

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 233

Ala Val Asp Asn His Ser Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 234

<211> LENGTH: 11

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 234

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

<210> SEQ ID NO 235

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 235

Ala Leu Arg Ser Asn Asp Tyr Lys Leu Ser
1 5 10

<210> SEQ ID NO 236

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 236

Ala Val Arg Ile Ala Phe Trp Gly Leu Pro Glu Ser Tyr
1 5 10

<210> SEQ ID NO 237

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 237

Ala Ser Ser Leu Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 238

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 238

Ala Ser Ser Leu Gly Gln Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 239

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 239

Ser Val Glu Gly Gly Ser Ser Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 240

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 240

Ala Ser Ser Ser Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 241

<211> LENGTH: 10

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 241

Ala Ser Ser Leu Ala Gly Cys Glu Gln Tyr
1 5 10

<210> SEQ ID NO 242
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 242

Ala Ser Thr Ser Trp Gly Val Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 243
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 243

Ala Ser Ser Leu Ala Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 244
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 244

Ala Ser Ser Leu Ala Gly His Glu Gln Tyr
1 5 10

<210> SEQ ID NO 245
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 245

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 246
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 246

Ala Ser Ser Leu Thr Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 247
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 247

Ser Ala Asn Leu Ala Lys Ser Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 248

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<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 248

Ser Ala Pro Arg Asp Pro Asp Ala Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 249
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 249

Ala Trp Asp Arg Thr Gly Glu Val Glu Gln Tyr
1 5 10

<210> SEQ ID NO 250
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 250

Ala Ser Ser Ala Gly Tyr Glu Gln Tyr
1 5

<210> SEQ ID NO 251
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 251

Ala Ala Ala Trp Pro Ala Thr Ser Ser
1 5

<210> SEQ ID NO 252
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 252

Ala Ser Ser Met Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 253
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 253

Ala Trp Ser Phe His Pro Gly Leu Ala Ala Tyr Asn Glu Gln Phe
1 5 10 15

<210> SEQ ID NO 254
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 254

Ala Ser Ser Gln Leu Arg Gly Gly Ser Pro Leu His
1 5 10

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<210> SEQ ID NO 255
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 255

Ala Ser Ser Gly Gln Gly Gly Ser Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 256
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 256

Ala Ser Ser Leu Gly Gln Gly Arg His Ser Phe
1 5 10

<210> SEQ ID NO 257
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 257

Ala Ser Ser Leu Ala Glu Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 258
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 258

Ala Ser Ser Trp Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 259
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 259

Ala Ser Ser Leu Gly Arg Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 260
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 260

Ala Ser Ser Leu Ala Gly Phe Glu Gln Tyr
1 5 10

<210> SEQ ID NO 261
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 261

Ala Ser Ser Leu Ala Gly Glu Gln Tyr
1 5

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<210> SEQ ID NO 262
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 262

Ala Ser Ser Leu Gly Gln Gly Lys Arg Ser Phe
1 5 10

<210> SEQ ID NO 263
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 263

Ala Ser Ser Leu Gly Gln Gly Glu His Ser Phe
1 5 10

<210> SEQ ID NO 264
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 264

Ala Tyr Ser Thr Gly Tyr Phe Gly Tyr Thr
1 5 10

<210> SEQ ID NO 265
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 265

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

<210> SEQ ID NO 266
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 266

Ala Ser Ser Val Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 267
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 267

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

<210> SEQ ID NO 268
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 268

Ala Ser Ser Ser Gly Gln Gly Lys His Ser Phe
1 5 10

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<210> SEQ ID NO 269
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 269

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

<210> SEQ ID NO 270
<211> LENGTH: 17
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 270

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

Phe

<210> SEQ ID NO 271
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 271

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

<210> SEQ ID NO 272
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 272

Ala Ser Ser Leu Ala Gly Asn Glu Gln Tyr
1 5 10

<210> SEQ ID NO 273
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 273

Ala Ser Ser Leu Ala Ala Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 274
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 274

Ala Ser Ser Leu Ser Phe Asp Ser Glu Gln Tyr
1 5 10

<210> SEQ ID NO 275
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 275

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Ala Ser Ser Leu Ser Gln Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 276
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 276

Ala Ser Ser Phe Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 277
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 277

Ser Ala Arg Gln Gly Leu Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 278
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 278

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

<210> SEQ ID NO 279
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 279

Ala Ser Ser Leu Ala Gly Ser Glu Gln Tyr
1 5 10

<210> SEQ ID NO 280
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 280

Ser Val Glu Gly Asp Pro Leu Gly Pro Thr Ser
1 5 10

<210> SEQ ID NO 281
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 281

Ala Ser Ser Leu Ser Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 282
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 282

Ser Val Glu Glu Gly Ser Ser Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 283

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 283

Ala Ser Ser Leu Pro Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 284

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 284

Ala Thr Ser Arg Glu Gly Thr Gly Glu Asn Ile Gln Tyr
1 5 10

<210> SEQ ID NO 285

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 285

Ala Ser Ser Phe Ser Ile Arg Ala Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 286

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 286

Ala Ser Ser Leu Ala Gly Asp Glu Gln Tyr
1 5 10

<210> SEQ ID NO 287

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 287

Ala Ser Ser Val Ala Ser Thr Gly Glu Leu Phe
1 5 10

<210> SEQ ID NO 288

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 288

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

<210> SEQ ID NO 289

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 289

Ala Ser Ser Pro Ile Arg Arg Glu Gly Glu Gln Tyr
1 5 10

<210> SEQ ID NO 290

<211> LENGTH: 15

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 290

Ala Ser Phe Val Tyr Ser Ala Gly Asp Ser Tyr Asn Glu Gln Phe
1 5 10 15

<210> SEQ ID NO 291

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 291

Ser Ala Arg Asn Arg Val Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 292

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 292

Ala Ser Ser Leu Gly Gln Gly Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 293

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 293

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

<210> SEQ ID NO 294

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 294

Ala Ser Thr Asp Thr Asp Leu Gly Glu Gln Tyr
1 5 10

<210> SEQ ID NO 295

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 295

Ser Val Glu Arg Gly Ser Ser Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 296

<211> LENGTH: 11

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 296

Ala Ser Ser Leu Gly Gln Gly Asn His Ser Phe
1 5 10

<210> SEQ ID NO 297

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 297

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

<210> SEQ ID NO 298

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 298

Ala Ala Ala Trp Ala Arg Gly Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 299

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 299

Ala Leu Ser Asp Ser Gly Thr Ile Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 300

<211> LENGTH: 17

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 300

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

Tyr

<210> SEQ ID NO 301

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 301

Ala Ser Ser Leu Gly Gln Gly Lys Tyr Ser Phe
1 5 10

<210> SEQ ID NO 302

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 302

Ala Ser Gly Leu Tyr Asn Arg Gly Asn Glu Gln Phe
1 5 10

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<210> SEQ ID NO 303
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 303

Ser Val Glu Gly Gly Ser Ser Gly Pro Thr Ser
1 5 10

<210> SEQ ID NO 304
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 304

Ala Ser Gly Leu Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 305
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 305

Ala Ser Ser Arg Thr Arg Tyr Thr Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 306
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 306

Ala Ser Asn Leu Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 307
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 307

Ala Ser Ala Ser Trp Gly Val Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 308
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 308

Ala Ser Ser Leu Gly Gln Gly Glu Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 309
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 309

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

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<210> SEQ ID NO 310
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 310

Ser Val Gly Ala Asn Val Ala Gly Gly Lys Glu Thr Gln Tyr
1 5 10

<210> SEQ ID NO 311
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 311

Ala Ser Ser Val Thr Gly Thr Val Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 312
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 312

Ser Val Lys Gly Gly Ser Ser Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 313
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 313

Ser Val Glu Gly Gly Ser Thr Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 314
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 314

Ala Ser Ser Leu Gly Gln Gly Ile His Ser Phe
1 5 10

<210> SEQ ID NO 315
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 315

Ala Ser Ser Leu Gly Gln Gly Lys Leu Ser Phe
1 5 10

<210> SEQ ID NO 316
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 316

Ala Ser Ser Gln Asp Ile Glu Val Glu Ala Phe
1 5 10

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<210> SEQ ID NO 317
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 317

Ala Ser Ser Leu Arg Leu Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 318
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 318

Ala Ser Ser Val Glu Ala Gly Val Ser Gly Asn Thr Ile Tyr
1 5 10

<210> SEQ ID NO 319
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 319

Ser Val Val Arg Gln Gly His Tyr Glu Ala Phe
1 5 10

<210> SEQ ID NO 320
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 320

Ser Val Glu Gly Gly Ser Phe Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 321
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 321

Ala Ser Ser Pro Gly Arg Ile Leu Thr Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 322
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 322

Ala Ser Ser Leu Ala Asp Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 323
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 323

Ala Ser Ser Gly Gly Leu Asn Gln Pro Gln His

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1	5	10
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<210> SEQ ID NO 324
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 324

Ala Ser Lys Val Gln Gly Ser Glu Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 325
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 325

Ala Ser Ser Pro Pro Gly Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 326
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 326

Ala Ser Ser Gly Ala Gly Gln Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 327
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 327

Ala Ser Ser Leu Ala Ser Cys Glu Gln Tyr
1 5 10

<210> SEQ ID NO 328
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 328

Ala Ser Ser Leu Ala Gly Tyr Arg Gln Tyr
1 5 10

<210> SEQ ID NO 329
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 329

Ala Ser Ser Leu Ala Gly Tyr Lys Gln Tyr
1 5 10

<210> SEQ ID NO 330
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 330

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Ala	Ser	Thr	Ser	Trp	Ala	Ser	Pro	Thr	Met	Ser	Ser
1				5					10		

<210> SEQ ID NO 331
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 331

Ala	Ser	Thr	Ser	Arg	Gly	Val	Ser	Tyr	Asn	Glu	Gln	Phe
1				5					10			

<210> SEQ ID NO 332
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 332

Ala	Ser	Ser	Phe	Gly	Gln	Gly	Lys	His	Ser	Phe
1				5					10	

<210> SEQ ID NO 333
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 333

Ala	Ser	Ser	Gly	Gln	Gly	Lys	His	Ser	Phe
1				5					10

<210> SEQ ID NO 334
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 334

Ala	Ser	Ser	Leu	Val	Gly	His	Glu	Gln	Tyr
1				5					10

<210> SEQ ID NO 335
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 335

Ala	Ser	Ser	Leu	Ala	Gly	His	Gly	Gln	Tyr
1				5					10

<210> SEQ ID NO 336
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 336

Ala	Ser	Asn	Ser	Ala	Gly	Tyr	Glu	Gln	Tyr
1				5					10

<210> SEQ ID NO 337
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 337

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Ala Ser Gly Ser Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 338
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 338

Ala Ser Thr Ser Trp Gly Ile Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 339
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 339

Ala Ser Thr Ser Trp Gly Ala Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 340
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 340

Ala Ser Thr Ser Gly Val Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 341
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 341

Ala Gly Thr Ser Trp Gly Val Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 342
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 342

Ala Ser Ser Val Gly Gln Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 343
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 343

Ala Ser Ser Met Gly Gln Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 344
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 344

Ala Ser Ser Leu Cys Gln Gly Lys His Ser Phe
1 5 10

<210> SEQ ID NO 345

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 345

Ala Ser Arg Gly Leu Ala Gly Phe Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 346

<211> LENGTH: 15

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 346

Ala Ser Ser Leu Met Arg Val Gly Phe Arg Thr Asp Thr Gln Tyr
1 5 10 15

<210> SEQ ID NO 347

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 347

Ala Ser Ser Gln Asp Glu Leu Ala Gly Arg Thr Gln Tyr
1 5 10

<210> SEQ ID NO 348

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 348

Ala Ser Thr Asn Ser Leu Thr Ser Thr Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 349

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 349

Ala Ser Ser Pro Pro Glu Gly Leu Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 350

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 350

Ala Ile Ser Arg Ala Asp Gln Glu Thr Gln Tyr
1 5 10

<210> SEQ ID NO 351

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 351

Ser Ala Arg Asp Arg Gly Ala Thr Gly Glu Leu Phe
1 5 10

<210> SEQ ID NO 352

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 352

Ser Val Glu Gly Gly Ser Ala Gly Ala Asn Val Leu Thr
1 5 10

<210> SEQ ID NO 353

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 353

Ser Ala Arg Gln Gly Arg Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 354

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 354

Ala Ser Thr Ser Trp Gly Val Pro Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 355

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 355

Ala Ser Ser Leu Thr Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 356

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 356

Ala Ser Ser Leu Thr Gly Cys Glu Gln Tyr
1 5 10

<210> SEQ ID NO 357

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 357

Ala Ser Ser Leu Gly Gln Arg Lys His Ser Phe
1 5 10

<210> SEQ ID NO 358

<211> LENGTH: 9

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 358

Ala Ser Ser Leu Ala Gly Tyr Lys Tyr
1 5

<210> SEQ ID NO 359

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 359

Ala Ser Gly Met Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 360

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 360

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

<210> SEQ ID NO 361

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 361

Ala Ser Ser Leu Gly Gln Glu Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 362

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 362

Ala Ser Thr Leu Tyr Glu Lys Leu Phe
1 5

<210> SEQ ID NO 363

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 363

Ala Ser Asp Leu Ala Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 364

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 364

Ala Ser Val Gly Thr Gly Asn Val Asp Glu Gln Tyr
1 5 10

<210> SEQ ID NO 365

<211> LENGTH: 13

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 365

Ala Ser Ser Pro Pro Glu Gly Ser Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 366
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 366

Ala Ser Ser Pro Pro Glu Gly Phe Ser Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 367
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 367

Ser Ala Asn Leu Ala Arg Ser Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 368
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 368

Ser Ala Leu Asp Leu Ala Gly Ser Gln Glu Thr Gln Tyr
1 5 10

<210> SEQ ID NO 369
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 369

Ala Val Glu Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 370
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 370

Ala Gly Ala Val Thr Gly Gln Leu Gln Gln Ile Leu
1 5 10

<210> SEQ ID NO 371
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: HoJo virus

<400> SEQUENCE: 371

Ala Val Gly Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 372

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<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 372

Ala Val Glu Leu Leu Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 373
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 373

Ala Val Glu Leu Ser Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 374
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 374

Ala Val Lys Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 375
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 375

Ala Val Glu Leu Phe Thr Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 376
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 376

Ala Val Glu Leu Phe Ala Thr Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 377
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 377

Ala Val Glu Leu Phe Val Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 378
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 378

Ala Val Glu Leu Phe Ala Ala Gly Asn Lys Leu
1 5 10

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<210> SEQ ID NO 379
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 379

Ala Val Val Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 380
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 380

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

<210> SEQ ID NO 381
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 381

Ala Val Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 382
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 382

Ala Val Glu Leu Phe Ala Ser Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 383
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 383

Ala Val Glu Leu Phe Ala Ala Ala Thr Ser
1 5 10

<210> SEQ ID NO 384
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 384

Ala Val Asp Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 385
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 385

Ala Val Glu Leu Phe Asp Ala Gly Asn Lys Leu Thr
1 5 10

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<210> SEQ ID NO 386
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 386

Ala Ala Ser Glu Gly Asn Tyr Asn Val Leu Tyr
1 5 10

<210> SEQ ID NO 387
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 387

Ala Val Glu Val Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 388
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 388

Ala Val Glu Leu Phe Ser Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 389
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 389

Ala Val Ala Leu Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 390
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 390

Ala Val Glu Ile Phe Ala Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 391
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 391

Ala Val Glu Leu Phe Pro Ala Gly Asn Lys Leu Thr
1 5 10

<210> SEQ ID NO 392
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 392

Ala Val Glu Leu Phe Gly Ala Gly Asn Lys Leu Thr
1 5 10

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<210> SEQ ID NO 393
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 393

Ala Val Glu Leu Phe Ala Glu Ala Thr Ser
1 5 10

<210> SEQ ID NO 394
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 394

Ala Ser Ser Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 395
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 395

Ala Ser Ser Ile Glu Gly Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 396
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 396

Ala Ser Ser Leu Ile Ser Gly Ser Pro Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 397
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 397

Ala Ser Gly Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 398
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 398

Ala Ser Ser Leu Ile Gly Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 399
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 399

Ala Ser Ser Leu Val Ser Gly Ser Ser Tyr Glu Gln Tyr

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1	5	10
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<210> SEQ ID NO 400
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 400

Ala Ser Ser Pro Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 401
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 401

Ala Ser Ser Leu Ile Ser Gly Gly Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 402
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 402

Ala Ser Asn Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 403
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 403

Ala Ser Ser Leu Ile Ser Gly Ser Phe Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 404
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 404

Ala Ser Ser Leu Ile Ser Gly Ser Thr Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 405
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 405

Ala Ser Ser Ile Glu Gly Gln Lys Ala Leu Lys Leu
1 5 10

<210> SEQ ID NO 406
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 406

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Ala	Ser	Arg	Leu	Ile	Ser	Gly	Ser	Ser	Tyr	Glu	Gln	Tyr
1				5					10			

<210> SEQ ID NO 407
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 407

Ala	Ser	Ser	Ile	Glu	Gly	Gln	Lys	Trp	Thr	Leu	Lys	Leu
1			5					10				

<210> SEQ ID NO 408
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 408

Ala	Ala	Val	Val	Val	Ala	Pro	Thr	Ser	Ser
1			5					10	

<210> SEQ ID NO 409
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 409

Ala	Ser	Ser	Ile	Gly	Gly	Gln	Lys	Thr	Leu	Lys	Leu
1			5					10			

<210> SEQ ID NO 410
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 410

Ala	Ser	Ser	Ile	Glu	Gly	Gln	Arg	Thr	Leu	Lys	Leu
1			5						10		

<210> SEQ ID NO 411
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 411

Ala	Ser	Ser	Ile	Glu	Gly	Arg	Lys	Thr	Leu	Lys	Leu
1			5						10		

<210> SEQ ID NO 412
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 412

Ala	Ser	Ser	Thr	Glu	Gly	Gln	Lys	Thr	Leu	Lys	Leu
1			5						10		

<210> SEQ ID NO 413
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 413

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Ala Ser Ser Leu Ile Ser Val Ala Pro Thr Ser Ser
1 5 10

<210> SEQ ID NO 414
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 414

Ala Ser Ser Ile Glu Gly Gln Glu Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 415
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 415

Ala Arg Ser Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 416
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 416

Ala Ser Ser Met Glu Gly Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 417
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 417

Ala Ser Ser Ile Glu Glu Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 418
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 418

Ala Ser Ser Ile Glu Gly Gln Lys Arg Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 419
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 419

Ala Ser Ser Leu Ile Ser Gly Ser Ala Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 420
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 420

Ala Ser Cys Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 421

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 421

Ala Ser Ser Leu Ile Ser Gly Arg Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 422

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 422

Ala Ser Ser Leu Ile Ser Gly Ser Tyr Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 423

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 423

Ala Ser Ser Ile Glu Gly Gln Lys Cys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 424

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 424

Ala Ser Ser Leu Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 425

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 425

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

<210> SEQ ID NO 426

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 426

Ala Ser Ser Leu Ile Ser Gly Ser Ser Arg Glu Gln Tyr
1 5 10

<210> SEQ ID NO 427

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 427

Ala Ser Ile Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 428

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 428

Ala Ser Ser Lys Glu Gly Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 429

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 429

Ala Ser Thr Leu Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 430

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 430

Ala Ser Ser Pro Ile Ser Gly Ser Pro Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 431

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 431

Ala Ser Ser Leu Val Ser Gly Asn Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 432

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 432

Ala Ser Ser Leu Ile Ser Gly Ser Cys Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 433

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 433

Ala Ser Gly Pro Ile Ser Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 434

<211> LENGTH: 13

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 434

Ala Ser Gly Leu Ile Ser Gly Gly Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 435

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 435

Ala Ser Gly Leu Ile Gly Gly Ser Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 436

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 436

Ala Ser Ser Ile Glu Gly Gln Lys His Ser Phe
1 5 10

<210> SEQ ID NO 437

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 437

Ala Ser Ser Arg Glu Gly Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 438

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 438

Ala Ser Ser Ile Lys Gly Gln Lys Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 439

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 439

Ala Ser Ser Ile Glu Gly Gln Lys Gly Thr Leu Lys Leu
1 5 10

<210> SEQ ID NO 440

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 440

Ala Pro Pro Pro Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 441

<211> LENGTH: 9

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 441

Ala Val Met Asn Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 442
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 442

Ala Leu Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 443
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 443

Ala Pro Pro Ser Ser Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 444
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 444

Thr Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 445
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 445

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

<210> SEQ ID NO 446
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 446

Ala Pro Ser Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 447
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 447

Ala Pro Pro Phe Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 448

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<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 448

Ala Pro Pro Thr Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 449
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 449

Ala Glu Asn Glu Asp Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 450
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 450

Ala Pro Pro Ser Gly Ser Ala Arg Gln Leu
1 5 10

<210> SEQ ID NO 451
<211> LENGTH: 52
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 451

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

Gln Leu Thr Val Leu Pro Glu His Ile Lys Lys Arg Gly Glu Val Thr
20 25 30

Lys Gly Ser Leu Leu Gly Ile Lys His Cys Asp Thr His Gly Arg Arg
35 40 45

Lys Gln Thr His
50

<210> SEQ ID NO 452
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 452

Ala Gln Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 453
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 453

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

<210> SEQ ID NO 454
<211> LENGTH: 11

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<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 454

Ala Pro Pro Ala Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 455

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 455

Ala Pro Pro Tyr Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 456

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 456

Asp Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 457

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 457

Gly Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 458

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 458

Ala Val Asn Ile Gly Gly Ser Gln Gly Asn Leu Ile
1 5 10

<210> SEQ ID NO 459

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 459

Ser Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 460

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 460

Ala Pro Pro Ser Arg Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 461

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<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 461

Ala Arg Pro Leu Val Leu Gln Gly Asn
1 5

<210> SEQ ID NO 462
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 462

Pro Pro Pro Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 463
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 463

Ala Pro Pro Ser Asp Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 464
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 464

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

<210> SEQ ID NO 465
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 465

Ala Val Asn Ala Arg Asp Ser Gly Thr Tyr Lys Tyr Ile
1 5 10

<210> SEQ ID NO 466
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 466

Ala Ala Pro Gly Glu Cys Trp Gln Gln Pro Ala Asp
1 5 10

<210> SEQ ID NO 467
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 467

Ala Arg Thr Gly Tyr Ser Gly Gly Gly Ala Asp Gly Leu Thr
1 5 10

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<210> SEQ ID NO 468
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 468

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

<210> SEQ ID NO 469
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 469

Ala Met Ser Phe Arg Gly Gly Tyr Gln Lys Val Thr
1 5 10

<210> SEQ ID NO 470
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 470

Ala Pro Pro Ser Gly Pro Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 471
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 471

Ala Pro Pro Ser Asp Pro Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 472
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 472

Ala Pro Pro Cys Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 473
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 473

Ala Val Arg Pro Ile Glu His Arg Pro Val Leu
1 5 10

<210> SEQ ID NO 474
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 474

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

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<210> SEQ ID NO 475
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 475

Ala Val Gly Ala Gly Gly Lys Leu Ile
1 5

<210> SEQ ID NO 476
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 476

Ala Val Thr Asn Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 477
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 477

Ala Val Met Ser Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 478
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 478

Ala Val Met Asp Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 479
<211> LENGTH: 7
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 479

Pro Leu Val Leu Gln Gly Asn
1 5

<210> SEQ ID NO 480
<211> LENGTH: 52
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 480

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

Gln Leu Thr Val Leu Pro Glu His Ile Lys Lys Arg Gly Glu Val Thr
20 25 30

Lys Gly Ser Leu Leu Gly Ile Lys His Cys Glu Thr His Gly Arg Arg
35 40 45

Lys Gln Thr His
50

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<210> SEQ ID NO 481
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 481

Ala Pro Pro Pro Asp Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 482
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 482

Ala Met Ser Leu Asp Asn Tyr Gly Gln Asn Phe Val
1 5 10

<210> SEQ ID NO 483
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 483

Ala Phe Ile Leu Gln Gly Ala Gln Lys Leu Val
1 5 10

<210> SEQ ID NO 484
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 484

Ala Leu Glu Leu Ser Gly Tyr Ala Leu Asn
1 5 10

<210> SEQ ID NO 485
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 485

Ile Trp Leu Arg Ala Asp Leu Lys Ser Trp
1 5 10

<210> SEQ ID NO 486
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 486

Ala Tyr Gly Ser Ser Asn Thr Gly Lys Leu Ile
1 5 10

<210> SEQ ID NO 487
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 487

Ala Val Ser Ala Arg Arg Gln Asn Phe Val
1 5 10

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<210> SEQ ID NO 488
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 488

Ala Val Arg Asn Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 489
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 489

Ala Met Met Asn Ala Gly Lys Ser Thr
1 5

<210> SEQ ID NO 490
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 490

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

<210> SEQ ID NO 491
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 491

Thr Pro Pro Phe Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 492
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 492

Thr Pro Leu Ser Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 493
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 493

Ser Ala Leu Trp Phe Cys Lys Ala Thr Asp
1 5 10

<210> SEQ ID NO 494
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 494

Ala Thr Pro Pro Gly Ser Ala Arg Gln Leu Thr
1 5 10

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<210> SEQ ID NO 495
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 495

Ala Ser Pro Pro Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 496
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 496

Ala Pro Ser Ser Ala Gly Asn Asn Arg Lys Leu Ile
1 5 10

<210> SEQ ID NO 497
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 497

Ala Pro Pro Ser Val Leu Gln Gly Asn
1 5

<210> SEQ ID NO 498
<211> LENGTH: 52
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 498

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

Gln Leu Ala Val Leu Pro Glu His Ile Lys Lys Arg Gly Glu Val Thr
20 25 30

Lys Gly Ser Leu Leu Gly Ile Lys His Cys Asp Thr His Gly Arg Arg
35 40 45

Lys Gln Thr His
50

<210> SEQ ID NO 499
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 499

Ala Pro Pro Ser Gly Ser Ala Gly Asn Trp
1 5 10

<210> SEQ ID NO 500
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 500

Ala Pro Pro Ser Gly Leu Ala Arg Gln Leu Thr
1 5 10

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<210> SEQ ID NO 501
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 501

Ala Pro Pro Pro Gly Ser Ala Arg Gln Leu
1 5 10

<210> SEQ ID NO 502
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 502

Ala Pro Pro Leu Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 503
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 503

Ala Leu Pro Pro Gly Ser Ala Arg Gln Leu Thr
1 5 10

<210> SEQ ID NO 504
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 504

Ala Leu Asp Leu Thr Gly Asn Gln Phe Tyr
1 5 10

<210> SEQ ID NO 505
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 505

Ala Ala Ser Leu Ser Asn Phe Gly Asn Glu Lys Leu Thr
1 5 10

<210> SEQ ID NO 506
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 506

Ala Ala Ser Phe Ser Asp Gln Thr Gly Ala Asn Asn Leu Phe
1 5 10

<210> SEQ ID NO 507
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 507

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asp Glu Gln Phe
1 5 10

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<210> SEQ ID NO 508
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 508

Ala Ser Ser Pro Pro Glu Gly Phe Gly Ser Glu Gln Phe
1 5 10

<210> SEQ ID NO 509
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 509

Ala Ser Ser Pro Pro Glu Gly Phe Asp Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 510
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 510

Ala Ser Ser Leu Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 511
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 511

Ala Ser Ser Pro Leu Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 512
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 512

Ala Ser Ser Pro Ser Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 513
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 513

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

<210> SEQ ID NO 514
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 514

Ala Ser Ser His Leu Arg Val Leu Ala Met Ser Ser

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1	5	10
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<210> SEQ ID NO 515
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 515

Ala Ser Ser Pro	Pro Gly Leu Gly Tyr	Glu Gln Tyr
1	5	10

<210> SEQ ID NO 516
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 516

Ala Ser Ser Pro	Arg Gly Gly Ser Tyr	Glu Gln Tyr
1	5	10

<210> SEQ ID NO 517
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 517

Ala Ser Ser Pro	Pro Glu Gly Phe Gly	Lys Glu Gln Phe
1	5	10

<210> SEQ ID NO 518
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 518

Ala Ile Arg Ser	Thr Ala Ser Thr Asp	Thr Gln Tyr
1	5	10

<210> SEQ ID NO 519
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 519

Ala Ser Ser Pro	His Glu Gly Phe Gly	Asn Glu Gln Phe
1	5	10

<210> SEQ ID NO 520
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 520

Ala Ala His His	Leu Arg Val Leu Ala	Met Ser Ser
1	5	10

<210> SEQ ID NO 521
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 521

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Ala	Ser	Ser	Pro	Pro	Glu	Gly	Phe	Gly	Tyr	Glu	Gln	Phe
1				5					10			

<210> SEQ ID NO 522
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 522

Ala	Ser	Ser	Gln	Pro	Glu	Gly	Phe	Gly	Asn	Glu	Gln	Phe
1				5					10			

<210> SEQ ID NO 523
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 523

Ala	Ser	Arg	Gly	Thr	Ser	Val	Gln	Gln	Ala	Val
1				5					10	

<210> SEQ ID NO 524
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 524

Ala	Ser	Thr	Pro	Ser	Gly	Pro	Ser	Thr	Asp	Thr	Gln	Tyr
1				5					10			

<210> SEQ ID NO 525
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 525

Ala	Ser	Ser	Pro	Pro	Glu	Gly	Phe	Gly	Ile	Glu	Gln	Phe
1				5					10			

<210> SEQ ID NO 526
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 526

Ala	Ser	Ser	Tyr	Ser	Gly	Ala	Gly	Gly	Pro	Trp	Asp	Thr	Gln	Tyr
1				5					10				15	

<210> SEQ ID NO 527
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 527

Ala	Ser	Ser	Pro	Pro	Glu	Gly	Phe	Gly	Thr	Glu	Gln	Phe
1				5					10			

<210> SEQ ID NO 528
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 528

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Ala Ser Ser Val Glu Gly Thr Gly Thr Ser Ile Gln Tyr
1 5 10

<210> SEQ ID NO 529
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 529

Ala Ser Ser Pro Pro Glu Gly Phe Gly His Glu Gln Phe
1 5 10

<210> SEQ ID NO 530
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 530

Ala Ser Ser Pro Thr Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 531
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 531

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

<210> SEQ ID NO 532
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 532

Ala Ser Ser Arg Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 533
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 533

Ala Ser Ser Pro Arg Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 534
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 534

Ala Ser Ser Leu Asp Arg Leu Tyr Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 535
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 535

Ala Ser Ser Phe Gly Thr Gly Gly Asn Thr Gln Tyr
1 5 10

<210> SEQ ID NO 536

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 536

Ala Ser Ser Pro Ala Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 537

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 537

Ala Ser Ser Leu Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 538

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 538

Ala Ser Arg Thr Glu Ala Arg Glu Gln Tyr
1 5 10

<210> SEQ ID NO 539

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 539

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

<210> SEQ ID NO 540

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 540

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asp Gly Gln Phe
1 5 10

<210> SEQ ID NO 541

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 541

Ala Ser Arg Leu Gly His Gln Pro Gln His
1 5 10

<210> SEQ ID NO 542

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 542

Ala Ser Ser Pro Pro Lys Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 543

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 543

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asn Arg Gln Phe
1 5 10

<210> SEQ ID NO 544

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 544

Ala Ser Pro Pro Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 545

<211> LENGTH: 15

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 545

Ser Val Gly Val Thr Gly Gly Thr Ile Thr Pro His Glu Gln Tyr
1 5 10 15

<210> SEQ ID NO 546

<211> LENGTH: 17

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 546

Ala Ser Ser Asp Arg Asp Arg Asp Gly Arg Ala Arg Gly Gly Glu Gln
1 5 10 15

Phe

<210> SEQ ID NO 547

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 547

Ala Ser Ser Pro Pro Lys Gly Leu Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 548

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 548

Ala Ser Ser Pro Pro Glu Ser Leu Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 549

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<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 549

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asn Lys Gln Phe
1 5 10

<210> SEQ ID NO 550
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 550

Ala Trp Arg Pro Gly Tyr Met Asn Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 551
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 551

Ala Ile Ser Glu Trp Ala Ser Gly Arg Pro Ser Tyr Glu Gln Tyr
1 5 10 15

<210> SEQ ID NO 552
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 552

Ala Ser Ser Ala Leu Ala Gly Asp Thr Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 553
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 553

Ala Ser Ser Pro Arg Arg Gly Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 554
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 554

Ala Ser Ser Pro Arg Gly Ala Pro Thr Ser Ser
1 5 10

<210> SEQ ID NO 555
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 555

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

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<210> SEQ ID NO 556
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 556

Ala Ser Ser Pro Ser Glu Gly Phe Asp Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 557
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 557

Ala Ser Ser Pro Pro Glu Gly Leu Ser Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 558
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 558

Ala Ser Ser Pro Pro Glu Gly Phe Ser Ser Glu Gln Phe
1 5 10

<210> SEQ ID NO 559
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 559

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asn Glu Phe
1 5 10

<210> SEQ ID NO 560
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 560

Ala Ser Ser Pro Pro Glu Asp Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 561
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 561

Ala Ile Arg Ser Thr Ala Ser Ala Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 562
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 562

Ala Thr Thr Arg Thr Ser Gly Ser Asn Glu Gln Phe
1 5 10

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<210> SEQ ID NO 563
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 563

Ala Ser Ser Pro Arg Gly Gly Leu Leu Arg Ala Val
1 5 10

<210> SEQ ID NO 564
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 564

Ala Ser Ser Tyr Gly Leu Ala His Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 565
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 565

Ala Thr Leu Gln Gly Pro Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 566
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 566

Ala Ser Ser Ser Ser Val Leu Arg Ala Arg Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 567
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 567

Ala Ser Ser Ile Phe Leu Gly Asp Asn Thr Gly Glu Leu Phe
1 5 10

<210> SEQ ID NO 568
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 568

Ala Ser Leu Pro Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 569
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 569

Ala Ser Ser Pro Ser Glu Asp Phe Gly Asn Glu Gln Phe
1 5 10

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<210> SEQ ID NO 570
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 570

Ala Ser Ser Pro Pro Lys Gly Ser Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 571
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 571

Ala Ser Ser Pro Pro Gly Gly Phe Asp Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 572
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 572

Ala Ser Ser Pro Pro Glu Gly Phe Asn Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 573
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 573

Ala Ser Ser Pro Pro Glu Gly Phe Gly Tyr Gly Gln Phe
1 5 10

<210> SEQ ID NO 574
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 574

Ala Ser Ser Pro Pro Glu Gly Phe Gly Asn Gly Gln Phe
1 5 10

<210> SEQ ID NO 575
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 575

Ala Ser Ser Pro Pro Glu Asp Ser Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 576
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 576

Ala Ser Ser Pro Pro Glu Asp Phe Asp Asn Glu Gln Phe

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1	5	10
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<210> SEQ ID NO 577
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 577

Ala Ser Ser Pro Leu Lys Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 578
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 578

Ala Ser Ser Pro Leu Gly Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 579
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 579

Ala Ser Ser Pro Leu Glu Gly Phe Ser Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 580
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 580

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

<210> SEQ ID NO 581
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 581

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

<210> SEQ ID NO 582
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 582

Ala Ser Pro Leu Pro Glu Gly Phe Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 583
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 583

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Ser	Val	Trp	Thr	Asp	Ser	Asp	Thr	Gln	Tyr
1				5				10	

<210> SEQ ID NO 584
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 584

Ala	Ser	Ser	Gly	Pro	Ser	Gly	Gln	Pro	Gln	His
1				5				10		

<210> SEQ ID NO 585
<211> LENGTH: 17
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 585

Ala	Ser	Leu	Ser	Ser	Pro	Pro	Arg	Asp	Pro	Trp	Arg	Leu	Ile	His	Pro
1				5				10					15		

Ser

<210> SEQ ID NO 586
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 586

Ala	Ala	Ser	Gly	Ala	Asn	Thr	Asn	Lys	Val	Val
1				5				10		

<210> SEQ ID NO 587
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 587

Ala	Pro	Tyr	Ala	Gly	Arg	Arg	Ala	Leu	Thr
1				5				10	

<210> SEQ ID NO 588
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 588

Ala	Pro	Cys	Thr	Gly	Arg	Arg	Ala	Leu	Thr
1				5				10	

<210> SEQ ID NO 589
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 589

Thr	Pro	Tyr	Thr	Gly	Arg	Arg	Ala	Leu	Thr
1				5				10	

<210> SEQ ID NO 590
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 590

Val	Pro	Tyr	Thr	Gly	Arg	Arg	Ala	Leu	Thr
1				5					10

<210> SEQ ID NO 591

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 591

Ala	Pro	Tyr	Met	Gly	Arg	Arg	Ala	Leu	Thr
1				5					10

<210> SEQ ID NO 592

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 592

Ala	Pro	Tyr	Thr	Gly	Arg	Arg	Ala	Leu
1				5				

<210> SEQ ID NO 593

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 593

Ala	Gly	Gln	Asp	Gln	Asp	Ser	Gly	Tyr	Ala	Leu	Asn
1				5							10

<210> SEQ ID NO 594

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 594

Ala	Pro	Thr	Arg	Ala	Gly	Glu	His	Leu
1				5				

<210> SEQ ID NO 595

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 595

Ala	Ala	Asn	Ser	Asn	Asp	Tyr	Lys	Leu	Ser
1				5					10

<210> SEQ ID NO 596

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 596

Ala	Pro	Tyr	Pro	Gly	Arg	Arg	Ala	Leu	Thr
1				5					10

<210> SEQ ID NO 597

<211> LENGTH: 10

<212> TYPE: PRT

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<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 597

Ala Pro Tyr Lys Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 598

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 598

Ala Pro Tyr Ser Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 599

<211> LENGTH: 13

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 599

Ala Leu Leu Asp Ser Gly Gly Gly Ala Asp Gly Leu Thr
1 5 10

<210> SEQ ID NO 600

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 600

Gly Pro Tyr Thr Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 601

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 601

Ala Ala Ser Gly Ala Asn Thr Asn Lys Ala Val
1 5 10

<210> SEQ ID NO 602

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 602

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

<210> SEQ ID NO 603

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 603

Ala Pro Thr Gly Arg Arg Ala Leu Thr
1 5

<210> SEQ ID NO 604

<211> LENGTH: 14

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<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 604

Ala Val Ser Ala Ile Thr Gln Gly Gly Ser Glu Lys Leu Val
1 5 10

<210> SEQ ID NO 605

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 605

Ser Pro Tyr Thr Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 606

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 606

Pro Pro Tyr Thr Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 607

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 607

Glu Pro Tyr Thr Gly Arg Arg Ala Leu Thr
1 5 10

<210> SEQ ID NO 608

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 608

Ala Pro Tyr Thr Ala Gly Glu His Leu
1 5

<210> SEQ ID NO 609

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 609

Ala Gly Pro Gly Gly Gln Leu Ile Asp
1 5

<210> SEQ ID NO 610

<211> LENGTH: 9

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 610

Ala Pro Ser Arg Ala Gly Glu His Leu
1 5

<210> SEQ ID NO 611

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<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 611

Ala Glu Arg Tyr Asn Thr Asp Lys Leu Ile
1 5 10

<210> SEQ ID NO 612
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 612

Ala Ala Ser Gly Ala Asn Thr Asn Lys Phe Val
1 5 10

<210> SEQ ID NO 613
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 613

Ala Ser Ser Leu Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 614
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 614

Ser Ala Arg Glu Gly Ser Gly Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 615
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 615

Ala Ser Ser Leu Gly Gln Gly Asp Glu Ala Phe
1 5 10

<210> SEQ ID NO 616
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 616

Ala Ser Ser Leu Gly Arg Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 617
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 617

Ala Ser Ser Leu Gly Gln Gly Ser Glu Ala Phe
1 5 10

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<210> SEQ ID NO 618
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 618

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

<210> SEQ ID NO 619
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 619

Ala Ser Ser Ser Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 620
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 620

Ala Ser Ser Leu Tyr Leu Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 621
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 621

Ser Ala Ser Ser Gly Ser Thr Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 622
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 622

Ala Ser Ser Leu Tyr Phe Gly Arg Pro Gln His
1 5 10

<210> SEQ ID NO 623
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 623

Ala Ser Ser Leu Tyr Ser Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 624
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 624

Ala Ser Gly Leu Tyr Phe Gly Gln Pro Gln His
1 5 10

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<210> SEQ ID NO 625
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 625

Ala Ser Ser Leu Tyr Phe Gly Gln Pro Ser
1 5 10

<210> SEQ ID NO 626
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 626

Ala Ser Ser Leu Gly Gln Gly Asn Lys Ala Phe
1 5 10

<210> SEQ ID NO 627
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 627

Ala Ser Ser Leu Cys Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 628
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 628

Ser Val Ala Gly Thr Tyr Ser Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 629
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 629

Ser Ala Arg Asp Gln Ile Arg Glu Gln Phe
1 5 10

<210> SEQ ID NO 630
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 630

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

<210> SEQ ID NO 631
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 631

Ala Ser Asn Leu Gly Gln Gly Asn Glu Ala Phe
1 5 10

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<210> SEQ ID NO 632
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 632

Ala Ser Ser Leu Asp Arg Gly Met Lys Leu
1 5 10

<210> SEQ ID NO 633
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 633

Ser Val Glu Gly Thr Gly Gly Leu Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 634
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 634

Ala Ser Ser Leu Gly Gln Gly Met Lys Leu
1 5 10

<210> SEQ ID NO 635
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 635

Ala Ser Ser Leu Gly Trp Arg Gly Asn Ser Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 636
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 636

Ala Ser Ser Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 637
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 637

Ala Ser Asn Leu Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 638
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 638

Ala Ser Ser Leu Tyr Phe Gly Gln Pro Gln

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1	5	10
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<210> SEQ ID NO 639
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 639

Ala	Ser	Ser	Leu	Tyr	Phe	Gly	Pro	Gln	His
1			5					10	

<210> SEQ ID NO 640
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 640

Ala	Ser	Ser	Leu	Val	Ser	Gly	Gly	Asn	Glu	Gln
1			5					10		

<210> SEQ ID NO 641
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 641

Ala	Ser	Ser	Leu	Tyr	Phe	Gly	Gln	Ser	Gln	His
1			5					10		

<210> SEQ ID NO 642
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 642

Ala	Trp	Glu	Glu	Gly	Glu	Ala	Phe
1			5				

<210> SEQ ID NO 643
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 643

Ala	Ser	Ser	Leu	Gly	Gln	Gly	Asn	Glu	Ala
1			5					10	

<210> SEQ ID NO 644
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 644

Ala	Ser	Ser	Leu	Gly	Gln	Gly	Asn	Val	Ala	Phe
1			5					10		

<210> SEQ ID NO 645
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 645

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Ala Ser Ser Leu Gly Gln Gly Lys Glu Ala Phe
1 5 10

<210> SEQ ID NO 646
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 646

Ser Val Asp Leu Gly Trp Glu Gln Tyr
1 5

<210> SEQ ID NO 647
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 647

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

<210> SEQ ID NO 648
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 648

Ser Val Glu Leu Ala Gly Glu Ala Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 649
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 649

Ala Ala Val Tyr Thr Leu Gly Ser Pro Ser
1 5 10

<210> SEQ ID NO 650
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 650

Ala Ser Ser Met Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 651
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 651

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

<210> SEQ ID NO 652
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 652

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Ala Ser Ser Leu Gly Gln Gly Asn Asp Ala Phe
1 5 10

<210> SEQ ID NO 653
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 653

Ala Ser Ser Leu Tyr Phe Gly Ser Pro Ser
1 5 10

<210> SEQ ID NO 654
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 654

Ser Ala Ser Ser Gly Thr Ser Gly Arg Leu Tyr Asn Glu Gln Phe
1 5 10 15

<210> SEQ ID NO 655
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 655

Ala Ala Ala Trp Asp Arg Gly Met Lys Leu
1 5 10

<210> SEQ ID NO 656
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 656

Ala Ser Ser Trp Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 657
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 657

Ala Ser Ser Val Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 658
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 658

Ala Ser Ser Leu Thr Leu Gln Glu Thr Gln Tyr
1 5 10

<210> SEQ ID NO 659
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

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<400> SEQUENCE: 659

Ser Val Gly Thr Ser Gly Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 660

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 660

Ala Ser Ser Tyr Phe Ala Gly Pro Tyr Glu Gln Tyr
1 5 10

<210> SEQ ID NO 661

<211> LENGTH: 12

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 661

Ala Trp Ser Glu Gly Val Gly Asn Gln Pro Gln His
1 5 10

<210> SEQ ID NO 662

<211> LENGTH: 10

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 662

Ala Ser Ser Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 663

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 663

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

<210> SEQ ID NO 664

<211> LENGTH: 11

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 664

Ala Ser Ile Leu Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 665

<211> LENGTH: 19

<212> TYPE: PRT

<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 665

Ala Ser Ser Leu Val Gly Ala Gln Gly Leu Ala Gly Thr Asn Asn Tyr
1 5 10 15

Glu Gln Tyr

<210> SEQ ID NO 666

<211> LENGTH: 11

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<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 666

Ala Ser Ser Leu Tyr Phe Gly Pro Pro Gln His
1 5 10

<210> SEQ ID NO 667
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 667

Ala Ser Ser Leu Tyr Phe Gly Leu Pro Gln His
1 5 10

<210> SEQ ID NO 668
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 668

Ala Ser Ser Leu Tyr Phe Gly His Pro Gln His
1 5 10

<210> SEQ ID NO 669
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 669

Ala Ser Ser Ile Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 670
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 670

Ala Ser Ile Leu Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 671
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 671

Ala Ser Ser Pro Gly Ser Ala Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 672
<211> LENGTH: 14
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 672

Ala Ile Ser Glu Ser Leu Ala Gly Gly Tyr Asn Glu Gln Phe
1 5 10

<210> SEQ ID NO 673

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<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 673

Ala Ser Arg Leu Gly Gln Gly Asn Glu Ala Phe
1 5 10

<210> SEQ ID NO 674
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 674

Ala Ser Ser Pro Thr Leu Gly Val Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 675
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 675

Ala Ser Ser Val Asp Gly Gly Glu Gln Pro Gln His
1 5 10

<210> SEQ ID NO 676
<211> LENGTH: 9
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 676

Ala Ser Ser Gln Tyr Val Glu Gln Tyr
1 5

<210> SEQ ID NO 677
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 677

Ala Ser Ser Gln Gly Ser Asp Glu Gln Tyr
1 5 10

<210> SEQ ID NO 678
<211> LENGTH: 15
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 678

Ala Ser Ser Leu Thr Gly His Arg Glu Ala Tyr Asn Glu Gln Phe
1 5 10 15

<210> SEQ ID NO 679
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 679

Ala Ser Ser Ser Thr Gly Gly Thr Ser Tyr Gly Tyr Thr
1 5 10

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<210> SEQ ID NO 680
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 680

Ala Ser Ser Leu Gly Gln Gly Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 681
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 681

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

<210> SEQ ID NO 682
<211> LENGTH: 8
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 682

Ala Ser Ser Leu Gly Gln Gly Asn
1 5

<210> SEQ ID NO 683
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 683

Ala Ser Ser Leu Gly Gln Gly Asp Gly Ala Phe
1 5 10

<210> SEQ ID NO 684
<211> LENGTH: 17
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 684

Ala Ser Ser Pro Arg Val Pro Gly Gln Gly Thr Ala Gly Asn Thr Ile
1 5 10 15

Tyr

<210> SEQ ID NO 685
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 685

Ala Ser Ser Leu Ser Val Gly Ser Gly Glu Leu Phe
1 5 10

<210> SEQ ID NO 686
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 686

Ala Ser Ser Val Tyr Phe Gly Gln Pro Gln His

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<210> SEQ ID NO 687
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 687

Ala Ser Ser Leu Tyr Phe Gly Gln Thr Gln His
1 5 10

<210> SEQ ID NO 688
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 688

Ala Ser Ser Leu Tyr Phe Gly Gln Ala Gln His
1 5 10

<210> SEQ ID NO 689
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 689

Ala Ser Ser Leu Tyr Phe Gly Lys Pro Gln His
1 5 10

<210> SEQ ID NO 690
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 690

Ala Ser Arg Leu Tyr Phe Gly Gln Pro Gln His
1 5 10

<210> SEQ ID NO 691
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 691

Ala Ser Ser Leu Tyr Trp Val Asp Thr Gln Tyr
1 5 10

<210> SEQ ID NO 692
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 692

Ala Ser Ser Leu Ala Tyr Thr Ser Thr Glu Ala Phe
1 5 10

<210> SEQ ID NO 693
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 693

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Ala	Ser	Ser	Leu	Tyr	Gln	Gly	Pro	Asn	Glu	Gln	Phe
1			5						10		

<210> SEQ ID NO 694
<211> LENGTH: 16
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 694

Ala	Ser	Ser	Phe	Arg	Gln	Trp	Ala	Gly	Gly	Gly	Thr	Asp	Thr	Gln	Tyr
1			5					10						15	

<210> SEQ ID NO 695
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 695

Ala	Ser	Ser	Leu	Val	Gln	Gly	Thr	Trp	Tyr	Glu	Gln	Tyr
1			5					10				

<210> SEQ ID NO 696
<211> LENGTH: 13
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 696

Ala	Ser	Ser	Leu	Val	Gly	Gly	Ala	Tyr	Asn	Glu	Gln	Phe
1			5						10			

<210> SEQ ID NO 697
<211> LENGTH: 10
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 697

Ala	Ser	Ser	Trp	Asp	Arg	Gly	Met	Lys	Leu
1			5						10

<210> SEQ ID NO 698
<211> LENGTH: 12
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 698

Ala	Ser	Ser	Leu	Val	Ser	Gly	Gly	Asn	Glu	Gln	Phe
1			5						10		

<210> SEQ ID NO 699
<211> LENGTH: 11
<212> TYPE: PRT
<213> ORGANISM: Homo sapiens

<400> SEQUENCE: 699

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<212> TYPE: PRT

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<400> SEQUENCE: 708

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<210> SEQ ID NO 709

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<212> TYPE: PRT

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1. A method of cellular immunotherapy for treating a subject for a cancer expressing a mutated epidermal growth factor receptor (EGFR) or KRAS neo-antigen epitope, the method comprising:

- a) eliciting an antigen-specific cytotoxic T cell response by contacting cytotoxic T cells (CTLs) with an antigen presenting cell presenting at its surface an immunogenic peptide comprising the mutated EGFR or KRAS neo-antigen epitope in a complex with major histocompatibility complex (MHC);
- b) isolating CTLs specific for the mutated EGFR or KRAS neo-antigen epitope;
- c) generating induced pluripotent stem cells (iPSC) from the CTLs specific for the mutated EGFR or KRAS neo-antigen epitope;
- d) differentiating the iPSCs into rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope; and
- e) administering a therapeutically effective amount of the rejuvenated CTLs specific for the mutated EGFR or KRAS neo-antigen epitope to the subject.

2. The method of claim 1, wherein the mutated EGFR neo-antigen epitope comprises a mutation selected from the group consisting of a C797S mutation, a T790M mutation, an L858R mutation, and a deletion, or the mutated KRAS neo-antigen comprises a mutation selected from the group consisting of a G12D mutation, a G12V mutation, and a G12C mutation.

3. (canceled)

4. The method of claim 1, wherein the immunogenic peptide is selected from the group consisting of:

- a) an immunogenic peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5; and
- b) an immunogenic peptide comprising an amino acid sequence having at least 70% identity to an amino acid sequence selected from the group consisting of SEQ ID

NOS:1-5, wherein the immunogenic peptide comprises the mutated EGFR or KRAS neo-antigen epitope.

5. (canceled)

6. The method of claim 1, wherein the CTLs are contacted with the antigen presenting cell in vivo, ex vivo, or in vitro.

7. The method of claim 1, wherein the CTLs specific for the mutated EGFR or KRAS neo-antigen epitope are isolated from tumor infiltrating lymphocytes or peripheral blood mononuclear cells.

8. The method of claim 1, wherein the CTLs are provided in a biological sample, wherein the biological sample is blood, a tumor biopsy, a cancerous tissue sample, or a malignant effusion fluid sample.

9-10. (canceled)

11. The method of claim 1, wherein the CTLs are autologous or allogeneic.

12. The method of claim 1, wherein the CTLs are obtained from a donor that is human leukocyte antigen (HLA)-matched with the subject.

13. The method of claim 1, wherein the rejuvenated CTLs express CD8.

14. The method of claim 1, wherein the rejuvenated CTLs are expanded in vitro before being administered to the subject.

15-16. (canceled)

17. The method of claim 1, wherein multiple cycles of treatment are administered to the subject for a time period sufficient to effect at least a partial tumor response or a complete tumor response.

18. (canceled)

19. The method of claim 1, wherein the cancer expresses a major histocompatibility complex (MHC) carrying a peptide comprising the mutated EGFR or KRAS neo-antigen epitope.

20. The method of claim 1, further comprising introducing a suicide gene into the rejuvenated CTLs.

21-22. (canceled)

23. The method of claim 1, wherein the antigen presenting cell is a dendritic cell, a macrophage, an artificial antigen

presenting cell, or a cancerous cell expressing the mutated epidermal growth factor receptor (EGFR) or KRAS neo-antigen epitope.

24-29. (canceled)

30. A method of producing an induced pluripotent stem cell (IPSC)-derived rejuvenated cytotoxic T cell (CTL) specific for a mutated EGFR or KRAS neo-antigen epitope, the method comprising:

- a) obtaining a biological sample comprising cytotoxic T cells (CTLs);
- b) eliciting an antigen-specific cytotoxic T cell response by contacting cytotoxic T cells (CTLs) with an antigen presenting cell presenting at its surface an immunogenic peptide comprising a mutated EGFR or KRAS neo-antigen epitope in a complex with major histocompatibility complex;
- c) isolating a CTL specific for the mutated EGFR or KRAS neo-antigen epitope;
- d) generating an induced pluripotent stem cell (IPSC) from the CTL specific for the mutated EGFR or KRAS neo-antigen epitope; and
- e) differentiating the IPSC into a rejuvenated CTL specific for the mutated EGFR or KRAS neo-antigen epitope.

31. The method of claim **30**, wherein the mutated EGFR neo-antigen comprises a C797S mutation, a T790M mutation, an L858R mutation, or a deletion, or the mutated

KRAS neo-antigen comprises a mutation selected from the group consisting of a G12D mutation, a G12V mutation, and a G12C mutation.

32. (canceled)

33. The method of claim **30**, wherein the immunogenic peptide is selected from the group consisting of:

- a) an immunogenic peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5; and
- b) an immunogenic peptide comprising an amino acid sequence having at least 70% identity to an amino acid sequence selected from the group consisting of SEQ ID NOS:1-5, wherein the immunogenic peptide comprises the mutated EGFR or KRAS neo-antigen epitope.

34. The method of claim **30**, wherein the biological sample is blood, a tumor biopsy, a cancerous tissue sample, or a malignant effusion fluid sample.

35-37. (canceled)

38. An IPSC-derived rejuvenated CTL produced according to the method of claim **30**.

39. A composition comprising the IPSC-derived rejuvenated CTL of claim **38** and a pharmaceutically acceptable excipient.

40-51. (canceled)

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