

WHAT IS CLAIMED IS:

1. An isolated T-cell population that comprises CD49f⁺ T-cells, wherein the CD49f⁺ T-cells constitute at least 1% (including at least 2% to 99% and all integer percentages therebetween) of the T-cells in the population.
2. The isolated population of claim 1, wherein the CD49f⁺ T-cells have one or more immune properties selected from an early memory phenotype, a stem-like phenotype, increased proliferative potential, increased survival and increased persistence in vivo, decreased differentiation, increased immune effector function, decreased immune effector dysfunction and increased responsiveness in immunotherapy.
- ~~3. The isolated population of claim 1 or claim 2, wherein the CD49f⁺ T-cells comprise CD49f^{hi} T-cells, CD49f^{int} T-cells, or both.~~
- ~~4.3. The isolated population of any one of claims 1 to 3~~ claim 1 or claim 2, wherein the CD49f⁺ T-cells comprise memory T-cells (e.g., central memory T-cells) such as, but not limited to, CD49f⁺CD27⁺CD28⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺CCR7⁺ memory T-cells and CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺CCR7⁺ memory T-cells, wherein the memory cells are optionally positive for CD127.
- ~~5.4. The isolated population of any one of claims 1 to 3~~ 4, wherein the CD49f⁺ T-cells are positive for one or both of CD4 and CD8.
- ~~6.5. The isolated population of any one of claims 1 to 4~~ 5, wherein the CD49f⁺ T-cells are positive for TCF-1 (e.g., TCF-1^{hi}) and/or LEF-1 (e.g., LEF-1^{hi}) and optionally positive for one or both of Oct4 and Sox2.
- ~~7. The isolated population of any one of claims 1 to 6, wherein the CD49f⁺ T-cells in the isolated population constitute 1% or more of the T-cells in the population, including 2% or more, 3% or more, 4% or more, 5% or more, 10% or more, 15% or more, 20% or more, 25% or more, 30% or more, 35% or more, 40% or more, 45% or more, 50% or more, 55% or more, 60% or more, 65% or more, 70% or more, 75% or more, 80% or more, 85% or more, 90% or more, 95% or more, 96% or more, 97% or more, 98% or more, 99% or more, or up to and including 100% of the T-cells in the isolated population.~~
- ~~8. The isolated population of any one of claims 1 to 6, wherein the CD49f⁺ T-cells in the isolated population constitute 10% or more of the total number of cells in the population, including 1% or more of the T-cells in the population, including 2% or more, 3% or more, 4% or more, 5% or more, 10% or more, 15% or more, 20% or more, 25% or more, 30% or more, 35% or more, 40% or more, 45% or more, 50% or more, 55% or more, 60% or more, 65% or more, 70% or more, 75% or more, 80% or more, 85% or more, 90% or more, 95% or more, 96% or more, 97% or more, 98% or more, 99% or more, or up to and including 100% of the total number of cells in the isolated population.~~

- ~~9. The isolated population of any one of claims 1 to 8, wherein the isolated population is a substantially homogeneous population.~~
- 10.6. The isolated population of any one of claims 1 to 59, wherein the CD49⁺ T-cells express a recombinant T-cell receptor (rTCR).
- 11.7. The isolated population of any one of claims 1 to 69, wherein the CD49⁺ T-cells express a chimeric antigen receptor (CAR), wherein the CAR or CAR-expressing T-cell is suitably selected from a T-cell Redirected for Universal Cytokine Killing ("TRUCK"), Universal CAR, Self-driving CAR, Armored CAR, Self-destruct CAR, Conditional CAR, Marked CAR, TenCAR, Dual CAR, or safety CAR.
12. The isolated population of claim 11, wherein the CAR targets CD19.
13. The isolated population of claims 11, wherein the CAR targets any one of the group comprising: CD22, CD23, myeloproliferative leukemia protein (MPL), CD30, CD32, CD20, CD70, CD79b, CD99, CD123, CD138, CD179b, CD200R, CD276, CD324, Fc receptor like 5 (FcRH5), CD171, CS-1 (signalling lymphocytic activation molecule family 7, SLAMF7), C-type lectin like molecule 1 (CLL-1), CD33, cadherin-1, cadherin-6, cadherin-16, cadherin-17, cadherin-19, epidermal growth factor receptor variant III (EGFRviii), ganglioside GD2, ganglioside GD3, human leukocyte antigen A2 (HLA-A2), B-cell maturation antigen (BCMA), Tn antigen, prostate-specific membrane antigen (PSMA), receptor tyrosine kinase like orphan receptor 1 (ROR1), FMS-like tyrosine kinase 3 (FLT3), fibroblast activation protein (FAP), tumour-associated glycoprotein (TAG)-72, CD38, CD44v6, carcinoembryonic antigen (CEA), epithelial cell adhesion molecule (EpCAM), KIT, interleukin-13 receptor subunit alpha-2 (IL-13Ra2), interleukin-11 receptor subunit alpha (IL11Ra), Mesothelin, prostate stem cell antigen (PSCA), vascular endothelial growth factor receptor 2 (VEGFR2), Lewis Y, CD24, platelet derived growth factor receptor beta (PDGFR-beta), Protease Serine 21 (PRSS21), sialyl glycolipid stage specific embryonic antigen 4 (SSEA-4), Fc region of an immunoglobulin, tissue factor, folate receptor alpha, epidermal growth factor receptor 2 (ERBB2), mucin-1 (MUC1), epidermal growth factor receptor (EGFR), neural small adhesion molecule (NCAM), Prostase, prostatic acid phosphatase (PAP), elongation factor 2 mutated (ELF2M), Ephrin-B2, insulin-like growth factor I receptor (IGF-I receptor), carbonic anhydrase IX (CAIX), latent membrane protein 2 (LMP2), melanocyte protein gp100, bcr-abl, tyrosinase, erythropoietin-producing hepatocellular carcinoma A2 (EphA2), fucosylated monosialoganglioside (Fucosyl GM1), sialyl Lewis a (sLea), ganglioside GM3, transglutaminase 5 (TGS5), high molecular weight melanoma-associated antigen (HMWMAA), o-acetyl-GD2 ganglioside, folate receptor beta, TEM1/CD248, tumour endothelial marker 7-related (TEM7R), claudin-6 (CLDN6), thyroid stimulating hormone receptor (TSHR), T-cell receptor (TCR)-beta1 constant chain, TCR beta2 constant chain, TCR gamma-delta, G-protein coupled receptor class C group 5 member D (GPRC5D), CXORF61 protein, CD97, CD179a, anaplastic lymphoma kinase (ALK), Polysialic acid, placenta-specific 1 (PLAC1), carbohydrate antigen GloboH, breast differentiation antigen NY-BR-1, uroplakin-2 (UPK2), Hepatitis A virus cellular receptor 1 (HAVCR1), adrenoreceptor beta-3 (ADRB3), pannexin-3 (PANX3), G-protein coupled receptor 20 (GPR20), lymphocyte antigen-6 family member K (LY6K), olfactory receptor family 51-subfamily E member 2 (OR51E2), T-cell receptor gamma-chain alternate reading-frame protein (TARP), Wilms tumor antigen 1 protein (WT1), cancer testis antigen NY-ESO-1, cancer testis antigen LAGE-

~~la, legumain, human papillomavirus (HPV) E6, HPV E7, Human T-lymphotrophic viruses (HTLV) Tax, Kaposi's sarcoma-associated herpesvirus glycoprotein (KSHV) K8.1 protein, Epstein-Barr virus (EBV)-encoded glycoprotein 350 (EBB-gp350), HIV-1 envelope glycoprotein gp120, multiplex automated genome engineering (MAGE)-A1, translocation-Ets leukemia virus (ETV) protein 6-AML, sperm protein 17, X Antigen Family Member (XAGE), transmembrane tyrosine-protein kinase receptor Tie-2, melanoma cancer-testis antigen MAD-CT-1, melanoma cancer-testis antigen MAD-CT-2, Fos-related antigen 1, p53, p53 mutant, prostein, survivin and telomerase, prostate cancer tumour antigen 1 (PCTA-1)/Galectin 8, MelanA/MART1, Ras mutant, human telomerase reverse transcriptase (hTERT), delta-like 3 (DLL3), Trophoblast cell surface antigen 2 (TROP2), protein tyrosine kinase 7 (PTK7), Guanylyl Cyclase C (GCC), alpha-fetoprotein (AFP), sarcoma translocation breakpoints, melanoma inhibitor of apoptosis (ML-IAP), ERG (TMPRSS2-ETS fusion gene), N-acetyl glucosaminyl transferase V (NA17), paired box protein Pax-3 (PAX3), Androgen receptor, Cyclin B1, v-myc avian myelocytomatosis viral oncogene neuroblastoma derived homolog (MYCN), Ras Homolog Family Member C (RhoC), tyrosinase-related protein 2 (TRP-2), Cytochrome P4501B1 (CYP1B1), CCCTC-Binding Factor (Zinc Finger Protein)-Like (BORIS or Brother of the Regulator of Imprinted Sites), squamous Cell Carcinoma Antigen Recognized By T-Cells 3 (SART3), PAX-5, proacrosin binding protein sp32 (OY-TES1), lymphocyte-specific protein tyrosine kinase (LCK), A-kinase anchor protein 4 (AKAP-4), synovial sarcoma, X breakpoint 2 (SSX2), Receptor for Advanced Glycation Endproducts (RAGE-1), renal ubiquitous 1 (RU1), RU2, intestinal carboxyl esterase, heat shock protein 70-2 mutated (mut-hsp70-2), CD79a, CD72, leukocyte-associated immunoglobulin-like receptor 1 (LAIR1), Fc fragment of IgA receptor (FCAR), Leukocyte immunoglobulin-like receptor subfamily A member 2 (LILRA2), CD300 molecule-like family member f (CD300LF), C-type lectin domain family 12 member A (CLEC12A), bone marrow stromal cell antigen 2 (BST2), EGF-like module containing mucin-like hormone receptor-like 2 (EMR2), lymphocyte antigen 75 (LY75), Glypican-3 (GPC3), Fc receptor-like 5 (FCRL5), immunoglobulin lambda-like polypeptide 1 (IGLL1), FITC, Leutenizing hormone receptor (LHR), Follicle stimulating hormone receptor (FSHR), Chorionic Gonadotropin Hormone receptor (CGHR), CC-chemokine receptor 4 (CCR4), signalling lymphocyte activation molecule (SLAM) family member 6 (SLAMF6), SLAMF4, or any combination thereof.~~

- ~~14.8. _____~~ A process of manufacturing a T-cell population comprising T-cells with enhanced immune properties (e.g., selected from one or more of an early memory phenotype, a stem like phenotype, increased proliferative potential, increased survival and increased persistence in vivo, decreased differentiation, increased immune effector function, decreased immune effector dysfunction and increased responsiveness in immunotherapy), the process comprising or consisting essentially of: isolating or selecting from a sample containing T-cells a T-cell population comprising CD49f⁺ T-cells, wherein the CD49f⁺ T-cells constitute at least 1% (including at least 2% to at least 99% and all integer percentages therebetween) of the T-cells in the population, or enriching a sample containing T-cells for CD49f⁺ T-cells, thereby manufacturing a T-cell population comprising T-cells with enhanced immune properties.
- ~~15. The process of claim 14, further comprising harvesting the T-cell-containing sample from a suitable source.~~

- ~~16. The process of claim 15, wherein the source is selected from a peripheral blood mononuclear cell (PBMC) sample, cord blood cells, a purified population of T cells, a T-cell line, or a sample obtained by leukapheresis.~~
- ~~17.9.~~ 17.9. The process of ~~any one of claims 14 to 16~~claim 8, wherein T-cell-containing sample is enriched for T-cells of interest, for example CD8⁺ T-cells, CD4⁺ T-cells, naive T-cells, memory T-cells, previously activated T-cells and/or tumor infiltrating lymphocytes.
- ~~18.10.~~ 18.10. The process of ~~any one of claims 14 to 17~~claim 8 or claim 9, wherein the CD49f⁺ T-cells include CD49f⁺ memory T-cells including CD49f⁺ central memory T-cells (e.g., CD49f⁺CD27⁺CD28⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺CCR7⁺ memory T-cells or CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺CCR7⁺ memory T-cells), wherein the memory T-cells are optionally positive for CD127.
- ~~19.11.~~ 19.11. The process of any one of claims 14 to ~~18~~8 to 10, wherein the CD49f⁺ T-cells have an early memory phenotype and/or a stem-like phenotype (e.g., CD49f⁺ T-cells are positive for TCF-1 (e.g., TCF-1^{hi}) and/or LEF-1 (e.g., LEF-1^{hi}) and optionally positive for one or both of Oct4 and Sox2).
- ~~20.12.~~ 20.12. The process of any one of claims 14 to ~~19~~8 to 11 wherein the enhanced immune properties are relative to a control (e.g., a T-cell population that is not enriched for CD49f⁺ T-cells as defined above and elsewhere herein, or an isolated or CD49f⁺ T-cell enriched T-cell population as defined above and elsewhere herein).
- ~~21. The process of any one of claims 14 to 20, wherein the isolated or CD49f⁺ T-cell enriched T-cell population is autologous, allogeneic, or xenogeneic relative to a subject to whom the population is or will be administered.~~
- ~~22.13.~~ 22.13. The process of any one of claims 14 to ~~21~~8 to 12, wherein the isolation or enriching steps comprises contacting the sample T-cell population with an antigen-binding molecule that binds to CD49f and isolating cells that bind to the antigen-binding molecule, optionally wherein the anti-CD49f antigen-binding molecule is directly or indirectly connected to a magnetic or paramagnetic particle.
- ~~23. The process of claim 22, wherein the anti-CD49f antigen-binding molecule is directly or indirectly connected to a magnetic or paramagnetic particle.~~
- ~~24.14.~~ 24.14. The process of any one of claims 14 to ~~23~~8 to 13, wherein the enriching comprises positive selection for CD49f⁺ cells using affinity based selection.
- ~~25. The process of any one of claims 14 to 24, further comprising isolating the T-cell-containing sample from a suitable source of T-cells.~~
15. The process of any one of claims 14 to ~~25~~8 to 14, further comprising activating the T-cells of the isolated or CD49f⁺ T-cell enriched T-cell population, and/or further comprising stimulating

the T-cells of the isolated or CD49f⁺ T-cell enriched T-cell population to proliferate, preferably wherein the activation and stimulation of the T-cells comprises contacting the T-cells with

- (1) an anti-CD3 antigen-binding molecule and (2) an anti-CD28 antigen-binding molecule;

- B7-1 or B7-2;

- an anti-CD49f antigen-binding molecule; or

26.- contacting the T-cells with an antigen to produce antigen-specific T-cells.

~~27. The process of any one of claims 14 to 26, further comprising stimulating the T-cells of the isolated or CD49f⁺ T-cell enriched T-cell population to proliferate.~~

~~28. The process of claim 27, wherein the activation and stimulation of the T-cells comprises contacting the T-cells with (1) an anti-CD3 antigen-binding molecule and (2) an anti-CD28 antigen-binding molecule, or B7-1 or B7-2.~~

~~29. The process of claim 27, wherein the activation and stimulation of the T-cells comprises contacting the T-cells with an anti-CD49f antigen-binding molecule.~~

~~30. The process of any one of claims 14 to 29, further comprising contacting the T-cells with an antigen to produce antigen-specific T-cells.~~

~~31.~~16. The process of any one of claims 14 to ~~30~~ to 15, further comprising transducing the T-cells of the isolated or CD49f⁺ T-cell enriched T-cell population with a nucleic acid (-e.g., a vector such as a viral vector including a retroviral vector such as a lentiviral vector) from which a rTCR or CAR is expressible, optionally in combination with a cytokine {(e.g., an immune-stimulatory cytokine)}, optionally wherein the T-cells are transduced with the nucleic acid after T-cell proliferation.

~~32. The process of claim 31, wherein the T-cells are transduced with the nucleic acid after T-cell proliferation.~~

~~33.~~17. The process of claim ~~31 or claim 32~~16, wherein the CAR comprises a) an extracellular domain that binds to an antigen or portion thereof, wherein the antigen is selected from the group consisting of: a cancer or tumor-associated antigen, an infectious disease-associated antigen, an autoimmune disease-associated antigen, a transplantation antigen and an allergen; b) a transmembrane domain derived from a polypeptide selected from the group consisting of: CD8a, CD4, CD28, CD45, PD-1, and CD152; c) one or more intracellular costimulatory signaling domains selected from the group consisting of: CD28, CD54 (ICAM), CD134 (OX40), CD137 (4-1BB), CD152 (CTLA4), CD273 (PD-L2), CD274 (PD-L1), and CD278 (ICOS); and d) a CD3- ζ signaling domain.

18. The process of claim ~~33~~17, wherein the extracellular domain comprises an antigen binding molecule (e.g., scFv) that binds the antigen and/or wherein the CAR further comprises

- a hinge region polypeptide (e.g., a hinge region of IgG1 or CD8a; and/or
- ~~34. a signal peptide (e.g., an IgG1 heavy chain signal polypeptide or a CD8a signal polypeptide).~~
- ~~35. The process of claim 33 or claim 34, wherein the CAR further comprises a hinge region polypeptide (e.g., a hinge region of IgG1 or CD8a).~~
- ~~36. The process of any one claims 33 to 35, wherein the CAR further comprises a signal peptide (e.g., an IgG1 heavy chain signal polypeptide or a CD8a signal polypeptide).~~
- ~~37. The process of any one claims 14 to 36, further comprising storing the isolated or CD49f⁺ T-cell enriched T-cell population.~~
- ~~38. The process of claim 37, wherein the storing comprises cryopreservation of the isolated or CD49f⁺ T-cell enriched T-cell population.~~
- ~~39. A kit for carrying out the manufacturing processes of any one of claims 13 to 37, comprising one or more antigen-binding molecules or other binding partners, suitably coupled to solid supports, for the isolation or separation of, or enrichment for, a CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 13.~~
- ~~40. The kit of claim 39, comprising an antigen-binding molecule for one or more T-cell biomarkers selected from CD95, CD45RA, CCR7, CD28, CD27, CD62L, CD127, and one or both of CD8 and CD4.~~
- ~~41. The kit of claim 39 or claim 40, further containing instructional material for carry out the isolation or separation of, or enrichment for, the CD49f⁺ T-cell enriched T-cell population.~~
- ~~42. The kit of any one of claims 39 to 40, comprising antigen-binding molecules for positive and negative selection, suitably bound to magnetic beads.~~
- ~~43. The kit of claim 42, comprising instructions to carry out selection starting with a sample, such as a PBMC sample, by selecting based on expression of a first surface marker, recognized by one or more of the antigen-binding molecules provided with the kit, retaining both positive and negative fractions.~~
- ~~44. The kit of clam 43, wherein the instructions further include instructions to carry out one or more additional selection steps, starting with the positive and/or negative fractions derived therefrom, for example, while maintaining the compositions in a contained environment and/or in the same separation vessel.~~
- ~~45.19. _____~~ A method of determining a likelihood that a T-cell population is competent for immunotherapy (e.g., adoptive cell therapy), the method comprising or consisting essentially of: determining a level or concentration of CD49f⁺ T-cells in a sample of the T-cell population; and determining a likelihood that the T-cell population is competent for immunotherapy based on the level or concentration of CD49f⁺ T-cells in the sample.

46. ~~The method of claim 45, wherein the level or concentration of CD49f⁺ T-cells comprises a level or concentration of CD49f^{hi} T-cells only, a level or concentration of CD49f^{int} T-cells only, or a level or concentration of both CD49f^{hi} T-cells and CD49f^{int} T-cells.~~
47. ~~The method of claim 45 or claim 46, wherein the CD49f⁺ T-cells comprise memory T-cells (e.g., central memory T-cells), such as, but not limited to, CD49f⁺CD27⁺CD28⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CCR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺CCR7⁺ memory T-cells or CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺CCR7⁺ memory T-cells, wherein the memory T-cells are optionally positive for CD127.~~
48. ~~The method of any one of claims 45 to 47, wherein the CD49f⁺ T-cells are positive for one or both of CD4 and CD8.~~
49. ~~The method of any one of claims 45 to 48, wherein the CD49f⁺ T-cells have an early memory phenotype and/or a stem-like phenotype.~~
50. ~~The method of claim 49, wherein the CD49f⁺ T-cells are positive for TCF-1 (e.g., TCF-1^{hi}) and/or LEF-1 (e.g., LEF-1^{hi}) and optionally positive for one or both of Oct4 and Sox2.~~
51. ~~The method of any one of claims 45 to 50, wherein the T-cell population is determined to be competent for immunotherapy when the level or concentration of CD49f⁺ T-cells meets or exceeds a threshold level or concentration that correlates with competence for immunotherapy.~~
52. ~~The method of claim 51, wherein the T-cell population is determined to be competent for immunotherapy when the level or concentration of CD49f⁺ T-cells is at least 1% of the T-cells in the population (including at least 2% and up to and including 100%, and all integer percentages between 2% and 100%) of the T-cells in the population.~~
53. ~~The method of claim 51, wherein the T-cell population is determined to be competent for immunotherapy when the level or concentration of CD49f⁺ T-cells is at least 1% of the T-cells in the population (including at least 2% and up to and including 100%, and all integer percentages between 2% and 100%) of the total number of cells in the T-cell population.~~
54. ~~The method of any one of claims 45 to 50, wherein the T-cell population is determined to be incompetent for immunotherapy when the level or concentration of CD49f⁺ T-cells is below a threshold level or concentration that correlates with competence for immunotherapy.~~
55. ~~The method of claim 54, wherein the T-cell population is determined to be incompetent for immunotherapy when the level or concentration of CD49f⁺ T-cells is less than 1% of the T-cells in the population, including less than 0.9%, less than 0.8%, less than 0.7%, less than 0.6%, less than 0.5%, less than 0.4%, less than 0.3%, less than 0.2% or less than 0.1% of the T-cells in the population.~~
56. ~~The method of claim 54, wherein the T-cell population is determined to be incompetent for immunotherapy when the level or concentration of CD49f⁺ T-cells is less than 1% of the T-cells~~

~~in the population, including less than 0.9%, less than 0.8%, less than 0.7%, less than 0.6%, less than 0.5%, less than 0.4%, less than 0.3%, less than 0.2% or less than 0.1% of the total number of cells in the population.~~

~~57. The method of any one of claims 45 to 56, wherein the T-cell population is an unexpanded population of T-cells.~~

~~58. The method of any one of claims 45 to 56, wherein the T-cell population is an expanded population of T-cells.~~

~~59. The method of any one of claims 45 to 58, wherein the T-cell population results from a process that includes antigen-specific stimulation of T-cells to produce antigen-specific T-cells.~~

~~60. A kit for determining a likelihood that a T-cell population is competent for immunotherapy (e.g., adoptive cell therapy), the kit comprising an antigen-binding molecule for detecting CD49f⁺ T-cells in the T-cell population.~~

~~61. The kit of claim 60, further comprising an antigen-binding molecule for one or more T-cell biomarkers selected CD95, CD45RA, CCR7, CD28, CD27, CCR7, CD45RA, CD62L, CD127 and one or both of CD8 and CD4.~~

~~62. The kit of claim 60 or claim 61, containing instructional material for detecting and/or quantifying the CD49f⁺ T-cells in the T-cell population.~~

~~63. The kit of any one of claims 60 to 62, wherein the T-cell population is a T-cell containing sample that has not been subjected to the manufacturing process of any one of claims 14 to 38, or an isolated or CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 12.~~

~~64.20. _____ A pharmaceutical composition comprising an isolated or CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 13 or obtained from the process of any one of claims 8 to 18, 14 to 38, and optionally a pharmaceutically carrier.~~

~~65. An article of manufacture, comprising: one or more sealable containers individually comprising: at least one unit dose of an isolated or CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 13 or as obtained from the process of any one of claims 14 to 38 for administration to a subject; packaging material; and a label or package insert comprising instructions for administering the at least one unit dose to a subject by carrying out at least one administration.~~

~~66. The article of manufacture of claim 65, wherein the unit dose comprises about 1×10^6 to about 5×10^6 cells.~~

~~67. The article of manufacture of claim 65 or claim 66, wherein the article of manufacture comprises a plurality of unit doses and the label or package insert comprises instructions for administering the plurality of unit doses to the subject by carrying out a first administration and at least one subsequent administration, wherein the first administration comprises delivering~~

~~one of the unit doses to the subject and the at least one subsequent administration individually comprises administering one or a plurality of said the doses to the subject.~~

~~68. The article of manufacture of any one of claims 65 to 67, wherein the isolated or CD49f⁺ T-cell enriched T-cell population is autologous, allogeneic or xenogeneic relative to the subject to whom the population is administered.~~

~~69. A method for enhancing immune effector function in a patient having or at risk of developing an immune dysfunction, or requiring augmented immune effector function, the method comprising or consisting essentially of: administering to the patient an effective amount of an isolated or CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 12, or as obtained by the process of any one of claims 14 to 38.~~

~~70-21. Use of the isolated T cell population of claims 1 to 7, as obtained from the process of any one of claims 8 to 18 for use in A method for the manufacture of a medicament for treating or inhibiting the development of a condition (for example cancer, infectious disease, autoimmune disease, inflammatory disease, and immunodeficiency) in a patient, wherein the patient has or is at risk of developing an immune dysfunction and/or is in need or desirous of augmented immune effector function, the method comprising or consisting essentially of: administering to the patient an effective amount of an isolated or CD49f⁺ T-cell enriched T-cell population as defined in any one of claims 1 to 13 or as obtained from the process of any one of claims 14 to 38.~~

~~71. The method of claim 69 or claim 70, wherein the patient is in need of adoptive transfer of T-cells, suitably antigen-specific T-cells.~~

~~72. The method of any one of claims 69 to 71, wherein the isolated or CD49f⁺ T-cell enriched T-cell population is autologous to the patient.~~

~~73. The method of any one of claims 69 to 71, wherein the isolated or CD49f⁺ T-cell enriched T-cell population is from a suitable donor who is suitably HLA-matched to the patient.~~

~~74. The method of any one of claims 69 to 71, wherein the isolated or CD49f⁺ T-cell enriched T-cell population is from a xenogeneic source.~~

~~75. The method of any one of claims 69 to 74, wherein the patient has or is at risk of developing a T-cell dysfunctional disorder.~~

~~76. The method of any one of claims 69 to 75, wherein patient is a cancer patient, a patient having an infectious disease, a patient having autoimmune disease, or a patient in need of transplantation.~~

~~77. A method for enhancing immune effector function in a patient having or at risk of developing an immune dysfunction, or requiring augmented immune effector function, the method comprising or consisting essentially of: contacting T-cells in the patient with an anti-CD49f affinity agent (e.g., an anti-CD49f antigen-binding molecule) to selectively stimulate activation of CD49f⁺ immune cells in the patient and enhance immune effector function in the patient.~~

- ~~78. A method for treating or inhibiting the development of a condition in a patient, wherein the patient has or is at risk of developing an immune dysfunction and/or is in need or desirous of an augmented immune effector function, the method comprising or consisting essentially of: contacting T-cells in the patient with an anti-CD49f affinity agent (e.g., an anti-CD49f antigen-binding molecule) to selectively stimulate activation of CD49f⁺ immune cells in the patient and treat or inhibit the development of the condition.~~
- ~~79. The method of claim 78, wherein the condition is selected from cancer, infectious disease, autoimmune disease, inflammatory disease, and immunodeficiency.~~
- ~~80. The method of any one of claims 77 to 79, wherein the anti-CD49f affinity agent (e.g., an anti-CD49f antigen-binding molecule) stimulates activation of CD49f⁺ T-cells, which are suitably selected from CD49f⁺ memory T-cells (e.g., CD49f⁺CD27⁺CD28⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CGR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CGR7⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺ memory T-cells, CD49f⁺CD27⁺CD28⁺CD95⁺CGR7⁺ memory T-cells and CD49f⁺CD27⁺CD28⁺CD45RA⁺CD95⁺CGR7⁺ memory T-cells), wherein the memory T-cells are optionally positive for CD127.~~
- ~~81. The method of any one of claims 77 to 80, wherein the patient has or is at risk of developing a T-cell dysfunctional disorder.~~
- ~~82. The method of any one of claims 77 to 81, wherein the patient is a cancer patient, a patient having an infectious disease, a patient having autoimmune disease, or a patient in need of transplantation.~~
- ~~83. The method of any one of claims 77 to 82, comprising administering an effective amount of the anti-CD49f affinity agent (e.g., an anti-CD49f antigen-binding molecule) to the subject.~~
- ~~84. The method of claim 83, method further comprising concurrently administering with the anti-CD49f affinity agent (e.g., an anti-CD49f antigen-binding molecule) an ancillary agent that stimulates immune effector function or that treats or inhibits the development of the condition in the patient.~~
- ~~85. The method of claim 84, wherein the ancillary agent comprises an immunotherapy such as an immune-checkpoint inhibitor.~~