CLAIMS

What is claimed is:

1. A method of preparing natural killer T (NKT) cells for use in immunotherapy, comprising the step of enriching a population of NKT cells for CD62L+ NKT cells.

2. The method of claim 1, wherein the CD62L+ NKT cells are activated by stimulation of T-cell receptor and co-stimulation by costimulatory receptors and/or cytokines.

3. The method of claim 1 or 2, wherein the cells are modified to express one or more chimeric antigen receptors, T-cell receptors, one or more cytokines, one or more cytokine receptors, one or more chimeric cytokine receptors, or a combination thereof.

4. Use of a population of NKT cells in the manufacture of a medicament for immunotherapy

wherein the population of NKT cells are enriched for CD62L+ NKT cells.

5. Use of a population of co-stimulated CD62L+ NKT cells in the manufacture of a medicament for immunotherapy, wherein the

CD62L+ NKT cells are expanded from a population mixture of CD62L+ NKT cells and CD62L- NKT cells by exposing the population mixture to one or more co-stimulatory agents to enrich for and produce co-stimulated CD62L+ NKT cells.

6. The use of claim 5, wherein the co-stimulatory agents comprise:

a) one or more cytokines;

b) a substrate that comprises an agonistic antibody or ligand for T-cell receptor (*e.g.* OKT3 mAb, 6B11 mAb, or recombinant human CD1d with bound agonistic glycolipid such as alpha-galactosylceramide) and one or more agonistic antibodies that target co-stimulatory receptors; or

c) an antigen presenting cell that comprises CD1d expression and that comprises expression of one or more ligands of one or more costimulatory receptors.

7. The use of claim 6, wherein the CD1d expression is with bound agonistic glycolipid.

8. The use of claim 7, wherein the glycolipid is alpha-galactosylceramide.

9. The use of claim 6, 7, or 8, wherein the cytokine is selected from the group consisting of IL-21, IL-2, IL-7, IL-15, IL-12, TNFalpha, and a combination thereof.

10. The use of any one of claims 6-9, wherein the substrate is a bead, plate, or a gel.

11. The use of any one of claims 6-10, wherein the antigen presenting cell is transduced with one or more polynucleotides to express one or more ligands of one or more co-stimulatory receptors.

12. The use of any one of claims 6-11, wherein the co-stimulatory receptor is CD28, OX40, 4-1BB, ICOS, CD40, CD30, CD27, or a combination thereof.

13. The use of any one of claims 6-12, wherein the ligand of the co-stimulatory receptor is CD80, CD86, OX40L, 4-1BBL, ICOS ligand, CD154, CD30L, or a combination thereof.

14. The use of any one of claims 6-13, wherein the NKT cells comprise a genetic modification.

15. The use of claim 14, wherein the genetic modification provides the cells with cancer cell-targeting activity.

16. The use of claim 15, wherein the cancer cell-targeting activity comprises targeting of an antigen on cancer cells.

17. The use of any one of claims 14-16, wherein the genetic modification comprises a T-cell receptor.

18. The use of any one of claims 14-16, wherein the genetic modification comprises a chimeric antigen receptor.

19. The use of any one of claims 14-18, wherein the NKT cells are genetically modified after the exposing of the population to one or more co-stimulatory agents.

20. The use of claim 19, wherein the NKT cells are genetically modified within 1, 2, 3, 4, 5, 6, or more days after the exposing of the population to one or more co-stimulatory agents.

21. A method of producing NKT cells for immunotherapy, comprising the step of co-stimulating a population of NKT cells to maintain CD62L expression in at least some of the NKT cells.

22. A method of producing NKT cells for immunotherapy, comprising the step of exposing a pre-sorted population of CD62L+ NKT cells or a mixed population of CD62L+ NKT cells and CD62L- NKT cells to one or more co-stimulatory agents that enrich or retain a population of CD62L+ NKT cells.

23. The method of claim 22, further comprising the step of obtaining the mixed population.

24. The method of claim 22 or 23, wherein the mixed population is from an individual to which the enriched population will be delivered.

25. The method of claim 22 or 23, wherein the mixed population is from an individual that is different from the individual to which the enriched population will be delivered.

26. The method of claim 22 or 23, wherein the mixed population is from a depository.

27. The method of claim 22 or 23, wherein the mixed population is obtained commercially.