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 step of enriching a population of NKT cells for CD62L+ NKT cells comprises sorting the CD62L+ NKT cells from a population mixture of CD62L+ NKT and CD62L- NKT cells.

3. The method according to claim 2, wherein the CD62L+ NKT cells are sorted from the population mixture of CD62L+ NKT cells and CD62L- NKT cells by using an antibody on a substrate, wherein the antibody binds to the CD62L+ NKT cells.

4. The method according to claims 2 or 3, wherein magnetic separation is employed to sort the CD62L+ NKT cells from the population mixture of CD62L+ NKT cells and CD62L- NKT cells.

5. The method of any one of claims 1 to 4, wherein the CD62L+ NKT cells are activated by stimulation of T-cell receptor and co-stimulation by costimulatory receptors and/or cytokines.

6. The method of any one of claims 1 to 5, 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.

7. The method of any one of claims 1 to 6, further comprising the step of collecting the desired CD62L+ NTK cells.

8. 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.

9. Use according to claim 8, wherein the population of NKT cells are enriched for CD62L+ NKT cells by sorting the CD62L+ NKT cells from a population mixture of CD62L+ NKT cells and CD62L- NKT cells.

10. The method according to claims 8 or 9, wherein the CD62L+ NKT cells are sorted from the population mixture of CD62L+ NKT cells and CD62L- NKT cells by using an antibody on a substrate, wherein the antibody binds to the CD62L+ NKT cells.

11. Use according to claims 9 or 10, wherein magnetic separation is employed to sort the CD62L+ NKT cells from the population mixture of CD62L+ NKT cells and CD62L- NKT cells.

12. 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.

13. The use of claim 12, 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.

14. The use of claim 13, wherein the CD1d expression is with bound agonistic glycolipid.

15. The use of claim 14, wherein the glycolipid is alpha-galactosylceramide.

16. The use of any one of claims 13-15, 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.

17. The use of claim 16, wherein the cytokine is IL-21.

18. The use of any one of claims 13-17, wherein the substrate is a bead, plate, or a gel.

19. The use of any one of claims 13-18, 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.

20. The use of any one of claims 13-19, wherein the co-stimulatory receptor is CD28, OX40, 4-1BB, ICOS, CD40, CD30, CD27, or a combination thereof.

21. The use of any one of claims 13-20, wherein the ligand of the co-stimulatory receptor is CD80, CD86, OX40L, 4-1BBL, ICOS ligand, CD154, CD30L, or a combination thereof.

22. The use of any one of claims 13-21, wherein the NKT cells comprise a genetic modification.

23. The use of claim 22, wherein the genetic modification provides the cells with cancer cell-targeting activity.

24. The use of claim 23, wherein the cancer cell-targeting activity comprises targeting of an antigen on cancer cells.

25. The use of any one of claims 22-24, wherein the genetic modification comprises a T-cell receptor.

26. The use of any one of claims 22-25, wherein the genetic modification comprises a chimeric antigen receptor.

27. The use of any one of claims 22-26, wherein the NKT cells are genetically modified after the exposing of the population to one or more co-stimulatory agents.

28. The use of claim 27, 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.

29. 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 for a population of CD62L+ NKT cells.

30. The method of claim 29, further comprising the step of obtaining the mixed population.

31. The method of claim 29 or 30, wherein the mixed population is from an individual to which the enriched population will be delivered.

32. The method of claim 29 or 30, wherein the mixed population is from an individual that is different from the individual to which the enriched population will be delivered.

33. The method of claim 29 or 32, wherein the mixed population is from a depository.

34. The method of claim 29 or 33, wherein the mixed population is obtained commercially.