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-positive NKT cells.

2. The method of claim 1, wherein the CD62L-positive 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, further comprising the step of delivering a therapeutically effective amount of the cells to an individual in need of therapy.

4. The method of claim 1, 2 or 3, 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.

5. A method of treating an individual for a medical condition using immunotherapy, comprising the steps of:

a) enriching a population of NKT cells for CD62L-positive NKT cells or obtaining a population of NKT cells that are enriched for CD62L-positive NKT cells; and

b) providing a therapeutically effective amount of the CD62L-positive NKT cells to the individual.

6. A method of treating an individual for a medical condition using immunotherapy, comprising the steps of:

expanding CD62L+ NKT cells 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; and

providing a therapeutically effective amount of the co-stimulated CD62L+ NKT cells to the individual.

7. The method of claim 6, wherein stimulatory agents and 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.

8. The method of claim 7, wherein the CD1d expression is with bound agonistic glycolipid.

9. The method of claim 8, wherein the glycolipid is alpha-galactosylceramide.

10. The method of claim 7, 8, or 9, 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.

11. The method of any one of claims 7-10, wherein the substrate is a bead, plate, or a gel.

12. The method of any one of claims 7-11, 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.

13. The method of any one of claims 7-12, wherein the co-stimulatory receptor is CD28, OX40, 4-1BB, ICOS, CD40, CD30, CD27, or a combination thereof.

14. The method of any one of claims 7-13, wherein the ligand of the co-stimulatory receptor is CD80, CD86, OX40L, 4-1BBL, ICOS ligand, CD154, CD30L, or a combination thereof.

15. The method of any one of claims 7-14, wherein the NKT cells comprise a genetic modification.

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

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

18. The method of any one of claims 15-17, wherein the genetic modification comprises a T-cell receptor.

19. The method of any one of claims 15-17, wherein the genetic modification comprises a chimeric antigen receptor.

20. The method of any one of claims 15-19, wherein the NKT cells are genetically modified after the exposing of the population to one or more co-stimulatory agents.

21. The method of claim 20, 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.

22. A method of producing NKT cells for immunotherapy, comprising the step of costimulating a population of NKT cells to maintain CD62L expression in at least some of the NKT cells.

23. The method of claim 22, further comprising the step of providing an effective amount of the NKT cells to an individual in need thereof.

24. 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 designed to purposely enrich or retain a population of CD62L+ NKT cells.

25. The method of claim 24, further comprising the step of obtaining the mixed population.

26. The method of claim 24 or 25, wherein the mixed population is from an individual to which the enriched population will be delivered.

27. The method of claim 24 or 25, wherein the mixed population is from an individual that is different from the individual to which the enriched population will be delivered.

28. The method of claim 24 or 25, wherein the mixed population is from a depository.

29. The method of claim 24 or 25, wherein the mixed population is obtained commercially.