WHAT IS CLAIMED IS:

1. A genetically engineered cell population that does not express major histocompatibility complex (MHC) I molecules,

wherein said engineered cell population is derived from K562 cells,

wherein said engineered cell population is modified to express:

(a) membrane-bound interleukin-15 (mbIL15),

(b) membrane-bound 4-1BB ligand (4-1BBL),

(c) membrane bound interleukin (IL) 12A (mbIL12A),

(d) membrane bound interleukin 12B (mbIL12B), and

(e) membrane bound interleukin IL18 (mbIL18), wherein the mbIL18 has at least 95% sequence identity to the amino acid sequence of SEQ ID NO: 8,

wherein each of mbIL15, mbIL12A, mbIL12B, and mbIL18 comprises a transmembrane domain of human CD8α, and

wherein co-culture of said engineered cell population with a population of Natural Killer (NK) cells results in the enhanced activation and enhanced expansion of at least one subpopulation of immune cells as compared to NK cells co-cultured with K562 cells expressing 4-1BBL and mbIL15 but not expressing mbIL12A, mbIL12B, and mbIL18.

2. The engineered cell population of Claim 1, wherein the mbIL15 is encoded by a nucleic acid sequence that comprises SEQ ID NO. 1.

3. The engineered cell population of Claim 1 or Claim 2, wherein the 4-1BBL is encoded by a nucleic acid sequence that comprises SEQ ID NO. 13.

4. The engineered cell population of Claim 1, wherein the transmembrane domain of human CD8α comprises the sequence of SEQ ID NO. 18.

5. The engineered cell population according to any one of Claims 1 to 4, wherein the engineered cell population lacks expression of MHC II molecules.

6. The engineered cell population according to any one of Claims 1 to 5, wherein the IL12A comprises the sequence of SEQ ID NO. 4.

7. The engineered cell population according to any one of Claims 1 to 6, wherein the IL12B comprises the sequence of SEQ ID NO. 6.

8. An engineered cell population according to any one of Claims 1 to 7, wherein the engineered cell population further expresses membrane bound IL21 (mbIL21).

9. The engineered cell population of Claim 8, wherein the IL21 comprises the sequence of SEQ ID NO. 10.

10. The engineered cell population according to any one of Claims 1 to 9, wherein the cells further express:

membrane bound IL22 (mbIL22), wherein the IL22 comprises the sequence of SEQ ID NO. 12, and/or

a membrane bound anti-CD3 antibody (mbα-CD3), an antibody fragment thereof, or scFv, wherein the mbα-CD3 is optionally a monoclonal antibody, and, optionally, wherein the mbα-CD3 targets an epitope within the nucleic acid sequence of CD3 epsilon of SEQ ID NO. 15 .

11. The engineered cell population of Claim 10, wherein the mbα-CD3 is a scFv, and comprises a sequence having at least 95% identity to SEQ ID NO. 17.

12. A method for expanding NK cells, comprising co-culturing a blood sample comprising NK cells with the engineered cell population of any one of Claims 1 to 11.

13. An engineered cell population according to any one of Claims 1 to 11, wherein the engineered cell population further expresses:

membrane bound IL21 (mbIL21), wherein the IL21 comprises the sequence of SEQ ID NO. 10,

membrane bound IL22 (mbIL22), wherein the IL22 comprises the sequence of SEQ ID NO. 12,

a membrane bound anti-CD3 antibody (mbα-CD3), an antibody fragment thereof, or scFv, wherein the mbα-CD3 is optionally a monoclonal antibody, and

wherein the mbα-CD3 targets an epitope within the nucleic acid sequence of CD3 epsilon of SEQ ID NO. 15.

14. The engineered cell population according to Claim 13, wherein the mbα-CD3 is a scFv, and wherein the scFv comprises the sequence of SEQ ID NO. 17.

15. An engineered cell population according to any one of Claims 1 to 11 or 13 to 14, wherein the engineered cells lack expression of MHC II molecules.

16. A genetically engineered cell population that does not express major histocompatibility complex (MHC) I molecules,

wherein said engineered cell population is derived from K562 cells,

wherein said engineered cell population is modified to express:

(a) membrane-bound interleukin-15 (mbIL15),

(b) membrane-bound express 4-1BB ligand (4-1BBL),

(c) membrane bound interleukin (IL) 12A (mbIL12A),

(d) membrane bound interleukin (IL) 12B (mbIL12B),

(e) membrane bound interleukin IL18 (mbIL18), and

(f) a membrane-bound anti-CD3 antibody (mbα-CD3) that stimulates immune cell activation, wherein the mbα-CD3 is an scFv and wherein the scFv comprises the sequence of SEQ ID NO. 17, and

wherein co-culture of said engineered cell population with a population of immune cells results in the activation and expansion of at least one subpopulation of immune cells.

17. An engineered cell population according to Claim 16, wherein the mbα-CD3 targets an epitope within the nucleic acid sequence of CD3 epsilon of SEQ ID NO. 15.

18. An engineered cell population according to Claim 16 or 17, wherein:

the mbIL12A comprises the sequence of SEQ ID NO. 4,

the mbIL12B comprises the sequence of SEQ ID NO. 6, and

the mbIL18 comprises the sequence of SEQ ID NO. 8.

19. An engineered cell population according to any one of Claims 1 to 7, wherein the engineered cells further express one or both of membrane-bound IL21 (mbIL21) and/or membrane-bound IL22, wherein the mbIL21 comprises the IL21 sequence of SEQ ID NO. 10, and wherein the mbIL22 comprises the IL22 sequence of SEQ ID NO. 12.

20. A method for expanding NK cells, comprising co-culturing a sample comprising NK cells with the engineered cell population of any one of Claims 1 to 11 or 13 to 19.

21. A method for preparing the engineered cell population of any one of Claims 1 to 11 or 13 to 19, comprising:

transducing the cells with a first construct encoding mbIL15, thereby generating a first transduced population of cells,

expanding the first transduced population of cells,

transducing the first transduced population of cells with a second construct encoding 4-1BBL, thereby generating a second transduced population of cells,

transducing the second transduced population of cells with a third construct encoding membrane bound interleukin (IL) 12A (mbIL12A), thereby generating a third transduced population of cells,

transducing the third transduced population of cells with a fourth construct encoding membrane bound interleukin (IL) 12B (mbIL12B), thereby generating a fourth transduced population of cells,

transducing the fourth transduced population of cells with a fifth construct encoding membrane bound interleukin (IL) 18 (mbIL18), thereby generating a fifth transduced population of cells, and

expanding the fifth transduced population of cells.

22. A plurality of nucleic acids, for use in preparing the engineered cell population of any one of Claims 1 to 11 or 13 to 19, comprising:

a nucleic acid encoding mbIL15,

a nucleic acid encoding 4-1BBL,
a nucleic acid encoding mbIL12A,
a nucleic acid encoding mbIL12B, and
a nucleic acid encoding mbIL18.

23. The plurality of nucleic acids of Claim 22, wherein the plurality of nucleic acids are configured as a single construct.

24. The plurality of nucleic acids of Claim 22, wherein mbIL15 is encoded by a nucleic acid sequence comprising SEQ ID NO. 1, wherein 4-1BBL is encoded by a nucleic acid sequence comprising SEQ ID NO. 13, wherein mbIL12A is encoded by a nucleic acid sequence comprising SEQ ID NO. 3, wherein mbIL12B is encoded by a nucleic acid sequence comprising SEQ ID NO. 5, and wherein mbIL18 is encoded by a nucleic acid sequence comprising SEQ ID NO. 7.

25. The plurality of nucleic acids according to any one of Claims 22 to 24, wherein each of the plurality of nucleic further comprises a GFP tag.

26. A method for expanding NK cells, comprising:

a) obtaining a peripheral blood sample comprising a mixed population of immune cells comprising NK cells and T cells,

b) contacting mixed population of cells with an engineered cell population that exhibits reduced expression of MHC I and has been modified to express:

i) membrane-bound interleukin-15 (mbIL15),

ii) 4-1BB ligand (4-1BBL),

iii) membrane bound interleukin IL12A,

iv) membrane bound interleukin IL12B, and

v) membrane bound interleukin IL18 (mbIL18), and wherein the mbIL18 has at least 95% sequence identity to the amino acid sequence of SEQ ID NO: 8, and

c) co-culturing the mixed population of cells with the engineered cells for a period of time sufficient to expand the NK cells of the mixed population of immune cells, thereby expanding the NK cells.

27. The method of Claim 26, further comprising removing T cells from the mixed population either prior to or after co-culturing.

28. A composition comprising an expanded subpopulation of Natural Killer (NK) cells,

wherein said NK cells have been expanded by co-culturing the NK cells with an engineered cell population,

wherein said engineered cell population is derived from K562 cells,

wherein said engineered cell population is modified to express:

(a) membrane-bound interleukin-15 (mbIL15),

(b) membrane-bound 4-1BB ligand (4-1BBL),

(c) membrane bound IL12A,

(d) membrane bound IL12B, and

(e) membrane bound IL18 (mbIL18), and wherein the mbIL18 has at least 95% sequence identity to the amino acid sequence of SEQ ID NO: 8,

wherein co-culture of said engineered cell population with a population of NK cells results in the activation and expansion of NK cells, and

wherein the composition comprising said NK cells is for use in treating cancer or an infectious disease.