CLAIMS

What is claimed is:

1. A recombinant nucleic acid, comprising:

   a T7 promoter sequence portion, a 5' untranslated (5'-UTR) sequence portion, a signal peptide sequence portion, a single chain antibody fragment sequence portion, a hinge region sequence portion, a transmembrane domain sequence portion, and one or more intracellular domain sequence portions; and

   wherein the nucleic acid ~~has at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% identity to~~comprises any one of SEQ ID NO: 1, SEQ ID NO: 2, SEQ ID NO: 3, or SEQ ID NO: 4.

2. The recombinant nucleic acid of claim 1, wherein the hinge sequence portion provides range of motion for the single chain antibody fragment sequence portion.

3. The recombinant nucleic acid of claim 1, wherein the transmembrane domain sequence portion enables insertion of a transmembrane domain encoded by the transmembrane domain sequence portion into a membrane.

4. The recombinant nucleic acid of claim 1, wherein the intracellular domain sequence portion comprises CD28 and/or CD3ζ.

5. The recombinant nucleic acid of claim 1, wherein the intracellular domain sequence portion comprises CD28 and/or FcεRIγ.

6. The recombinant nucleic acid of claim 1, wherein the intracellular domain sequence portion provides enhanced cytotoxic activity against tumor cells.

7. The recombinant nucleic acid of claim 1, wherein the recombinant nucleic acid is in a vector.

8. The recombinant nucleic acid of claim 1, further comprising a sequence portion encoding CD16a.

9. The recombinant nucleic acid of claim 1, further comprising a sequence portion encoding ER-IL2.

~~10. A primary NK cell comprising a recombinant nucleic acid encoding:~~

~~a 5' untranslated (5' UTR) sequence portion, a signal peptide sequence portion, a single chain antibody fragment sequence portion, a hinge region sequence portion, a transmembrane domain sequence portion, and one or more intracellular domain sequence portions;~~

~~wherein the nucleic acid sequences are operably linked to each other as a single polynucleotide.~~

~~11. The primary NK cell of claim 10, wherein the cell specifically targets a tumor cells.~~

~~12. The primary NK cell of claim 10, wherein the modified NK cell specifically targets PDL1 or other tumor antigens.~~

~~13. The primary NK cell of claim 10, wherein the signal peptide sequence portion further comprises a sequence encoding CD64.~~

~~14. The primary NK cell of claim 10, wherein the single chain antibody fragment sequence portion comprises a sequence encoding for a single chain variable fragment that is adapted to bind PDL1 antigen or other tumor antigens.~~

~~15. The primary NK cell of claim 10, wherein the hinge sequence portion provides range of motion for the single chain antibody fragment sequence portion.~~

~~16. The primary NK cell of claim 10, wherein the transmembrane domain sequence portion enables insertion of a peptide encoded by the recombinant nucleic acid to a membrane.~~

~~17. The primary NK cell of claim 10, wherein the intracellular domain sequence portion comprises co-stimulatory or signaling sequence portions.~~

~~18. The primary NK cell of claim 10, wherein the intracellular domain sequence portion comprises CD28 and/or CD3ζ.~~

~~19. The primary NK cell of claim 10, wherein the intracellular domain sequence portion comprises CD28 and/or FccRIγ.~~

~~20. The primary NK cell of claim 10, wherein the intracellular domain sequence portion provides enhanced cytotoxic activity against tumor cells.~~

~~21. The primary NK cell of claim 10, further comprising a 3' untranslated region (3' UTR)~~

~~22. The primary NK cell of claim 10, wherein the 3' UTR sequence portion provides RNA stability and initiation of translation.~~

~~23. The primary NK cell of claim 10, further comprising a poly-A sequence portion.~~

~~24. The primary NK cell of claim 10, wherein the poly-A sequence portion comprises at least 150 adenine nucleotides.~~

~~25. The primary NK cell of claim 10, wherein the poly-A sequence portion provides RNA stability and initiation of translation.~~

~~26. The primary NK cell of claim 10, wherein the recombinant nucleic acid is in a vector.~~

~~27. The primary NK cell of claim 10, further comprising a sequence portion encoding CD16a.~~

~~28. The primary NK cell of any one of claims 10-27, further comprising a sequence portion encoding ER-IL2.~~

~~29~~10. A method of generating CAR-NK cells, comprising: transfecting a primary NK cell with a recombinant nucleic acid of any one of claims 1-9.

~~30. A composition comprising the primary NK cell of any one of claims 10-27 and a pharmaceutically acceptable excipient.~~

~~31. A kit comprising the NK cell of any one of claims 10-27 and instructions for use.~~

~~32. Use of a therapeutically effective amount of the modified NK cells of any one of claims 10-27 in the manufacture of a medicament for the treatment of a cancer or tumor in a subject, wherein the medicament is to be administered to the subject, and wherein the administration of the medicament treats the cancer or reduces the size of the tumor in the subject.~~

~~33. Use of a therapeutically effective amount of the modified NK cells of any one of claims 10-27 in the manufacture of a medicament for reducing cancer metastasis in a subject, wherein the medicament is to be administered to the subject, thereby reducing cancer metastasis in the subject.~~

~~34. The use of claim 32 or 33, wherein from 1×10^{3} to 1×10^{10}, per m^{2} of the NK cells are to be administered to the subject.~~

~~35. The use of any one of claims 32-34, wherein the NK cells are to be administered parenterally, intravenously, peritumorally, or by infusion.~~

~~36. The use of any one of claims 32-35, wherein an additional therapeutic agent is to be further administered to the subject.~~

~~37~~11. A recombinant cell comprising the recombinant nucleic acid of any one of claims 1-9, wherein the cell is a bacterial cell or wherein the cell is an autologous NK cell, or wherein the NK cell is genetically modified.

~~38. Use of a therapeutically effective amount of any one of the genetically modified NK cells of claims 10-28 in the manufacture of a medicament for the treatment of cancer in a patient in need thereof, wherein the medicament is to be administered to the patient, thereby treating the cancer.~~

~~39. The use of claim 38 wherein at least one additional therapeutic entity selected from the group consisting of a viral cancer vaccine, a bacterial cancer vaccine, a yeast cancer vaccine, N-803, an antibody, a stem cell transplant, and a tumor targeted cytokine is to be further administered to the patient.~~

~~40. The use of claim 38 or 39, wherein the cancer is selected from leukemia, acute lymphocytic leukemia, acute myelocytic leukemia, chronic leukemias, chronic myelocytic (granulocytic) leukemia, chronic lymphocytic leukemia, polycythemia vera, lymphomas, Hodgkin's disease, non-Hodgkin's disease, multiple myeloma, Waldenstrom's macroglobulinemia, heavy chain disease, solid tumors including, but not limited to, sarcomas and carcinomas such as fibrosarcoma, myxosarcoma, liposarcoma, chondrosarcoma, osteogenic sarcoma, chordoma,~~

~~angiosarcoma, endotheliosarcoma, lymphangiosarcoma, lymphangioendotheliosarcoma, synovioma, mesothelioma, Ewing's tumor, leiomyosarcoma, rhabdomyo-sarcoma, colon carcinoma, pancreatic cancer, breast cancer, ovarian cancer, prostate cancer, squamous cell carcinoma, basal cell carcinoma, adenocarcinoma, sweat gland carcinoma, sebaceous gland carcinoma, papillary carcinoma, papillary adenocarcinomas, cystadenocarcinoma, medullary carcinoma, bronchogenic carcinoma, renal cell carcinoma, hepatoma, bile duct carcinoma, choriocarcinoma, seminoma, embryonal carcinoma, Wilm's tumor, cervical cancer, testicular tumor, lung carcinoma, small cell lung carcinoma, bladder carcinoma, epithelial carcinoma, glioma, astrocytoma, medulloblastoma, craniopharyngioma, ependymoma, pinealoma, hemangioblastoma, acoustic neuroma, oligodendroglioma, menangioma, melanoma, neuroblastoma and retinoblastoma.~~

~~41. The modified NK cells of any one of claims 10-27 for use as a medicament.~~