We claim:

1. A population of genetically engineered T cells, wherein the T cells are engineered to co-express a chimeric antigen receptor (CAR) that recognizes a cancer associated antigen, and a TGFβ signaling pathway modulator, wherein the CAR comprises an amino acid sequence of any one of SEQ ID NOs: 47-48, 50-57, or 62-63, and wherein TGFβ signaling pathway modulator comprises an amino acid sequence of any one of SEQ ID NOs: 1-40.

2. The population of genetically engineered T cells according to claim 1, wherein the CAR recognizes an antigen selected from the group consisting of CD19, GCC (also known as GUCY2C), and Mesothelin.

3. The population of genetically engineered T cells according to claim 1, wherein the TGFβ signaling pathway modulator binds TGFβ or a TGFβ receptor.

4. The population of genetically engineered T cells according to claim 1, wherein the TGFβ signaling pathway modulator is a single-chain variable fragment (scFv), a single domain antibody (sdAb), a heavy chain only antibody, an antibody, or an antigen binding fragment thereof.

5. The population of genetically engineered T cells according to claim 4, wherein the TGFβ signaling pathway modulator comprises a linker.

6. The population of genetically engineered T cells according to claim 5, wherein the linker comprises $(GGGGS)_n$ (SEQ ID NO: 59) or GGGGSGGGGSGGGGS (SEQ ID NO: 61).

7. The population of genetically engineered T cells according to claim 6, wherein the linker comprises $(GGGGS)_n$ (SEQ ID NO: 59), wherein n = 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.

8. The population of genetically engineered T cells according to claim 6, wherein the linker comprises GGGGSGGGGSGGGGS (SEQ ID NO: 61).

9. The population of genetically engineered T cells according to claim 1, wherein the TGFβ signaling modulator is a monomer, dimer, or trimer.

10. The population of genetically engineered T cells according to claim 9, wherein the TGFβ signaling modulator is a monomer.

11. The population of genetically engineered T cells according to claim 9, wherein the TGFβ signaling modulator is a dimer.

12. The population of genetically engineered T cells according to claim 9, wherein the TGFβ signaling modulator is a trimer.

13. The population of genetically engineered T cells according to claim 1, wherein the cells are autologous.

14. The population of genetically engineered T cells according to claim 1, wherein the cells are allogeneic.

15. The population of genetically engineered T cells according to any one of the preceding claims, wherein the cells are genetically modified using a vector comprising a first nucleic acid encoding a CAR polypeptide and a second nucleic acid encoding a TGFβ signaling pathway modulator.

16. The population of genetically engineered T cells according to any one of the preceding claims, wherein the cells are genetically modified using two vectors, a first vector

comprising a nucleic acid encoding a CAR polypeptide and a second vector comprising a nucleic acid encoding a TGFβ signaling pathway modulator.

17. The population of genetically engineered T cells according to any one of the preceding claims, wherein the CAR comprises an intracellular signaling domain selected from the group consisting of CD3ζ-chain, CD97, 2B4 GDI la-CD18, CD2, ICOS, CD27, CD154, CDS, OX40, 4-1BB, DAP10, DAP12, CD28 signaling domain, or combinations thereof.

18. The population of genetically engineered T cells according to any one of the preceding claims, wherein the CAR comprises a transmembrane domain derived from a transmembrane domain selected from the group consisting of CD3, CD8, CD28, OX40, CD27, 4-1BB, DAP10, DAP12 or combinations thereof.

19. A pharmaceutical composition comprising a population of genetically engineered T cells according any one of claims 1-18.

20. Use of a population of genetically engineered T cells according to any one of claims 1-18 in the manufacture of a medicament for modulating an immune response in a host to treat cancer, wherein the modulation of immune response comprises increase in IFNγ production; increase in IL-2 production; increase in antigen presentation; or increase in proliferation by host cells.

21. Use of a population of genetically engineered T cells according to any one of claims 1-18 in the manufacture of a medicament for treating cancer in a subject in need thereof.

22. The use of claim 21, wherein the cancer is selected from the group consisting of leukemia, lymphoma, solid tumors, lung carcinoma, and metastasis thereof.