We claim:

1. A population of genetically engineered T cells, comprising a chimeric antigen receptor (CAR) that recognizes a cancer associated antigen and a TGFβ signaling pathway modulator.

2. The population of cells according to claim 1, wherein the CAR recognizes an antigen selected from the group consisting of ADGRE2, CLEC12, CAIX, CEA, CD5, CD7, CD10, CD19, CD20, CD22, CD30, CD33, CD34, CD38, CD41, CD44, CD49f, CD56, CD74, CD133, CD138, a cytomegalovirus (CMV) infected cell antigen, CEACAM 5, Claudin 18.2, EGP-2, EGP-40, EpCAM, erb-B2,3,4, FBP, Fetal acetylcholine receptor, folate receptor-a, GCC (also known as GUCY2C), GD2, GD3, HER-2, hTERT, IL-13R-a2, x-light chain, KDR, LeY, LI cell adhesion molecule, MAGE-AI, MUC1, MUC13, Mesothelin, NKG2D ligands, NY-ES0-1, oncofetal antigen (h5T4), PSCA, PSMA, PTK7, ROR1, TAG-72, TROP2, VEGF-R2, and WT-1.

3. The population of cells according to claim 1 or 2, wherein the TGFβ signaling pathway modulator binds TGFβ or a TGFβ receptor.

4. The population of cells according to any of the preceding claims, wherein the TGFβ signaling pathway modulator comprises an amino acid sequence selected from Table 1.

5. The population of cells according to any of preceding claims, wherein the CAR is a CD19 CAR or a GCC CAR.

6. The population of cells according to claim 1, wherein the cells are autologous.

7. The population of cells according to claim 1, wherein the cells are allogeneic.

8. The population of 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.

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

10. The population of 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 and variations thereof.

11. The population of 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.

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

13. The vector of claim 12, further comprising an internal ribosomal entry site.

14. A vector of claim 12, further comprising a 2A self-cleaving site.

15. An immune cell modified with a vector of any one of claims 12-14.

16. The immune cell of claim 15, wherein the cell is a T-cell.

17. A pharmaceutical composition comprising a population of immune cells according to claim 1.

18. Use of a population of cells according to claim 1 in the manufacture of a medicament for modulating an immune response in a host, wherein the modulation of immune response comprises one or more of the following by host immune cells: increase in IFNγ production; increase in IL-2 production; increase in antigen presentation; and increase in proliferation.

19. Use of a population of cells according to claim 1 in the manufacture of a medicament for treating or preventing cancer in a subject in need thereof.

20. The use of claim 19, wherein the cancer is selected from the group consisting of leukemia, acute leukemia, acute lymphocytic leukemia, acute myelocytic leukemia, acute myeloblastic leukemia, acute promyelocyte leukemia, acute myelomonocytic leukemia, acute monocytic leukemia, acute erythroleukemia, chronic leukemia, chronic myelocytic leukemia, multiple myeloma, chronic lymphocytic leukemia, polycythemia vera, lymphoma, Hodgkin's lymphoma, non-Hodgkin's lymphoma, Waldenstrom's macroglobulinemia, heavy chain disease, solid tumors, sarcoma, carcinoma, fibrosarcoma, myxosarcoma, liposarcoma, chondrosarcoma, osteogenic sarcoma, chordoma, angiosarcoma, endotheliosarcoma, lymphangiosarcoma, lymphangioendotheliosarcoma, synovioma, mesothelioma, Ewing's tumor, leiomyosarcoma, rhabdomyosarcoma, 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, hepatocellular carcinoma, nile duct carcinoma, choriocarcinoma, seminoma, embryonal carcinoma, Wilm's tumor, cervical cancer, uterine cancer, testicular cancer, lung carcinoma, small cell lung carcinoma, bladder carcinoma, colorectal carcinoma, epithelial carcinoma, glioma, astrocytoma, medulloblastoma, craniopharyngioma, ependymoma, pinealoma, hemangioblastoma, acoustic neuroma, oligodendroglioma, schwannoma, meningioma, melanoma, neuroblastoma, retinoblastoma, and metastasis thereof.