

CLAIMS

What is claimed is:

1. An isolated nucleic acid encoding a chimeric antigen receptor (CAR), wherein the CAR comprises a polypeptide having the amino acid sequence of SEQ ID NO: 31.
2. The isolated nucleic acid of claim 1, further encoding a truncated epidermal growth factor receptor.
3. The isolated nucleic acid of claim 2, wherein the truncated epidermal growth factor receptor is HER1t and comprises a polypeptide having the amino acid sequence of SEQ ID NO: 65 or SEQ ID NO: 66.
4. A vector comprising a backbone and a nucleic acid encoding:
 - (1) a truncated epidermal growth factor receptor comprising at least one of HER1t, HER1t-1, or a functional variant thereof;
 - (2) a cytokine; and
 - (3) a chimeric antigen receptor (CAR) comprising a polypeptide having the amino acid sequence of SEQ ID NO: 31.
5. The vector of claim 4, wherein the cytokine is IL-15 or IL-12.
6. The vector of claim 4, wherein the vector is a lentivirus vector, a retroviral vector, or a non-viral vector.
7. The vector of claim 5, wherein the IL-15 is membrane bound IL-15.
8. The vector of claim 7, wherein the membrane bound IL-15 comprises a nucleotide sequence that encodes a polypeptide having the amino acid sequence of SEQ ID NO: 69.
9. The vector of claim 4, further comprising a nucleotide sequence encoding a self-cleaving Thosea asigna virus (T2A) peptide.
10. An immune effector cell comprising the vector of claim 4.

11. The immune effector cell of claim 10, wherein the cell is a T cell, a Natural Killer (NK) cell, a cytotoxic T lymphocyte (CTL), or a regulatory T cell.