

CLAIM(S):

1. A chimeric antigen receptor (CAR) comprising an antigen recognition domain, a transmembrane (TM) domain, and a T cell activation domain, wherein the CAR has antigen specificity for B-cell maturation antigen (BCMA), wherein the antigen recognition domain comprises the amino acid sequences of:

- (a) SEQ ID NOs: 1-3;
- (b) SEQ ID NOs: 4-6;
- (c) SEQ ID NOs: 7-9; or
- (d) SEQ ID NOs: 10-12.

2. The CAR of claim 1, wherein all domains of the CAR are human.

3. The CAR of claim 1 or 2, wherein the antigen recognition domain does not comprise a linker peptide having a length of about 8 to about 40 amino acid residues.

4. The CAR of any one of claims 1-3, wherein the CAR does not comprise an antibody light chain variable region.

5. The CAR of any one of claims 1-4, wherein the antigen recognition domain comprises the amino acid sequence of:

- (a) SEQ ID NO: 13;
- (b) SEQ ID NO: 14;
- (c) SEQ ID NO: 15; or
- (d) SEQ ID NO: 16.

6. The CAR of any one of claims 1-5, wherein the T-cell activation domain comprises a T-cell signaling domain of any one of the following proteins: a human CD28 protein, a human CD3-zeta protein, a human FcR γ protein, a CD27 protein, an OX40 protein, a human 4-1BB protein, a human inducible T-cell costimulatory protein (ICOS), modified versions of any of the foregoing, or any combination of the foregoing.

7. The CAR of any one of claims 1-6 comprising the amino acid sequence of any one of SEQ ID NOs: 17-28.
8. A nucleic acid comprising a nucleotide sequence encoding the CAR of any one of claims 1-7.
9. The nucleic acid of claim 8 comprising the nucleotide sequence of any one of SEQ ID NOs: 29-40.
10. A vector comprising the nucleic acid of claim 8 or 9.
11. An isolated host cell comprising the vector of claim 10.
12. The isolated host cell of claim 11, wherein the host cell is a T-cell.
13. The isolated host cell of claim 11, wherein the host cell is a natural killer (NK) cell.
14. A population of cells comprising at least one host cell of any one of claims 11-13.
15. The CAR of any one of claims 1-7, the nucleic acid of claim 8 or 9, the vector of claim 10, the host cell of any one of claims 11-13, or the population of claim 14, for use in a method of treating or preventing cancer in a mammal.
16. The CAR, nucleic acid, vector, or host cell for the use of claim 15, wherein the cancer is multiple myeloma or Hodgkin's lymphoma.