CLAIMS

1. A chimeric antigen receptor (CAR) which binds the B-cell maturation antigen (BCMA) and comprises:

(i) a BCMA-binding domain which comprises at least part of a proliferation-inducing ligand (APRIL);

(ii) a spacer domain; and

(iii) a transmembrane domain; and

(iv) an intracellular T cell signaling domain.

2. A CAR according to Claim 1, in which the BCMA-binding domain comprises a truncated APRIL which comprises the BCMA binding site but lacks the amino terminal portion of APRIL responsible for proteoglycan binding.

3. A CAR according to Claim 2, which comprises the sequence shown as SEQ ID No. 14 or a variant of SEQ ID No. 14 having at least 80% sequence identity which binds BCMA.

4. A CAR according to any preceding claim, in which the transmembrane and intracellular T-cell signalling domain comprise the sequence shown as SEQ ID No. 7 or a variant of SEQ ID No. 7 having at least 80% sequence identity.

5. A CAR according to any preceding claim, in which the spacer comprises one of the following: a human IgG1 spacer; an IgG1 hinge; or a CD8 stalk.

6. A CAR according to Claim 5, in which the spacer comprises a CD8 stalk.

7. A CAR according to any preceding claim, which comprises the sequence shown as SEQ ID No. 1, 2, 3, 4, 5 or 6 or a variant of SEQ ID No. 1, 2, 3, 4, 5 or 6 which has at least 80% sequence identity but retains the capacity to i) bind BCMA and ii) induce T cell signalling.

8. A nucleic acid sequence which encodes a CAR according to any preceding claim.

9. A nucleic acid sequence according to Claim 8 which comprises the sequence shown as SEQ ID No 15, 16, 17, 18, 19 or 20 or a variant of SEQ ID No. 15, 16, 17, 18, 19 or 20 having at least 80% sequence identity.

10. A vector which comprises a nucleic acid sequence according to Claim 8 or 9.

11. A T cell or NK cell which expresses a CAR according to any of Claims 1 to 7.

12. A method for making a T cell or NK cell according to Claim 11, which comprises the step of introducing a nucleic acid according to Claim 8 or 9 into a T cell or NK cell.

13. A pharmaceutical composition which comprises a vector according to Claim 10 or T cell/NK cell according to Claim 11, together with a pharmaceutically acceptable carrier, diluent or excipient.

14. A vector according to Claim 10 or a T cell/ NK cell according to Claim 11 for use in treating plasmacytoma, plasma cell leukemia, multiple myeloma, macroglobulinemia, plasma cell-related amyloidosis, Waldenstrom's macroglobulinemia, solitary bone plasmacytoma, extramedullary plasmacytoma, osteosclerotic myeloma, heavy chain diseases, monoclonal gammopathy of undetermined significance or smoldering multiple myeloma.

15. A vector or T cell/NK cell according to Claim 14 for use in treating multiple myeloma.

16. The use of a vector according to Claim 10 or a T cell/ NK cell according to Claim 11 in the manufacture of a medicament for treating plasmacytoma, plasma cell leukemia, multiple myeloma, macroglobulinemia, plasma cell-related amyloidosis, Waldenstrom's macroglobulinemia, solitary bone plasmacytoma, extramedullary plasmacytoma, osteosclerotic myeloma, heavy chain diseases, monoclonal gammopathy of undetermined significance or smoldering multiple myeloma.

17. The use of a vector or T cell/NK cell according to Claim 16 in the manufacture of a medicament for treating multiple myeloma.