moiety and a T-cell activation moiety, and wherein the antigen recognition moiety is directed against B-cell Maturation Antigen (BCMA), and wherein a host cell expressing the CAR secretes interferon-gamma in response to co-culture with a BCMA-positive target cell.

[0007b] In another aspect, there is provided an isolated or purified CAR encoded by the nucleic acid sequence as described herein.

[0007c] In yet another aspect, there is provided a vector comprising the isolated or purified nucleic sequence as described herein.

[0007d] In yet another aspect, there is provided an isolated host cell which expresses the nucleic acid sequence as described herein.

[0007e] In yet another aspect, there is provided a method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the isolated or purified nucleic acid sequence as described herein, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

[0007f] In yet another aspect, there is provided a method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the vector of the present disclosure, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

[0007g] In yet another aspect, there is provided a method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated T-cells of the present disclosure, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

[0007h] In yet another aspect, there is provided a method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated NK cells of the present disclosure, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

[0007i] In yet another aspect, there is provided a use of the nucleic acid sequence as described herein, the CAR as described herein, the vector as described herein, or the host cell as described herein, in the manufacture of a medicament for the destruction of BCMA-expressing cancer cells.

CLAIMS:

1. An isolated or purified nucleic acid sequence encoding a chimeric antigen receptor (CAR), wherein the CAR comprises an antigen recognition moiety and a T-cell activation moiety, and wherein the antigen recognition moiety is directed against B-cell Maturation Antigen (BCMA).

2. The isolated or purified nucleic acid sequence of claim 1, wherein the antigen recognition moiety comprises a monoclonal antibody directed against BCMA, or an antigen-binding portion thereof.

3. The isolated or purified nucleic acid sequence of claim 2, wherein the antigen recognition moiety comprises a variable region of a monoclonal antibody directed against BCMA.

4. The isolated or purified nucleic acid sequence of any one of claims 1-3, wherein the T-cell activation moiety comprises a T-cell signaling domain of any one of the following proteins: a human CD8-alpha protein, a human CD28 protein, a human CD3-zeta protein, a human FcRγ protein, a CD27 protein, an OX40 protein, a human 4-1BB protein, modified versions of any of the foregoing, or any combination of the foregoing.

5. The isolated or purified nucleic acid sequence of any one of claims 1-4, which comprises the nucleic acid sequence of SEQ ID NO: 1, SEQ ID NO: 2, or SEQ ID NO: 3

6. An isolated or purified CAR encoded by the nucleic acid sequence of any one of claims 1-5.

7. The isolated or purified CAR of claim 6, which comprises the amino acid sequence of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, or SEQ ID NO: 12.

8. A vector comprising the isolated or purified nucleic acid sequence of any one of claims 1-5.

9. An isolated host cell which expresses the nucleic acid sequence of any one of claims 1-5.

10. The isolated host cell of claim 9, which expresses a CAR comprising an amino acid sequence of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, or SEQ ID NO: 12.

11. The isolated host cell of claim 9 or claim 10, which is a T-cell.

12. The isolated host cell of claim 9 or claim 10, which is a natural killer (NK) cell.

13. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the isolated or purified nucleic acid sequence of any one of claims 1-5, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

14. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the vector of claim 8, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

15. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated T-cells of claim 11, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

16. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated NK cells of claim 12, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

17. Use of the nucleic acid sequence of any one of claims 1-5, the CAR of claim 6 or 7, the vector of claim 8, or the host cell of any one of claims 9-12, in the manufacture of a medicament for the destruction of cancer cells.

18. The method of any one of claims 13-16 or the use of claim 17, wherein the cancer cells are multiple myeloma or Hodgkin's lymphoma cells.

CLAIMS:

1. An isolated or purified nucleic acid sequence encoding a chimeric antigen receptor (CAR), wherein the CAR comprises an antigen recognition moiety and a T-cell activation moiety, and wherein the antigen recognition moiety is directed against B-cell Maturation Antigen (BCMA), and wherein a host cell expressing the CAR secretes interferon-gamma in response to co-culture with a BCMA-positive target cell.

2. The isolated or purified nucleic acid sequence of claim 1, wherein the antigen recognition moiety comprises a monoclonal antibody directed against BCMA, or an antigen-binding portion thereof.

3. The isolated or purified nucleic acid sequence of claim 2, wherein the antigen recognition moiety comprises a variable region of a monoclonal antibody directed against BCMA.

4. The isolated or purified nucleic acid sequence of any one of claims 1-3, wherein the T-cell activation moiety comprises a T-cell signaling domain of any one of the following proteins: a human CD8-alpha protein, a human CD28 protein, a human CD3-zeta protein, a human FcRγ protein, a CD27 protein, an OX40 protein, a human 4-1BB protein, modified versions of any of the foregoing, or any combination of the foregoing.

5. The isolated or purified nucleic acid sequence of any one of claims 1-4, wherein the antigen recognition moiety comprises the (i) heavy chain complementarity determining region (CDR)1, (ii) heavy chain CDR2, (iii) heavy chain CDR3, (iv) light chain CDR1, (v) light chain CDR2, and (vi) light chain CDR3 of an amino acid sequence selected from the group consisting of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, and SEQ ID NO: 12.

6. The isolated or purified nucleic acid sequence of any one of claims 1-5, wherein the antigen recognition moiety comprises the (i) heavy chain variable region and (ii) light chain variable region of an amino acid sequence selected from the group consisting of SEQ ID NO: 4,

SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, and SEQ ID NO: 12.

7. The isolated or purified nucleic acid sequence of any one of claims 1-46, which comprises the nucleic acid sequence of SEQ ID NO: 1, SEQ ID NO: 2, or SEQ ID NO: 3

8. An isolated or purified CAR encoded by the nucleic acid sequence of any one of claims 1-7.

9. The isolated or purified CAR of claim 8, which comprises the amino acid sequence of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, or SEQ ID NO: 12.

10. A vector comprising the isolated or purified nucleic acid sequence of any one of claims 1-7.

11. An isolated host cell which expresses the nucleic acid sequence of any one of claims 1-7.

12. The isolated host cell of claim 11, which expresses a CAR comprising an amino acid sequence of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, or SEQ ID NO: 12.

13. The isolated host cell of claim 11 or claim 12, which is a T-cell.

14. The isolated host cell of claim 11 or claim 12, which is a natural killer (NK) cell.

15. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the isolated or purified nucleic acid sequence of any one of claims 1-7, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

16. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with the vector of claim 10, whereby the CAR is produced and binds to

BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

17. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated T-cells of claim 13, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

18. A method of destroying cancer cells, which method comprises contacting cancer cells that express BCMA with one or more of the isolated NK cells of claim 14, whereby the CAR is produced and binds to BCMA on the cancer cells and the cancer cells are destroyed, wherein the cancer cells are *in vitro*.

19. Use of the nucleic acid sequence of any one of claims 1-7, the CAR of claim 8 or 9, the vector of claim 10, or the host cell of any one of claims 11-14, in the manufacture of a medicament for the destruction of BCMA-expressing cancer cells.

20. The method of any one of claims 15-18 or the use of claim 19, wherein the cancer cells are multiple myeloma or Hodgkin's lymphoma cells.