

1. A B-cell maturation antigen (BCMA) binding molecule that specifically binds to human BCMA and comprises:

(a) according to the combined Kabat and Chothia definitions ~~a~~ CDR-L1, CDR-L2 and CDR-L3 sequences set forth in SEQ ID NOs: 26, 102, and 110, respectively, and ~~a~~ CDR-H1, CDR-H2 and CDR-H3 sequences set forth in SEQ ID NOs: 188, 112, and 49, respectively;

(b) according to the Kabat definition ~~a~~ CDR-L1, CDR-L2 and CDR-L3 sequences set forth in SEQ ID NOs: 26, 102, and 110, respectively, and ~~a~~ CDR-H1, CDR-H2 and CDR-H3 sequences set forth in SEQ ID NOs: 39, 112, and 49, respectively;

(c) according to the Chothia definition ~~a~~ CDR-L1, CDR-L2 and CDR-L3 sequences set forth in SEQ ID NOs: 27, 31, and 136, respectively, and ~~a~~ CDR-H1, CDR-H2 and CDR-H3 sequences set forth in SEQ ID NOs: 138, 140, and 49, respectively; or

(d) according to the IMGT definition ~~a~~ CDR-L1, CDR-L2 and CDR-L3 sequences set forth in SEQ ID NOs: 28, 154, and 110, respectively, and ~~a~~ CDR-H1, CDR-H2 and CDR-H3 sequences set forth in SEQ ID NOs: 162, 165, and 51, respectively.

2. The BCMA binding molecule of claim 1, ~~wherein the~~which comprises a light chain variable sequence ~~comprises-comprising~~ the amino acid sequence of SEQ ID NO:200 and ~~the-a~~ heavy chain variable sequence ~~comprises-comprising~~ the amino acid sequence of SEQ ID NO:224.

3. The BCMA binding molecule of any one of the previous claims, which comprises an antibody, an antibody fragment, an scFv, a dsFv, a Fv, a Fab, an scFab, a (Fab')₂, or a single domain antibody (SDAB).

4. The BCMA binding molecule of any one of the previous claims, which is a multispecific binding molecule.

5. The BCMA binding molecule of claim 4, which is a bispecific binding molecule (BBM).

6. The BCMA binding molecule of claim 5, wherein the BBM comprises:

(a) an antigen-binding domain 1 (ABD1) that binds specifically to BCMA; and

(b) an antigen-binding domain 2 (ABD2) that binds specifically to a component of a human T-cell receptor (TCR) complex.

7. The BCMA binding molecule of claim 6, wherein ABD1 is capable of binding BCMA at the same time as ABD2 is bound to the component of a human TCR complex.

8. The BCMA binding molecule of claim 6 or claim 7, wherein ABD1 or ABD2 is an antibody, an antibody fragment, an scFv, a dsFv, a Fv, a Fab, an scFab, a (Fab')₂, a single domain antibody (SDAB), a VH or VL domain, or a camelid VHH domain.

9. The BCMA binding molecule of any one of claims 6 to 8, wherein the component of the TCR complex is CD3, ~~optionally wherein ABD2 is an anti-CD3 antibody or an antigen-binding domain thereof, optionally wherein ABD2 comprises the CDR sequences of any one of CD3-1 to CD3-127.~~

10. The BCMA binding molecule of claim 9, wherein ABD2 is an anti-CD3 antibody or an antigen-binding domain thereof.

11. The BCMA binding molecule of claim 9 or claim 10, wherein ABD2 comprises the CDR sequences of any one of CD3-1 to CD3-127 as set forth in Table 3A.

~~10.12.~~ The BCMA binding molecule of any one of claims 5 to 9, which is bivalent, trivalent, or tetravalent.

~~11.13.~~ The BCMA binding molecule of claim 1, comprising:

- (a) a first polypeptide comprising:
 - (i) a first heavy chain constant domain comprising a first Fc region;
 - (ii) a scFv comprising an amino acid sequence of SEQ ID NO:294;

wherein the scFv is covalently attached to the N-terminus of the first Fc region by a hinge;

- (b) a second polypeptide comprising:
 - (i) a heavy chain variable domain;
 - (ii) a second heavy chain constant domain comprising a second Fc

region; and

(c) a third polypeptide comprising a light chain constant domain and a light chain variable domain;

wherein

A. the first and second Fc regions form an Fc domain;

B. the first and second Fc regions have a set of amino acid substitutions comprising S364K/E357Q ~~:-and~~ L368D/ 370S;

C. the first and/or second Fc regions comprise amino acid modifications E223P, L234V, L235A, G236del, and S267K;

D. the first and/or second Fc regions comprise amino acid substitutions N208D, Q295E, N384D, Q418E, and N421D; and

E. the light chain variable domain and the heavy chain variable domain comprise the light chain variable domain and heavy chain variable domain sequences of SEQ ID NO:200 and SEQ ID NO:224, respectively.

~~12.14.~~ The BCMA binding molecule of claim 1, comprising:

(a) a first polypeptide whose amino acid sequence comprises the amino acid sequence of SEQ ID NO:509;

(b) a second polypeptide whose amino acid sequence comprises the amino acid sequence of SEQ ID NO:510; and

(c) a third polypeptide whose amino acid sequence comprises the amino acid sequence of SEQ ID NO:504.

~~13.15.~~ The BCMA binding molecule of any one of the previous claims for use as a medicament.

~~14.16.~~ The BCMA binding molecule of any one of the previous claims for use in treating a disease or disorder associated with elevated expression of BCMA.

~~15.17.~~ A conjugate comprising the BCMA binding molecule of the previous claims and an agent.

~~16.18.~~ A pharmaceutical composition comprising the BCMA binding molecule or the conjugate of any one of the previous claims and a pharmaceutically acceptable excipient.

~~17.~~19. The BCMA binding molecule, the conjugate, or the pharmaceutical composition of any one of the previous claims, for use in a method of treating a subject with a disease or disorder associated with elevated expression of BCMA, optionally wherein the method further comprises administering at least one additional agent to the subject, and optionally wherein:

- (a) the disease or disorder comprises a plasma cell neoplasm;
- (b) the disease or disorder comprises a B cell malignancy that expresses cell surface BCMA, optionally wherein the B cell malignancy is multiple myeloma; or
- (c) the disease or disorder comprises an autoimmune disorder.

20. The BCMA binding molecule, the conjugate, or the pharmaceutical composition of any one of the previous claims, for use in a method of treating a subject with a disease or disorder associated with expression of BCMA in combination with at least one additional agent.

21. The BCMA binding molecule, conjugate, or pharmaceutical composition for use according to claim 19 or claim 20, wherein:

- (a) the disease or disorder comprises a plasma cell neoplasm;
- (b) the disease or disorder comprises a B cell malignancy that expresses cell surface BCMA; or
- (c) the disease or disorder comprises an autoimmune disorder.

22. The BCMA binding molecule, conjugate, or pharmaceutical composition for use according to any one of claims 19 to 21, wherein the disease or disorder is multiple myeloma.

~~18.~~23. A nucleic acid or plurality of nucleic acids encoding the BCMA binding molecule of any one of the previous claims.

~~19.~~24. A cell engineered to express the BCMA binding molecule of any one of the previous claims or transfected with one or more expression vectors comprising one or more nucleic acid sequences encoding the BCMA binding molecule or the conjugate of any one of the previous claims under the control of one or more promoters.

~~20.~~25. A method of producing a BCMA binding molecule, comprising:

- (a) culturing the cell of claim 24 in conditions under which the BCMA binding molecule is expressed; and
- (b) recovering the BCMA binding molecule from the cell culture.