

We Claim:

1. A trispecific antibody, or a trispecific binding fragment thereof, comprising:
 - (a) ___a first antigen-binding arm comprising a first heavy chain variable domain (VH1) and a first light chain variable domain (VL1); wherein the first antigen-binding arm comprises a heavy chain complementarity determining region (HCDR) 1, a HCDR2 and a HCDR3 of the heavy chain variable domain (VH1) of SEQ ID NO: 8 and a light chain complementarity determining region (LCDR) 1, a LCDR2 and a LCDR3 of the light chain variable domain (VL1) of SEQ ID NO: 7;
 - (b) ___a second antigen-binding arm comprising a second heavy chain variable domain (VH2) and a second light chain variable domain (VL2); wherein the second antigen-binding arm comprises a HCDR1, a HCDR2 and a HCDR3 of the VH2 of SEQ ID NO: 16 and a LCDR1, a LCDR2 and a LCDR3 of the VL2 of SEQ ID NO: 15;
 - (c) ___a third antigen-binding arm comprising a third heavy chain variable domain (VH3) and a third light chain variable domain (VL3), wherein the third antigen-binding arm comprises a HCDR1, a HCDR2 and a HCDR3 of the VH3 of SEQ ID NO: 24 and a LCDR 1, a LCDR2 and a LCDR3 of the VL3 of SEQ ID NO: 23,
wherein the first antigen-binding arm binds to an epitope on cluster of differentiation 3 (CD3), the second antigen-binding arm binds to an epitope on G-protein coupled receptor family C group 5 member D (GPC5D), and the third antigen-binding arm binds to an epitope on B cell maturation antigen (BCMA).
2. The trispecific antibody or trispecific binding fragment of claim 1, wherein:
 - (a) ___the VH1 and VL1 of first antigen-binding arm are present in a Fab, a diabody, a Fab-Fab', a F(ab')2, a Fv, a scFv, a Fd, a disulfide stabilized Fv fragment (dsFv), or a disulfide stabilized diabody (ds diabody), optionally a Fab;
 - (b) 3. The trispecific antibody or trispecific binding fragment of claim 1 or 2, wherein the VH2 and VL2 of the second antigen-binding arm are present in a scFv, a diabody, a Fab, Fab', a F(ab')2, a Fv, a scFv, a Fv, a Fd, a disulfide stabilized Fv fragment (dsFv), or a disulfide stabilized diabody (ds diabody), optionally a scFv; and/or;

~~(c) 4. — The trispecific antibody or trispecific binding fragment of any one of claims 1-3, wherein the VH3 and VL3 of the third antigen-binding arm are present in a scFv, an antibody fragment, a diabody, a Fab, Fab', a F(ab')2, a Fv, a scFv, a Fd, a disulfide stabilized Fv fragment (dsFv), or a disulfide stabilized diabody (ds diabody); optionally a scFv.~~

~~5. — The trispecific antibody or trispecific binding fragment of any one of claims 1-4, wherein the first antigen-binding arm that binds CD3 comprises a heavy chain complementarity determining region (HCDR) 1, a HCDR2 and a HCDR3 of the heavy chain variable domain (VH1) of SEQ ID NO: 8 and a light chain complementarity determining region (LCDR) 1, a LCDR2 and a LCDR3 of the light chain variable domain (VL1) of SEQ ID NO: 7.~~

~~36. The trispecific antibody or trispecific binding fragment of any one of claims 1 or claim 2-5, wherein:~~

~~(a) — the first antigen-binding arm that binds CD3 comprises a HCDR1 comprising the amino acid sequence of GDSVFNNNAAWS (SEQ ID NO: 4), a HCDR2 comprising the amino acid sequence of RTYYRSKWLYD (SEQ ID NO: 5), and a HCDR3 comprising the amino acid sequence of GYSSSFYD (SEQ ID NO: 6); and a LCDR1 comprising the amino acid sequence of TGTSSNIGTYKFVS (SEQ ID NO: 1), a LCDR2 comprising the amino acid sequence of EVSKRPS (SEQ ID NO: 2), and a LCDR3 comprising the amino acid sequence of VSYAGSGTLL (SEQ ID NO: 3);~~

~~(b) 7. — The trispecific antibody or trispecific binding fragment of any one of claims 1-6, wherein the first antigen-binding arm that binds CD3 comprises the VH1 of SEQ ID NO: 8 and the VL1 of SEQ ID NO: 7;~~

~~8. — The trispecific antibody or trispecific binding fragment of any one of claims 1-7, wherein the second antigen-binding arm that binds GPRC5D comprises a heavy chain complementarity determining region (HCDR) 1, a HCDR2 and a HCDR3 of the heavy chain variable domain (VH2) of SEQ ID NO: 16 and a light chain complementarity determining~~

region (LCDR) 1, a LCDR2 and a LCDR3 of the light chain variable domain (VL2) of SEQ ID NO: 15.

(c) ~~9.~~ — ~~The trispecific antibody or trispecific binding fragment of any one of claims 1-8, wherein the second antigen-binding arm that binds GPRC5D comprises a HCDR1 comprising the amino acid sequence of GFSLTNIRMSVS (SEQ ID NO: 12), HCDR2 comprising the amino acid sequence of HIFSNDEKS (SEQ ID NO: 13), and a HCDR3 comprising the amino acid sequence of MRLPYGMDV (SEQ ID NO: 14); and a LCDR1 comprising the amino acid sequence of RSSQSLVHSDGNTYLS (SEQ ID NO: 9), a LCDR2 comprising the amino acid sequence of KISNRFF (SEQ ID NO: 10), and a LCDR3 comprising the amino acid sequence of MQATQFPHT (SEQ ID NO: 11);~~

(d) ~~10.~~ — ~~The trispecific antibody or trispecific binding fragment of any one of claims 1-9, wherein the second antigen-binding arm that binds GPRC5D comprises the VH2 of SEQ ID NO: 16 and the VL2 of SEQ ID NO: 15;~~

~~11.~~ — ~~The trispecific antibody or trispecific binding fragment of any one of claims 1-10, wherein the third antigen-binding arm that binds BCMA comprises a heavy chain complementarity determining region (HCDR) 1, a HCDR2 and a HCDR3 of the heavy chain variable domain (VH3) of SEQ ID NO: 24 and a light chain complementarity determining region (LCDR) 1, a LCDR2 and a LCDR3 of the light chain variable domain (VL3) of SEQ ID NO: 23.~~

(e) ~~12.~~ — ~~The trispecific antibody or trispecific binding fragment of any one of claims 1-11, wherein the third antigen-binding arm that binds BCMA comprises a HCDR1 comprising the amino acid sequence of GFTFSSYAMS (SEQ ID NO: 20), a HCDR2 comprising the amino acid sequence of AISGSGGSTY (SEQ ID NO: 21), and a HCDR3 comprising the amino acid sequence of DEGYSSGHYYGMDV (SEQ ID NO: 22); and a LCDR1 comprising the amino acid sequence of RASQSISSSFLT (SEQ ID NO: 17), a LCDR2 comprising the amino acid sequence of GASSRAT (SEQ ID NO: 18), and a LCDR3 comprising the amino acid sequence of QHYGSSPMYT (SEQ ID NO: 19);~~

(f) ~~13.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1-12, wherein the third antigen-binding arm that binds BCMA comprises the VH3 of SEQ ID NO: 24 and the VL3 of SEQ ID NO: 23;

~~14.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1-4, wherein the first antigen-binding arm that binds CD3 comprises the HCDR1, the HCDR2 and the HCDR3 of the VH1 of SEQ ID NO: 8 and the LCDR1, the LCDR2 and the LCDR3 of the VL1 of SEQ ID NO: 7;
the second antigen-binding arm that binds GPRC5D comprises the HCDR1, the HCDR2 and the HCDR3 of the VH2 of SEQ ID NO: 16 and the LCDR1, the LCDR2 and the LCDR3 of the VL2 of SEQ ID NO: 15; and
the third antigen-binding arm that binds BCMA comprises the HCDR1, the HCDR2 and the HCDR3 of the VH3 of SEQ ID NO: 24 and the LCDR1, the LCDR2 and the LCDR3 of the VL3 of SEQ ID NO: 23.

(g) ~~15.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1-4 and 14, wherein the first antigen-binding arm that binds CD3 comprises the HCDR1, the HCDR2, the HCDR3, the LCDR1, the LCDR2 and the LCDR3 of SEQ ID NOs: 4, 5, 6, 1, 2, 3, respectively;
the second antigen-binding arm that binds GPRC5D comprises the HCDR1, the HCDR2, the HCDR3, the LCDR1, the LCDR2 and the LCDR3 of SEQ ID NOs: 12, 13, 14, 9, 10 and 11, respectively; and
the third antigen-binding arm that binds BCMA comprises the HCDR1, the HCDR2, the HCDR3, the LCDR1, the LCDR2 and the LCDR3 of SEQ ID NOs: 20, 21, 22, 17, 18 and 19, respectively; and/or;

(h) ~~16.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1-4, 14 and 15, wherein the first antigen-binding arm that binds CD3 comprises the VH1 of SEQ ID NO: 8 and the VL1 of SEQ ID NO: 7;
the second antigen-binding arm that binds GPRC5D comprises the VH2 of SEQ ID NO: 16 and the VL2 of SEQ ID NO: 15; and
the third antigen-binding arm that binds BCMA comprises the VH3 of SEQ ID NO: 24 and the VL3 of SEQ ID NO: 23.

~~417.~~ The trispecific antibody or trispecific binding fragment thereof of any one of claims 1–~~316~~, wherein the first antigen-binding arm comprises a Fragment crystallizable (Fc) domain, and the second antigen-binding arm or the third antigen-binding arm comprises a Fc domain.

~~518.~~ The trispecific antibody or trispecific binding fragment thereof of claim ~~417~~, wherein:
(a) the Fc domain of the first antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 158;
(b) the Fc domains comprise one or more mutations which promote heterodimerization of the Fc domains;

~~19.~~ ~~The trispecific antibody or trispecific binding fragment of claim 18, wherein~~
(c) the Fc domains comprise one or more mutations which promote heterodimerization of the Fc domains, wherein the mutations are selected from T366S, L368A, T366W and Y407V (EU numbering);

~~20.~~ ~~The trispecific antibody or trispecific binding fragment of any one of claims 17–19, wherein~~ (d) the Fc domains further comprise one or more mutations which reduce Fc binding to a Fcγ receptor;

~~21.~~ ~~The trispecific antibody or trispecific binding fragment of claim 20, wherein~~
(e) the Fc domains further comprise one or more mutations which reduce Fc binding to a Fcγ receptor, wherein the Fcγ receptor is FcγRI, FcγRIIA, FcγRIIB, FcγRIIIA, and/or FcγRIIIB;

~~22.~~ ~~The trispecific antibody or trispecific binding fragment of claim 20 or 21, wherein~~ (f) the Fc domains further comprise one or more mutations which reduce Fc binding to a Fcγ receptor, wherein the Fc domains comprise one or more mutations selected from L234A, L235A, and D265S (EU numbering);

~~23.~~ ~~The trispecific antibody or trispecific binding fragment of any one of claims 17–22, wherein~~

(g) the Fc domains further comprise one or more mutations which reduce Fc binding to protein A; and/or;

~~24. The trispecific antibody or trispecific binding fragment of claim 23,~~
~~wherein(h)~~ the Fc domains further comprise one or more mutations which reduce Fc binding to protein A, wherein the Fc domain comprises mutations H435R and/or Y436F (EU numbering).

~~25.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1 to ~~24~~, wherein;

(a) the first antigen-binding arm specifically binds to residues 22-35 (QDGNEEMGGITQTP (SEQ ID NO: 161)) of the CD3 ϵ chain;

~~26. The trispecific antibody or trispecific binding fragment of any one of claims 1-25,~~ wherein(b) the first antigen-binding arm specifically binds to CD3 with an affinity of about 1×10^{-8} to 1×10^{-7} M;

~~27. The trispecific antibody or trispecific binding fragment of claim 26,~~ wherein (c) the first antigen-binding arm specifically binds to CD3 with an affinity of about 2×10^{-8} to 4×10^{-8} M;

~~28. The trispecific antibody or trispecific binding fragment of any one of claims 1 to 27,~~ wherein(d) the third antigen-binding arm specifically binds residues 17-26 (LLHACIPCQL (SEQ ID NO: 162)) of the BCMA BCMW37 chain;

~~29. The trispecific antibody or trispecific binding fragment of any one of claims 1-28,~~ wherein(e) the third antigen-binding arm specifically binds to BCMA with an affinity of about 1×10^{-10} to 1×10^{-7} M; and/or;

~~30. The trispecific antibody or trispecific binding fragment of claim 29,~~ wherein(f) the third antigen-binding arm specifically binds to BCMA with an affinity of about 2×10^{-10} to 9×10^{-10} M.

7. The trispecific antibody or trispecific binding fragment of claim 1, comprising a first antigen-binding arm that binds to an epitope on cluster of differentiation 3 (CD3), a second antigen-binding arm that binds to an epitope on G-protein coupled receptor family C group 5 member D (GPRC5D), and a third antigen-binding arm that binds to an epitope on B cell maturation antigen (BCMA),
wherein the first antigen-binding arm comprises a heavy chain (HC1) polypeptide and a light chain (LC) polypeptide, wherein the heavy chain (HC1) polypeptide further comprises the second antigen-binding arm,
wherein the trispecific antibody, or the trispecific binding fragment thereof, further comprises a single polypeptide comprising the third antigen-binding arm.
8. The trispecific antibody or trispecific binding fragment of claim 7:
(a) wherein:
(i) the HC1 of the first antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 29;
(ii) the LC of the first antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 30; and/or
(iii) the single polypeptide comprising the third antigen-binding arm comprises an amino acid sequence of SEQ ID NO: 31; or
(b) wherein the first antigen-binding arm comprises an HC1 comprising the amino acid sequence of SEQ ID NO: 29, and a LC comprising the amino acid sequence of SEQ ID NO: 30, and the single polypeptide comprising the third antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 31.
9. The trispecific antibody or trispecific binding fragment of claim 1, comprising a polypeptide comprising the amino acid sequence of SEQ ID NO: 29, which comprises the second antigen-binding arm and the HC of the first antigen-binding arm,
a polypeptide comprising the amino acid sequence of SEQ ID NO: 30, which comprises the LC of the first antigen-binding arm, and
a polypeptide comprising the amino acid sequence of SEQ ID NO: 31, which comprises the third antigen-binding arm.

~~1031.~~ The A trispecific antibody, or a trispecific binding fragment of claim 1 thereof, comprising a first antigen-binding arm that binds to an epitope on cluster of differentiation 3 (CD3), a second antigen-binding arm that binds to an epitope on G-protein coupled receptor family C group 5 member D (GPRC5D), and a third antigen-binding arm that binds to an epitope on B cell maturation antigen (BCMA),

wherein the first antigen-binding arm comprises a heavy chain (HC1) polypeptide and a light chain (LC) polypeptide; and

wherein the trispecific antibody, or a trispecific binding fragment thereof, comprises a single polypeptide comprising the second antigen-binding arm and the third antigen-binding arm.

~~3211.~~ The trispecific antibody or trispecific binding fragment of claim 1034:

(a) _____, wherein:

(i) _____ the HC1 of the first antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 26;

~~33.~~ ~~The trispecific antibody or trispecific binding fragment of claim 32 or 33, wherein~~

(ii) _____ the LC of the first antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 27; and/or:

~~34.~~ ~~The trispecific antibody or trispecific binding fragment of any one of claims 31-33, wherein~~ (iii) _____ the polypeptide comprising the second antigen-binding arm and the third antigen-binding arm comprises an amino acid sequence of SEQ ID NO: 28; or:

~~35.~~ ~~The trispecific antibody or trispecific binding fragment of claim 31, (b)~~ _____ wherein the first antigen-binding arm comprises an HC1 comprising the amino acid sequence of SEQ ID NO: 26, and a LC comprising the amino acid sequence of SEQ ID NO: 27, and the polypeptide comprising the second antigen-binding arm and the third antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 28.

12. The trispecific antibody, or trispecific binding fragment of claim 1, comprising:
a polypeptide comprising the amino acid sequence of SEQ ID NO: 26, which
comprises the HC of the first antigen-binding arm,
a polypeptide comprising the amino acid sequence of SEQ ID NO: 27, which
comprises the LC of the first antigen-binding arm, and
a polypeptide comprising the amino acid sequence of SEQ ID NO: 28, which
comprises the second antigen-binding arm and the third antigen-binding arm.
36. ~~A trispecific antibody, or a trispecific binding fragment thereof, comprising a first~~
~~antigen binding arm that binds to an epitope on cluster of differentiation 3 (CD3), a~~
~~second antigen binding arm that binds to an epitope on G-protein-coupled receptor~~
~~family C-group 5 member D (GPRC5D), and a third antigen binding arm that binds to~~
~~an epitope on B-cell maturation antigen (BCMA),~~
~~wherein the first antigen binding arm comprises a heavy chain (HC1)~~
~~polypeptide and a light chain (LC) polypeptide, wherein the heavy chain (HC1)~~
~~polypeptide further comprises the second antigen binding arm,~~
~~wherein the trispecific antibody, or the trispecific binding fragment thereof,~~
~~further comprises a single polypeptide comprising the third antigen binding arm.~~
37. ~~The trispecific antibody or trispecific binding fragment of claim 36, wherein the HC1~~
~~of the first antigen binding arm comprises the amino acid sequence of SEQ ID NO:~~
~~29.~~
38. ~~The trispecific antibody or trispecific binding fragment of claim 36 or 37, wherein the~~
~~LC of the first antigen binding arm comprises the amino acid sequence of SEQ ID NO: 30.~~
39. ~~The trispecific antibody or trispecific binding fragment of any one of claims 36-38,~~
~~wherein the single polypeptide comprising the third antigen binding arm comprises an~~
~~amino acid sequence of SEQ ID NO: 31.~~
40. ~~The trispecific antibody or trispecific binding fragment of claim 36, wherein the first~~
~~antigen binding arm comprises an HC1 comprising the amino acid sequence of SEQ~~
~~ID NO: 29, and a LC comprising the amino acid sequence of SEQ ID NO: 30, and the~~

~~single polypeptide comprising the third antigen-binding arm comprises the amino acid sequence of SEQ ID NO: 31.~~

~~1341.~~ The trispecific antibody or trispecific binding fragment of any one of claims 1-~~1240~~, wherein;

~~(a)~~ the antibody or antigen-binding fragment thereof is an IgG1, IgG2, IgG3, or IgG4 (human) isotype; and/or;

~~42.~~ The trispecific antibody or trispecific binding fragment of any of claims 1-~~41~~, wherein ~~(b)~~ the antibody or antigen-binding fragment thereof is an (human) IgG1 isotype.

~~43.~~ A synthetic polynucleotide encoding the trispecific antibody or trispecific binding fragment of any one of claims 1 to ~~42~~.

~~44.~~ A pharmaceutical composition comprising the trispecific antibody or trispecific binding fragment of any one of claims 1 to ~~42~~ and a pharmaceutically acceptable carrier.

~~45.~~ The pharmaceutical composition of claim ~~44~~, wherein the pharmaceutical composition further comprises a second therapeutic agent.

~~46.~~ The pharmaceutical composition of claim ~~45~~, wherein the second therapeutic agent comprises an anti-CD38 agent, an immunomodulatory imide drug (IMiD), an immune checkpoint inhibitor, an immune co-stimulating agent, a gamma secretase inhibitor, a T cell enhancer, or any combination thereof.

~~47.~~ A cell expressing the trispecific antibody or trispecific binding fragment of any one of claims 1 to ~~42~~.

~~48.~~ The cell of claim ~~47~~, wherein the cell is a hybridoma.

~~49.~~ The cell of claim ~~47~~ or ~~48~~, wherein the trispecific antibody is recombinantly produced.

~~50.~~ A method for treating cancer in a subject in need thereof, said method comprising administering to the subject a therapeutically effective amount of the trispecific antibody or trispecific binding fragment of any one of claims 1 to ~~42~~ or the pharmaceutical composition of any one of claims ~~44-46~~.

~~51.~~ The method of claim ~~50~~, wherein the trispecific antibody or trispecific binding fragment or the pharmaceutical composition is administered for a time sufficient to treat the cancer.

- 52.—A method for inhibiting growth or proliferation of a cancer cell, said method comprising administering to said cell an effective amount of the trispecific antibody or trispecific binding fragment of any one of claims 1 to 42 or the pharmaceutical composition of any one of claims 44-46, wherein said effective amount is sufficient to inhibit the growth or proliferation of said cancer cell.
- 53.—The method of claim 52, wherein said cancer cell is in a subject and the trispecific antibody or trispecific binding fragment or the pharmaceutical composition is administered to the subject.
- 54.—The method of claim 52, wherein said administration is conducted *ex vivo*.
- 55.—A method of redirecting a T cell to BCMA and/or GPRC5D-expressing cancer cells in a subject in need thereof, said method comprising administering to said subject a therapeutically effective amount of the trispecific antibody or trispecific binding fragment of any one of claims 1 to 42 or the pharmaceutical composition of any one of claims 44-46.
- 56.—The method of claim 55, wherein the said therapeutically effective amount is sufficient to direct said T cell response to said cancer cells.
- 57.—The method of any one of claims 50-56, wherein the cancer is a hematological cancer.
- 58.—The method of claim 57, wherein the hematological cancer is a BCMA and/or GPRC5D-expressing B cell cancer.
- 59.—The method of claim 58, wherein the BCMA and/or GPRC5D-expressing B cell cancer is multiple myeloma.
- 60.—The method of claim 58 or 59, wherein the BCMA and/or GPRC5D-expressing B cell cancer is smoldering multiple myeloma (SMM).
- 61.—The method of any one of claims 50-60, wherein the cancer is relapsed, refractory, or malignant cancer, or any combination thereof.
- 62.—The method of any one of claims 50-51, 53, and 55-61, wherein the subject has received a prior treatment.
- 63.—The method of claim 62, wherein the prior treatment comprises a proteasome inhibitor, an immunomodulatory drug, a CD38 antibody, a bispecific agent, a CAR-T therapy, or any combination thereof.
- 64.—The method of any one of claims 50-63, further comprising administering a second therapeutic agent.
- 65.—The method of claim 64, wherein the second therapeutic agent is a chemotherapeutic agent or a targeted anti-cancer therapy.
- 66.—The method of claim 65, wherein the chemotherapeutic agent is cytarabine, an anthracycline, histamine dihydrochloride, or interleukin 2 (IL-2).

~~67. The method of claim 64, wherein the second therapeutic agent is an anti-CD38 agent, an immunomodulatory imide drug (IMiD), an immune checkpoint inhibitor, an immune co-stimulating agent, a gamma secretase inhibitor, a T-cell enhancer, or any combination thereof.~~

~~68. The method of any one of claims 50-51, 53, and 55-67, wherein the trispecific antibody or trispecific binding fragment, or the pharmaceutical composition is administered intravenously, intramuscularly, intraperitoneally, and/or subcutaneously to the subject.~~

~~69. The method of any one of claims 50-51, 53, and 55-68, wherein the trispecific antibody or trispecific binding fragment, or the pharmaceutical composition is administered subcutaneously to the subject.~~

~~70. A method for generating the trispecific antibody or trispecific binding fragment of any one of claims 1 to 42, wherein said method comprises culturing the cell of any one of claims 47 to 49 and isolating said trispecific antibody or trispecific binding fragment.~~

~~71. A kit comprising (i) the trispecific antibody or trispecific binding fragment of any one of claims 1 to 42 and/or a polynucleotide of claim 43 and (ii) packaging for the same.~~

1472. An antibody, or an antigen-binding fragment thereof, that binds to BCMA, comprising: a heavy chain complementarity determining region 1 (CDR1) having the amino acid sequence of GFTFSSYAMS (SEQ ID NO: 20), a heavy chain CDR2 having the amino acid sequence of AISGSGGSTY (SEQ ID NO: 21), and a heavy chain CDR3 having the amino acid sequence of DEGYSSGHYYGMDV (SEQ ID NO: 22); and:-

~~73. The antibody or antigen-binding fragment of claim 72, further comprising: a light chain complementarity determining region 1 (CDR1) having the amino acid sequence of RASQSISSSFLT (SEQ ID NO: 17), a light chain CDR2 having the amino acid sequence of GASSRAT (SEQ ID NO: 18), and a light chain CDR3 having the amino acid sequence of QHYGSSPMYT (SEQ ID NO: 19).~~

~~74~~15. The antibody or antigen-binding fragment of claim ~~72 or 73~~14:

(a)____, comprising a heavy chain variable domain (VH) having the amino acid sequence of SEQ ID NO: 24;:-

75. ~~The antibody or antigen-binding fragment of any one of claims 72-74, (b)~~
_____comprising a light chain variable domain (VL) having the amino acid
sequence of SEQ ID NO: 23;:-

76. ~~The antibody or antigen-binding fragment of any one of claims 72-75, (c)~~
_____wherein the antibody or antigen-binding fragment specifically binds residues
17-26 (LLHACIPCQL (SEQ ID NO: 162)) of the BCMA BCMW37 chain;:-

77. ~~The antibody or antigen-binding fragment of any one of claims 72-76, (d)~~
_____wherein the antibody or antigen-binding fragment specifically binds to BCMA
with an affinity of about 1×10^{-10} to 1×10^{-7} M;:-

78. ~~The antibody or antigen-binding fragment of claim 77, wherein (e)~~ the
antibody or antigen-binding fragment specifically binds to BCMA with an affinity of
about 2×10^{-10} to 9×10^{-10} M;:-

79. ~~The antibody or antigen-binding fragment of any one of claims 72-78, (f)~~
_____wherein the antibody or antigen-binding fragment is a human antibody or
antigen-binding fragment;:-

80. ~~The antibody or antigen-binding fragment of any one of claims 72-79, (g)~~
_____wherein the antibody or antigen-binding fragment is recombinant;:-

81. ~~The antigen-binding fragment of any one of claims 72 to 80, (h)~~ wherein the
antigen binding fragment is a Fab fragment, a Fab2 fragment, or a single chain
antibody.

~~82. The antibody or antigen-binding fragment of any one of claims 72-81 (i)~~
~~_____ wherein the antibody or antigen-binding fragment thereof is an IgG1, IgG2,~~
~~IgG3, or IgG4 isotype; and/or-~~

~~83. The antibody or antigen-binding fragment of any of claims 72-82, (j)~~
~~_____ wherein the antibody or antigen-binding fragment thereof is an IgG1 or an~~
~~IgG4 isotype.~~

1684. A pharmaceutical composition comprising the trispecific antibody or trispecific binding fragment of any one of claims 1-13, or the antibody or antigen-binding fragment of any one of claim 14 or claim 15,s ~~72-83~~ and a pharmaceutically acceptable carrier.

1785. The pharmaceutical composition of claim 1684, wherein:
(a) _____ the pharmaceutical composition further comprises a second therapeutic agent;
and/or-

~~86. The pharmaceutical composition of claim 85, wherein~~
(b) _____ the pharmaceutical composition further comprises a second therapeutic agent,
wherein the second therapeutic agent comprises an anti-CD38 agent, an immunomodulatory imide drug (IMiD), an immune checkpoint inhibitor, an immune co-stimulating agent, a gamma secretase inhibitor, a T-cell enhancer, or any combination thereof.

1887. A cell expressing the trispecific antibody or trispecific binding fragment of any one of claims 1-13 or the antibody or antigen-binding fragment of any one of claims 72-83,claim 14 or claim 15.

1988. The cell of claim 18,87 wherein:
(a) _____ the cell is a hybridoma; or-

89. — The cell of claim 87 wherein

(b) the trispecific antibody or the antibody is recombinantly produced.

2090. Use of the trispecific antibody or trispecific binding fragment of any one of claims 1-13~~A method for treating cancer in a subject in need thereof, said method comprising administering to the subject a therapeutically effective amount of,~~ the -antibody or antigen-binding fragment of ~~any one of claim 14 or claim 15,~~⁷²⁻⁸³ or the pharmaceutical composition of ~~any one of claims 16 or claim 17,~~⁸⁴⁻⁸⁶ in the manufacture of a medicament for treating cancer, wherein a therapeutically effective amount of the trispecific antibody or trispecific binding fragment, or antibody or antigen binding fragment, or the pharmaceutical- composition is to be administered to a subject.

2191. The use according to method of claim 2090, wherein the trispecific antibody or trispecific binding fragment, the antibody or antigen-binding fragment, or the pharmaceutical composition is to be administered for a time sufficient to treat the cancer.

2292. Use of the trispecific antibody or trispecific binding fragment of any one of claims 1-13, A method for inhibiting growth or proliferation of a cancer cell, said method comprising administering to said cell an effective amount of the antibody or antigen-binding fragment of any one of claims 72-83 14 or claim 15, or the pharmaceutical composition of any one of claims 16 or claim 17⁸⁴⁻⁸⁶, in the manufacture of a medicament for inhibiting growth or proliferation of a cancer cell, wherein an effective amount of the trispecific antibody or trispecific binding fragment, the antibody or antigen binding fragment, or the pharmaceutical composition is to be administered to said cell, wherein said effective amount is sufficient to inhibit the growth or proliferation of said cancer cell.

~~2393.~~ The use according to method of claim 2292, wherein said cancer cell is in a subject and the antibody or antigen-binding fragment or the pharmaceutical composition is to be administered to the subject.

24. Use of the trispecific antibody or trispecific binding fragment of any one of claims 1-13, or the pharmaceutical composition of claim 16 or claim 17, in the manufacture of a medicament for redirecting a T cell to BCMA and/or GPRC5D-expressing cancer cells in a subject in need thereof, wherein a therapeutically effective amount of the trispecific antibody or trispecific binding fragment or the pharmaceutical composition is to be administered to a subject.

25. The use of claim 24, wherein the said therapeutically effective amount is sufficient to direct said T cell response to said cancer cells.

~~94.~~ ~~The method of claim 92, wherein said administration is conducted ex vivo.~~

~~2695.~~ The use according to method of any one of claims 20-2590-94, wherein:

(a) the cancer is a hematological cancer;

~~96.~~ ~~The method of claim 95, wherein~~ (b) the cancer is a hematological cancer, wherein the hematological cancer is a BCMA-expressing B cell cancer;

97. — ~~The method of claim 96, wherein~~(c) the cancer is a hematological cancer,
wherein the hematological cancer is a BCMA-expressing B cell cancer, and wherein
the BCMA-expressing B cell cancer is multiple myeloma;:-

98. — ~~The method of claim 97, wherein~~(d) the cancer is a hematological cancer,
wherein the hematological cancer is a BCMA-expressing B cell cancer, wherein the
BCMA-expressing B cell cancer is multiple myeloma, and wherein the BCMA-
expressing B cell cancer is smoldering multiple myeloma (SMM);:-

99. — ~~The method of any one of claims 90-98, wherein~~(e) the cancer is relapsed,
refractory, or malignant cancer, or any combination thereof;:-

100. — ~~The method of any one of claims 90-91, 93, and 95-99, wherein~~(f) the subject
has received a prior treatment;:-

101. — ~~The method of claim 100, wherein~~(g) the subject has received a prior
treatment, wherein the prior treatment comprises a proteasome inhibitor, an
immunomodulatory drug, a CD38 antibody, a bispecific agent, a CAR-T therapy, or a
combination thereof;:-

102. — ~~The method of any one of claims 90-101~~(h) further comprising administering
a second therapeutic agent is to be administered;:-

~~103.—The method of claim 102 wherein~~(i) a second therapeutic agent is to be administered, wherein the second therapeutic agent is a chemotherapeutic agent or a targeted anti-cancer therapy;

~~104.—The method of claim 103 wherein~~(j) a second therapeutic agent is to be administered, wherein the second therapeutic agent is a chemotherapeutic agent, wherein the chemotherapeutic agent is cytarabine, an anthracycline, histamine dihydrochloride, or interleukin 2 (IL-2);

~~105.—The method of claim 102 wherein~~(k) a second therapeutic agent is to be administered, wherein the second therapeutic agent is an anti-CD38 agent, an immunomodulatory imide drug (IMiD), an immune checkpoint inhibitor, an immune co-stimulating agent, a gamma secretase inhibitor, a T-cell enhancer, or any combination thereof;

~~106.—The method of any one of claims 90 91, 93, and 95 105, wherein~~

(l) the trispecific antibody or trispecific binding fragment, the antibody or antigen-binding fragment or the pharmaceutical composition is to be administered intravenously, intramuscularly, intraperitoneally, and/or subcutaneously to the subject; and/or;

~~107.—The method of any one of claims 90 91, 93, and 95 106, wherein~~

(m) the trispecific antibody or trispecific binding fragment, the antibody or antigen-binding fragment, or the pharmaceutical composition is to be administered subcutaneously to the subject.

27. A method for inhibiting growth or proliferation of a cancer cell, said method comprising administering *ex vivo* to said cell an effective amount of the trispecific antibody or trispecific binding fragment of any one of claims 1-13, the antibody or antigen-binding fragment of claim 14 or claim 15, or the pharmaceutical composition of claim 16 or claim 17, wherein said effective amount is sufficient to inhibit the growth or proliferation of said cancer cell.

28. The method of claim 27, wherein:

- (a) the cancer is a hematological cancer;
- (b) the cancer is a hematological cancer, wherein the hematological cancer is a BCMA-expressing B cell cancer;
- (c) the cancer is a hematological cancer, wherein the hematological cancer is a BCMA-expressing B cell cancer, and wherein the BCMA-expressing B cell cancer is multiple myeloma;
- (d) the cancer is a hematological cancer, wherein the hematological cancer is a BCMA-expressing B cell cancer, wherein the BCMA-expressing B cell cancer is multiple myeloma, and wherein the BCMA-expressing B cell cancer is smoldering multiple myeloma (SMM);
- (e) the cancer is relapsed, refractory, or malignant cancer, or any combination thereof;
- (f) the method further comprises administering a second therapeutic agent;
- (g) the method further comprises administering a second therapeutic agent, wherein the second therapeutic agent is a chemotherapeutic agent or a targeted anti-cancer therapy;
- (h) the method further comprises administering a second therapeutic agent, wherein the second therapeutic agent is a chemotherapeutic agent, wherein the chemotherapeutic agent is cytarabine, an anthracycline, histamine dihydrochloride, or interleukin 2 (IL-2); and/or

(i) the method further comprises administering a second therapeutic agent, wherein the second therapeutic agent is an anti-CD38 agent, an immunomodulatory imide drug (IMiD), an immune checkpoint inhibitor, an immune co-stimulating agent, a gamma secretase inhibitor, a T-cell enhancer, or any combination thereof.

~~29~~108. A method for generating the trispecific antibody or trispecific binding fragment of any one of claims 1-13, or the antibody or antigen-binding fragment of any one of claims 14 or claim 15~~72-83~~, wherein said method comprises culturing the cell of any one of claims ~~87-18 to 89~~or claim 19 and isolating said trispecific antibody or trispecific binding fragment or antibody or antigen-binding fragment.

~~30~~109. A synthetic polynucleotide encoding the trispecific antibody or trispecific binding fragment of any one of claims 1-13 or the antibody or antigen-binding fragment of any one of claims 72-8314 or claim 15.

~~31~~110. A kit comprising (i) the trispecific antibody or trispecific binding fragment of any one of claims 1-13 or the antibody or antigen-binding fragment of any one of claims 14 or claim 15~~72-83~~ and/or a polynucleotide of claim ~~109~~30 and (ii) packaging for the same.