

CLAIMS

~~What is claimed is:~~

1. An antibody that specifically binds to Mucin-1 (MUC-1), the antibody comprising:
a variable heavy chain-(VH) chain comprising a heavy chain CDRs1-3 (HCDRs1-3) of a VH chain having comprising the amino acid sequence of SEQ ID NO: 9:
EVQLVQSGAEVKKPGATVKISKVSGYTFTDHTMHWIKQRPKGKLEWM
GYFYPRDDSTNYNEKFKGRVTLTADKSTDTAYMELSSLRSEDTAVYYCARGLR
YALDYWGQGTLVTVSS (SEQ ID NO:1); and
a variable light chain-(VL) chain comprising a light chain CDRs1-3 (LCDRs1-3) of a VL chain having comprising the amino acid sequence of SEQ ID NO: 12, SEQ ID NO: 15, or SEQ ID NO: 16:
EIVLTQSPATLSLSPGERATLSCRASSSVSSSYLYWYQQKPGQAPRLWIYG
TSNLA SGV PARFSGSGSGTDYTLTISSLEPEDAAVYYCHQYAWSPPTFGQGKLE
IK (SEQ ID NO:2);
EIVLTQSPATLSLSPGERATLSCRASSSVGSSNLYWYQQKPGQAPRLWIYR
STKLASGV PARFSGSGSGTDYTLTISSLEPEDAAVYYCHQYRWSPTFGQGKLEI
K (SEQ ID NO:3); or
EIVLTQSPATLSLSPGERATLSCRASSSVSSSYLYWYQQKPGQAPRLWIIGT
SNLASGV PARFSGSGSGTDYTLTISSLEPEDAAVYYCHQYSWSPPTFGQGKLEIK
(SEQ ID NO:4).
2. The antibody of claim 1, wherein the VH chain comprises an amino acid sequence having at least 80% identity to the amino acid sequence set forth in SEQ ID NO:1.
3. The antibody of claim 2, wherein the VL chain comprises an amino acid sequence having at least 80% identity to the amino acid sequence set forth in SEQ ID NO:2, 3, or 4.
4. The antibody of any one of claims 1-3, ~~wherein~~ comprising:

~~the~~ heavy chain CDR1 (HCDR1) ~~comprises~~ing the amino acid sequence DHTMH (SEQ ID NO:17);

~~the~~ heavy chain CDR2 (HCDR2) ~~comprises~~ing the amino acid sequence YFYPRDDSTNYNEKFKG (SEQ ID NO:18);

~~the~~ heavy chain CDR3 (HCDR3) ~~comprises~~ing the amino acid sequence GLRYALDY (SEQ ID NO:9);

~~the~~ light chain CDR1 (LCDR1) ~~comprises~~ing the amino acid sequence RASSVSSSYLY (SEQ ID NO:10);

~~the~~ light chain CDR2 (LCDR2) ~~comprises~~ing the amino acid sequence GTSNLAS (SEQ ID NO:11); and

~~the~~ light chain CDR3 (LCDR3) ~~comprises~~ing the amino acid sequence HQYAWSPPT (SEQ ID NO:12), as per Kabat definition.

5. The antibody of any one of claims 1-3, ~~wherein~~comprising:

~~the~~ heavy chain CDR1 (HCDR1) ~~comprises~~ing the amino acid sequence DHTMH (SEQ ID NO:17);

~~the~~ heavy chain CDR2 (HCDR2) ~~comprises~~ing the amino acid sequence YFYPRDDSTNYNEKFKG (SEQ ID NO:18);

~~the~~ heavy chain CDR3 (HCDR3) ~~comprises~~ing the amino acid sequence GLRYALDY (SEQ ID NO:9);

~~the~~ light chain CDR1 (LCDR1) ~~comprises~~ing the amino acid sequence RASSVGSSNLY (SEQ ID NO:13);

~~the~~ light chain CDR2 (LCDR2) ~~comprises~~ing the amino acid sequence RSTKLAS (SEQ ID NO:14); and

~~the~~ light chain CDR3 (LCDR3) ~~comprises~~ing the amino acid sequence HQYRWSPT (SEQ ID NO:15), as per Kabat definition.

6. The antibody of any one of claims 1-3, ~~wherein~~comprising:

~~the~~ heavy chain CDR1 (HCDR1) ~~comprises~~ing the amino acid sequence DHTMH (SEQ ID NO:17);

~~the~~ heavy chain CDR2 (HCDR2) comprisesing the amino acid sequence YFYPRDDSTNYNEKFKG (SEQ ID NO:18);

~~the~~ heavy chain CDR3 (HCDR3) comprisesing the amino acid sequence GLRYALDY (SEQ ID NO:9);

~~the~~ light chain CDR1 (LCDR1) comprisesing the amino acid sequence RASSSVSSSYLY (SEQ ID NO:10);

~~the~~ light chain CDR2 (LCDR2) comprisesing the amino acid sequence GTSNLAS (SEQ ID NO:11); and

~~the~~ a light chain CDR3 (LCDR3) comprisesing the amino acid sequence HQYSWSPPT (SEQ ID NO:16), as per Kabat definition.

7. The antibody of any one of claims 1-3, wherein the antibody is a humanized antibody or a chimeric antibody.

8. The antibody of any one of claims 1-3, wherein the antibody is selected from the group consisting of: an IgG, Fv, single chain antibody, scFv, Fab, F(ab')₂, or Fab'.

9. The antibody of any one of claims 1-3, wherein the antibody is an antibody fragment that binds to MUC-1.

10. The antibody of any one of claims 1-3, wherein the antibody is an IgG, an IgG1, a Fab, a single chain antibody, an scFv, or a bispecific antibody.

11. The antibody of any one of claims 1-3, wherein the antibody is detectably labeled.

12. The antibody of any one of claims 1-3, wherein the antibody comprises a covalently linked non-peptide synthetic polymer.

13. The antibody of claim 12, wherein the synthetic polymer is poly(ethylene glycol) polymer.

14. The antibody of any one of claims 1-3, wherein the antibody comprises a covalently linked lipid or fatty acid moiety.

15. The antibody of any one of claims 1-3, wherein the antibody comprises a covalently linked polysaccharide or carbohydrate moiety.

16. The antibody of any one of claims 1-3, wherein the antibody ~~comprises~~ is linked to a contrast agent.

17. The antibody of any one of claims 1-3, wherein the antibody comprises an affinity domain.

18. The antibody of any one of claims 1-3, wherein the antibody is immobilized on a solid support.

19. The antibody of any one of claims 1-3, wherein the antibody comprises a covalently linked ~~age to a~~ cytotoxin.

20. The antibody of any one of claims 1-3, wherein the antibody comprises a constant region amino acid sequence comprising an amino acid sequence of a sulfatase motif.

21. The antibody of any one of claims 1-3, wherein the antibody comprises a constant region amino acid sequence comprising an amino acid sequence of a sulfatase motif, and wherein the sulfatase motif is modified to comprise a 2-formylglycine (fGly) moiety.

22. The antibody of claim 21, wherein the antibody ~~comprises~~ is covalently linked to a heterologous moiety ~~covalently linked to the antibody via the fGly moiety~~.

23. The antibody of claim 22, wherein the heterologous moiety is selected from a drug, a toxin, a detectable label, a water-soluble polymer, and a synthetic peptide.

24. ~~A nucleic acid encoding a variable heavy (VH) chain, a variable light chain (VL), or both, of the antibody of any one of claims 1 to 10.~~

25. ~~The nucleic acid of claim 24, wherein the antibody is a single chain antibody, and wherein the nucleic acid encodes the single chain antibody.~~

26. — ~~The nucleic acid of claim 25, wherein the single chain antibody is an scFv.~~
27. — ~~A recombinant expression vector comprising the nucleic acid of any one of claims 24-26, wherein the nucleic acid is operably linked to a transcriptional control element that is active in a eukaryotic cell.~~
28. — ~~A cell comprising the nucleic acid of any one of claims 24 to 26 or the expression vector of claim 27.~~
29. — ~~The cell of claim 28, wherein the nucleic acid encodes the VH chain of the antibody and the VL chain of the antibody.~~
30. — ~~The cell of claim 29, wherein the antibody is a single chain antibody, and wherein the nucleic acid encodes the single chain antibody.~~
31. — ~~The cell of claim 30, wherein the single chain antibody is an scFv.~~
32. — ~~A cell comprising:~~
~~a first nucleic acid encoding a variable heavy (VH) chain of the antibody of any one of claims 1 to 10; and~~
~~a second nucleic acid encoding a variable light (VL) chain of the antibody.~~
33. — ~~The cell of claim 32 comprising:~~
~~a first expression vector comprising the first nucleic acid; and~~
~~a second expression vector comprising the second nucleic acid.~~
34. — ~~A conjugate, comprising:~~
~~the antibody of any one of claims 1-10; and~~
~~an agent conjugated to the antibody.~~
35. — ~~The conjugate of claim 34, wherein the agent is selected from the group consisting of:~~
~~a half life extending moiety, a labeling agent, and a therapeutic agent.~~

~~36. — A fusion protein, comprising:
a variable heavy (VH) chain, a variable light (VL) chain, or both, of the antibody of any one
of claims 1-10; fused to
a heterologous amino acid sequence.~~

~~37~~24. A pharmaceutical composition comprising:
a) the antibody of any one of claims 1-10; and
b) a pharmaceutically acceptable carrier.

~~38. — A pharmaceutical composition comprising:
a) the conjugate of any one of claims 34-35; and
b) a pharmaceutically acceptable carrier.~~

~~39. — A pharmaceutical composition comprising:
a) the fusion protein of claim 36; and
b) a pharmaceutically acceptable carrier.~~

~~40~~25. The pharmaceutical composition of ~~any one of claims 37-39~~24, further comprising a
T cell activator.

~~41~~26. The pharmaceutical composition of claim ~~40~~25, wherein the T cell activator is
selected from the group consisting of: an immune checkpoint inhibitor, a cytokine, and an antagonist
of an inhibitory immune receptor.

~~42~~7. The pharmaceutical composition of any one of claims ~~37-41~~24-4126, wherein the
antibody is encapsulated in a liposome.

28. The antibody of any one of claims 1-10 for use in therapy.

~~43~~29. Use of the antibody of any one of claims 1-10 in the preparation of a medicament for
~~A method of treating a cell proliferative disorder in a subject, the method comprising:~~
administering to a subject having a cell proliferative disorder a therapeutically effective
amount of the pharmaceutical composition of any one of claims ~~37-42~~.

30. An antibody comprising a heavy chain and a light chain,
wherein the heavy chain comprises:

a heavy chain CDR1 as set forth in SEQ ID NO: 17, a heavy chain CDR2
as set forth in SEQ ID NO: 18, and a heavy chain CDR3 as set forth in SEQ ID
NO: 9;

wherein the light chain comprises:

a light chain CDR1 as set forth in SEQ ID NO: 10, a light chain CDR2 as
set forth in SEQ ID NO: 11, and a light chain CDR3 as set forth in SEQ ID NO:
12; or

a light chain CDR1 as set forth in SEQ ID NO: 13, a light chain CDR2 as
set forth in SEQ ID NO: 14, and a light chain CDR3 as set forth in SEQ ID NO:
15; or

a light chain CDR1 as set forth in SEQ ID NO: 10, a light chain
CDR2 as set forth in SEQ ID NO: 11, and a light chain CDR3 as set forth in SEQ
ID NO: 16.

31. The antibody of claim 30, wherein the heavy chain comprises the amino acid
sequence as set forth in SEQ ID NO: 1, and wherein the light chain comprises the amino acid
sequence as set forth in SEQ ID NO: 2, SEQ ID NO: 3, or SEQ ID NO: 4.

32. An antibody or fragment thereof that specifically binds to Mucin-1 (MUC-1),
wherein the antibody or fragment thereof comprises:

a heavy chain complementarity determining region (HCDR) 1, HCDR2, and HCDR3 as
set forth in a variable heavy (VH) chain comprising the amino acid sequence of SEQ ID
NO: 1; and

a light chain complementarity determining region (LCDR) 1, LCDR2, and LCDR3 as set
forth in a variable light (VL) chain comprising the amino acid sequence of any one of SEQ
ID NOs: 2, 3, or 4.