

WHAT IS CLAIMED IS:

1. An isolated antibody or an antigen-binding fragment thereof, comprising ~~1, 2, or 3 heavy chain complementarity determining region (CDR) sequences selected from the group consisting of: SEQ ID NOs: 1, 3, 5, 7, 9, 11, 14, 16, 17, 18, 19, 21, 23, 25, 27, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 95, 96, 97, 104, 105, 106, 113, 114, 115, 126, 127, 128, 136, 137, 150, 151, 152, 160, 161, 162, 168, 169, 170, 222, 223 and 224 and/or 1, 2, or 3 light chain CDR sequences selected from the group consisting of: SEQ ID NOs: 2, 4, 6, 8, 10, 12, 13, 15, 20, 22, 24, 26, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 98, 99, 100, 107, 108, 116, 117, 129, 130, 131, 138, 139, 140, 145, 153, 154, 155, 163, 171, 172, 173, 184, 185, 186, 187, 188, 225, 226 and 227;~~
2. ~~The antibody or antigen binding fragment thereof of claim 1, comprising a heavy chain variable region selected from the group consisting of:~~
 - a) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 1, SEQ ID NO: 3, and SEQ ID NO: 5;~~
 - b) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 7, SEQ ID NO: 9, and SEQ ID NO: 11;~~
 - c) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 7, SEQ ID NO: 14, and SEQ ID NO: 11;~~
 - d) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 16, SEQ ID NO: 17, and SEQ ID NO: 18;~~
 - e) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 19, SEQ ID NO: 21, and SEQ ID NO: 23;~~
 - f) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 27, and SEQ ID NO: 28;~~
 - ag) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 30, and SEQ ID NO: 28; and
 - h) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 32, SEQ ID NO: 34, and SEQ ID NO: 36;~~

- i) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 38, SEQ ID NO: 40, and SEQ ID NO: 42;~~
 - j) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 44, SEQ ID NO: 46, and SEQ ID NO: 48;~~
 - k) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97;~~
 - l) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106;~~
 - m) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 113, SEQ ID NO: 114, and SEQ ID NO: 115;~~
 - n) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 126, SEQ ID NO: 127, and SEQ ID NO: 128;~~
 - o) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 136, and SEQ ID NO: 137;~~
 - p) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 150, SEQ ID NO: 151, and SEQ ID NO: 152;~~
 - q) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 160, SEQ ID NO: 161, and SEQ ID NO: 162;~~
 - r) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 168, SEQ ID NO: 169, and SEQ ID NO: 170; and~~
 - s) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 222, SEQ ID NO: 223, and SEQ ID NO: 224.~~
3. ~~The antibody or antigen-binding fragment thereof of any of the preceding claims, comprising a light chain variable region selected from the group consisting of:~~
- a) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 2, SEQ ID NO: 4, and SEQ ID NO: 6;~~
 - b) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 8, SEQ ID NO: 10, and SEQ ID NO: 12;~~
 - c) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 13, SEQ ID NO: 10 and SEQ ID NO: 15;~~

- d) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 20, SEQ ID NO: 22, and SEQ ID NO: 24;~~
- e) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 26, SEQ ID NO: 22, and SEQ ID NO: 24;~~
- f) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 29, SEQ ID NO: 22, and SEQ ID NO: 31;~~
- g) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 33, SEQ ID NO: 35, and SEQ ID NO: 37;~~
- h) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 39, SEQ ID NO: 41, and SEQ ID NO: 43;~~
- i) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 45, SEQ ID NO: 47, and SEQ ID NO: 49;~~
- j) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100;~~
- k) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 107, SEQ ID NO: 108, and SEQ ID NO: 37;~~
- l) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 13, SEQ ID NO: 116, and SEQ ID NO: 117;~~
- m) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 129, SEQ ID NO: 130, and SEQ ID NO: 131;~~
- n) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 138, SEQ ID NO: 139, and SEQ ID NO: 140;~~
- o) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 29, SEQ ID NO: 145, and SEQ ID NO: 24;~~
- p) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 153, SEQ ID NO: 154, and SEQ ID NO: 155;~~
- q) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 163, SEQ ID NO: 154, and SEQ ID NO: 155;~~
- r) ~~a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 171, SEQ ID NO: 172, and SEQ ID NO: 173;~~

- ~~s) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 184, SEQ ID NO: 108, and SEQ ID NO: 37;~~
 - ~~t) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 185, SEQ ID NO: 108, and SEQ ID NO: 37;~~
 - ~~u) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 186, SEQ ID NO: 108, and SEQ ID NO: 37;~~
 - ~~v) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 187, SEQ ID NO: 108, and SEQ ID NO: 37;~~
 - ~~w) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 188, SEQ ID NO: 108, and SEQ ID NO: 37; and~~
 - ~~x) a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 225, SEQ ID NO: 226, and SEQ ID NO: 227.~~
4. The antibody or antigen binding fragment thereof of any of the preceding claims, comprising:
- b) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO:25, SEQ ID NO: 27, and SEQ ID NO: 28; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 26, SEQ ID NO: 22, and SEQ ID NO:24;
 - ca) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 1, SEQ ID NO: 3, and SEQ ID NO: 5; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 2, SEQ ID NO: 4, and SEQ ID NO: 6;
 - db) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 7, SEQ ID NO: 9, and SEQ ID NO: 11; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 8, SEQ ID NO: 10, and SEQ ID NO: 12;
 - ee) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 7, SEQ ID NO: 14, and SEQ ID NO: 11; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 13, SEQ ID NO: 10 and SEQ ID NO: 15;

- ~~f~~d) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 16, SEQ ID NO: 17, and SEQ ID NO: 18; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 13, SEQ ID NO: 10, and SEQ ID NO: 15;
- g) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 19, SEQ ID NO: 21, and SEQ ID NO: 23; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 20, SEQ ID NO: 22, and SEQ ID NO: 24;
- ~~f~~) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 27, and SEQ ID NO: 28; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 26, SEQ ID NO: 22, and SEQ ID NO: 24;~~
- ~~g~~) ~~a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 30, and SEQ ID NO: 28; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 29, SEQ ID NO: 22, and SEQ ID NO: 31;~~
- h) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 32, SEQ ID NO: 34, and SEQ ID NO: 36; and a light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 33, SEQ ID NO: 35, and SEQ ID NO: 37;
- i) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 38, SEQ ID NO: 40, and SEQ ID NO: 42; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 39, SEQ ID NO: 41, and SEQ ID NO: 43;
- j) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 44, SEQ ID NO: 46, and SEQ ID NO: 48; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 45, SEQ ID NO: 47, and SEQ ID NO: 49;
- k) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97; and a kappa light

- chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100;
- l) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 107, SEQ ID NO: 108, and SEQ ID NO: 37;
 - m) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 113, SEQ ID NO: 114, and SEQ ID NO: 115; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 13, SEQ ID NO: 116, and SEQ ID NO: 117;
 - n) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 126, SEQ ID NO: 127, and SEQ ID NO: 128; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 129, SEQ ID NO: 130, and SEQ ID NO: 131;
 - o) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 136, and SEQ ID NO: 137; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 138, SEQ ID NO: 139, and SEQ ID NO: 140;
 - p) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 25, SEQ ID NO: 30, and SEQ ID NO: 28; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 29, SEQ ID NO: 145, and SEQ ID NO: 24;
 - q) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 150, SEQ ID NO: 151, and SEQ ID NO: 152; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 153, SEQ ID NO: 154, and SEQ ID NO: 155;
 - r) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 160, SEQ ID NO: 161, and SEQ ID NO: 162; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 163, SEQ ID NO: 154, and SEQ ID NO: 155;

- s) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 168, SEQ ID NO: 169, and SEQ ID NO: 170; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 171, SEQ ID NO: 172, and SEQ ID NO: 173;
- t) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 184, SEQ ID NO: 108, and SEQ ID NO: 37;
- u) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 185, SEQ ID NO: 108, and SEQ ID NO: 37;
- v) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 186, SEQ ID NO: 108, and SEQ ID NO: 37;
- w) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 187, SEQ ID NO: 108, and SEQ ID NO: 37;
- x) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 188, SEQ ID NO: 108, and SEQ ID NO: 37; or
- y) a heavy chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 222, SEQ ID NO: 223, and SEQ ID NO: 224; and a kappa light chain variable region comprising 1, 2, or 3 CDR sequences selected from SEQ ID NO: 225, SEQ ID NO: 226, and SEQ ID NO: 227.

25. The antibody or antigen-binding fragment thereof of ~~any of the preceding claims~~
claim 1, comprising:

a) a heavy chain variable region comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: ~~74~~50, ~~SEQ ID NO: 54~~, ~~SEQ ID NO: 58~~, ~~SEQ ID NO: 62~~, ~~SEQ ID NO: 66~~, ~~SEQ ID NO: 70~~, ~~SEQ ID NO: 74~~, ~~SEQ ID NO: 78~~, ~~SEQ ID NO: 82~~, ~~SEQ ID NO: 86~~, ~~SEQ ID NO: 101~~, ~~SEQ ID NO: 109~~, ~~SEQ ID NO: 118~~, ~~SEQ ID NO: 122~~, ~~SEQ ID NO: 132~~, ~~SEQ ID NO: 141~~, ~~SEQ ID NO: 146~~, ~~SEQ ID NO: 156~~, ~~SEQ ID NO: 164~~, ~~SEQ ID NO: 174~~, ~~SEQ ID NO: 177~~, ~~SEQ ID NO: 178~~, ~~SEQ ID NO: and 179~~, ~~SEQ ID NO: 189~~, ~~SEQ ID NO: 190~~, ~~SEQ ID NO: 191~~, ~~SEQ ID NO: 192~~, ~~SEQ ID NO: 193~~, ~~SEQ ID NO: 194~~ and the homologue sequences of at least 80% sequence identity thereof.

6. ~~The antibody or antigen-binding fragment thereof of any of the preceding claims, comprising and~~ a light chain variable region comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: ~~52~~, ~~SEQ ID NO: 56~~, ~~SEQ ID NO: 64~~, ~~SEQ ID NO: 68~~, ~~SEQ ID NO: 72~~, ~~SEQ ID NO: 76~~, ~~SEQ ID NO: 80~~, ~~SEQ ID NO: 84~~, ~~SEQ ID NO: 88~~, ~~SEQ ID NO: 103~~, ~~SEQ ID NO: 111~~, ~~SEQ ID NO: 120~~, ~~SEQ ID NO: 124~~, ~~SEQ ID NO: 134~~, ~~SEQ ID NO: 143~~, ~~SEQ ID NO: 148~~, ~~SEQ ID NO: 158~~, ~~SEQ ID NO: 166~~, ~~SEQ ID NO: 176~~, ~~SEQ ID NO: 76~~, ~~180~~, ~~SEQ ID NO: 181~~, ~~SEQ ID NO: 182~~, and SEQ ID NO: 183;

b) a heavy chain variable region comprising SEQ ID NO: ~~195~~, ~~SEQ ID NO: 196~~, ~~SEQ ID NO: 197~~, ~~SEQ ID NO: 198~~, ~~SEQ ID NO: 199~~, ~~SEQ ID NO: 200~~, ~~SEQ ID NO: 201~~, ~~SEQ ID NO: 202~~, ~~SEQ ID NO: 203~~, ~~SEQ ID NO: 221~~ and the homologue sequences of at least 80% sequence identity thereof. 70 and a light chain variable region comprising SEQ ID NO: 72;

7. ~~The antibody or antigen-binding fragment thereof of any of the preceding claims, comprising:~~

ca) a heavy chain variable region comprising SEQ ID NO: 50 and a light chain variable region comprising SEQ ID NO: 52;

db) a heavy chain variable region comprising SEQ ID NO: 54 and a light chain variable region comprising SEQ ID NO: 56;

ee) a heavy chain variable region comprising SEQ ID NO: 58 and a light chain variable region comprising SEQ ID NO: 64;

- fd) a heavy chain variable region comprising SEQ ID NO: 62 and a light chain variable region comprising SEQ ID NO: 64;
- ge) a heavy chain variable region comprising SEQ ID NO: 66 and a light chain variable region comprising SEQ ID NO: 68;
- ~~f) a heavy chain variable region comprising SEQ ID NO: 70 and a light chain variable region comprising SEQ ID NO: 72;~~
- ~~g) a heavy chain variable region comprising SEQ ID NO: 74 and a light chain variable region comprising SEQ ID NO: 76;~~
- h) a heavy chain variable region comprising SEQ ID NO: 78 and a light chain variable region comprising SEQ ID NO: 80;
- i) a heavy chain variable region comprising SEQ ID NO: 82 and a light chain variable region comprising SEQ ID NO: 84;
- j) a heavy chain variable region comprising SEQ ID NO: 86 and a light chain variable region comprising SEQ ID NO: 88;
- k) a heavy chain variable region comprising SEQ ID NO: 101 and a light chain variable region comprising SEQ ID NO: 103;
- l) a heavy chain variable region comprising SEQ ID NO: 109 and a light chain variable region comprising SEQ ID NO: 111;
- m) a heavy chain variable region comprising SEQ ID NO: 118 and a light chain variable region comprising SEQ ID NO: 120 or SEQ ID NO: 221;
- n) a heavy chain variable region comprising SEQ ID NO: 122 and a light chain variable region comprising SEQ ID NO: 124;
- o) a heavy chain variable region comprising SEQ ID NO: 132 and a light chain variable region comprising SEQ ID NO: 134;
- p) a heavy chain variable region comprising SEQ ID NO: 141 and a light chain variable region comprising SEQ ID NO: 143;
- q) a heavy chain variable region comprising SEQ ID NO: 146 and a light chain variable region comprising SEQ ID NO: 148;
- r) a heavy chain variable region comprising SEQ ID NO: 156 and a light chain variable region comprising SEQ ID NO: 158;

- s) a heavy chain variable region comprising SEQ ID NO: 164 and a light chain variable region comprising SEQ ID NO: 166;
- t) a heavy chain variable region comprising SEQ ID NO: 174 and a light chain variable region comprising SEQ ID NO: 176;
- u) a heavy chain variable region comprising SEQ ID NO: 177 and a light chain variable region comprising SEQ ID NO: 180;
- v) a heavy chain variable region comprising SEQ ID NO: 178 and a light chain variable region comprising SEQ ID NO: 180;
- w) a heavy chain variable region comprising SEQ ID NO: 179 and a light chain variable region comprising SEQ ID NO: 180;
- x) a heavy chain variable region comprising SEQ ID NO: 177 and a light chain variable region comprising SEQ ID NO: 181;
- y) a heavy chain variable region comprising SEQ ID NO: 178 and a light chain variable region comprising SEQ ID NO: 181;
- z) a heavy chain variable region comprising SEQ ID NO: 179 and a light chain variable region comprising SEQ ID NO: 181;
- aa) a heavy chain variable region comprising SEQ ID NO: 177 and a light chain variable region comprising SEQ ID NO: 182;
- bb) a heavy chain variable region comprising SEQ ID NO: 178 and a light chain variable region comprising SEQ ID NO: 182;
- cc) a heavy chain variable region comprising SEQ ID NO: 179 and a light chain variable region comprising SEQ ID NO: 182;
- dd) a heavy chain variable region comprising SEQ ID NO: 177 and a light chain variable region comprising SEQ ID NO: 183;
- ee) a heavy chain variable region comprising SEQ ID NO: 178 and a light chain variable region comprising SEQ ID NO: 183;
- ff) a heavy chain variable region comprising SEQ ID NO: 179 and a light chain variable region comprising SEQ ID NO: 183;
- gg) a heavy chain variable region comprising SEQ ID NO: 189 and a light chain variable region comprising SEQ ID NO: 195;

- hh) a heavy chain variable region comprising SEQ ID NO: 189 and a light chain variable region comprising SEQ ID NO: 196;
- ii) a heavy chain variable region comprising SEQ ID NO: 189 and a light chain variable region comprising SEQ ID NO: 197;
- jj) a heavy chain variable region comprising SEQ ID NO: 189 and a light chain variable region comprising SEQ ID NO: 198;
- kk) a heavy chain variable region comprising SEQ ID NO: 189 and a light chain variable region comprising SEQ ID NO: 199;
- ll) a heavy chain variable region comprising SEQ ID NO: 190 and a light chain variable region comprising SEQ ID NO: 200;
- mm) a heavy chain variable region comprising SEQ ID NO: 190 and a light chain variable region comprising SEQ ID NO: 201;
- nn) a heavy chain variable region comprising SEQ ID NO: 190 and a light chain variable region comprising SEQ ID NO: 202;
- oo) a heavy chain variable region comprising SEQ ID NO: 190 and a light chain variable region comprising SEQ ID NO: 203;
- pp) a heavy chain variable region comprising SEQ ID NO: 191 and a light chain variable region comprising SEQ ID NO: 200;
- qq) a heavy chain variable region comprising SEQ ID NO: 191 and a light chain variable region comprising SEQ ID NO: 201;
- rr) a heavy chain variable region comprising SEQ ID NO: 191 and a light chain variable region comprising SEQ ID NO: 202;
- ss) a heavy chain variable region comprising SEQ ID NO: 191 and a light chain variable region comprising SEQ ID NO: 203;
- tt) a heavy chain variable region comprising SEQ ID NO: 192 and a light chain variable region comprising SEQ ID NO: 200;
- uu) a heavy chain variable region comprising SEQ ID NO: 192 and a light chain variable region comprising SEQ ID NO: 201;
- vv) a heavy chain variable region comprising SEQ ID NO: 192 and a light chain variable region comprising SEQ ID NO: 202;

ww) a heavy chain variable region comprising SEQ ID NO: 192 and a light chain variable region comprising SEQ ID NO: 203;

xx) a heavy chain variable region comprising SEQ ID NO: 193 and a light chain variable region comprising SEQ ID NO: 200;

yy) a heavy chain variable region comprising SEQ ID NO: 193 and a light chain variable region comprising SEQ ID NO: 201;

zz) a heavy chain variable region comprising SEQ ID NO: 193 and a light chain variable region comprising SEQ ID NO: 202;

aaa) a heavy chain variable region comprising SEQ ID NO: 193 and a light chain variable region comprising SEQ ID NO: 203;

bbb) a heavy chain variable region comprising SEQ ID NO: 194 and a light chain variable region comprising SEQ ID NO: 200;

ccc) a heavy chain variable region comprising SEQ ID NO: 194 and a light chain variable region comprising SEQ ID NO: 201;

ddd) a heavy chain variable region comprising SEQ ID NO: 194 and a light chain variable region comprising SEQ ID NO: 202; or

eee) a heavy chain variable region comprising SEQ ID NO: 194 and a light chain variable region comprising SEQ ID NO: 203.

38. The antibody or antigen-binding fragment thereof of any of the preceding claims, further comprising one or more amino acid residue substitutions or modifications yet retains specific binding affinity to human CD24 or cynomolgus monkey CD24, or

or

~~9. The antibody or antigen-binding fragment thereof of any one of the preceding claims,~~ preferably wherein the substitution is in one or more CDR sequences, and/or in one or more of the VH or VL sequences but not in any of the CDR sequences.

~~410.~~ The antibody or antigen-binding fragment thereof of any of the preceding claims, further comprising an immunoglobulin constant region, optionally a constant region of human Ig, or optionally a constant region of human IgG, or

- ~~11. The antibody or antigen-binding fragment thereof of claim 10, preferably wherein the constant region comprises a constant region of human IgG1, IgG2, IgG3, or IgG4.~~
- ~~12. The antibody or antigen-binding fragment thereof of any one of the preceding claims, which is a chimeric or humanized, or~~
- ~~13. The antibody or antigen-binding fragment thereof of any one of the preceding claims, preferably which is selected from the group consisting of: a diabody, a Fab, a Fab', a F(ab')₂, a Fd, an Fv fragment, a disulfide stabilized Fv fragment (dsFv), a (dsFv)₂, a bispecific dsFv (dsFv-dsFv'), a disulfide stabilized diabody (ds diabody), a single-chain antibody molecule (scFv), an scFv dimer (bivalent diabody), a multispecific antibody, a camelized single domain antibody, a nanobody, a domain antibody, and a bivalent domain antibody, or~~
- ~~14. The antibody or antigen-binding fragment thereof of any of the preceding claims, preferably which is bispecific, or~~
- ~~15. The antibody or antigen-binding fragment thereof of claim 14, preferably which is capable of specifically binding to a first and a second epitope of CD24, or capable of specifically binding to CD24 and a second antigen, or~~
- ~~16. The antibody or antigen-binding fragment thereof of claim 15, preferably which binds CD24 via a Fab and binds the second antigen via a scFv, or~~
- ~~17. The antibody or antigen-binding fragment thereof of claim 16, preferably wherein the second antigen-binding scFv is operably linked to the C terminus of the heavy chain constant region following the CD24-binding Fab, or~~
- ~~18. The antibody or antigen-binding fragment thereof of claim 17, preferably wherein the bispecific antibody molecule comprises a heavy chain in the format of: VH(anti-CD24)-CH1-Hinge-CH2-CH3-spacer-second antigen-binding scFv, associated with a light chain in the format of VL(anti-CD24)-CL, or~~
- ~~19. The antibody or antigen-binding fragment thereof of any one of claims 15-18, preferably wherein the second antigen is an immune related target, optionally selected from the group consisting of: PD-L1, PD-L2, PD-1, CLTA-4, TIM-3,~~

LAG3, CD160, 2B4, TGF β , VISTA, BTLA, TIGIT, LAIR1, OX40, CD2, CD27, ICAM-1, NKG2C, SLAMF7, NKp80, CD160, B7-H3, LFA-1, ICOS, 4-1BB, GITR, CD30, CD40, BAFFR, HVEM, CD7, LIGHT, IL-2, IL-15, CD3, CD16, SIRP α , Siglec 10, LILRB2, Clever-1, ~~MARCO_{acero}~~, LILRB4, Siglec15, CSF1R, PSGL-1, VSIG-4, B2M and CD83~~;~~, or

~~20. The antibody or antigen-binding fragment thereof of claim 16, preferably wherein~~
the second antigen comprises a tumor antigen~~;~~, or

~~21. The antibody or antigen-binding fragment thereof of claim 20, preferably wherein~~
the tumor antigen comprises CA-125, gangliosides G(D2), G(M2) and G(D3), CD19, CD20, CD33, CD47, CD52, Ep-CAM, CEA, CLDN18.2, bombesin-like peptides, PSA, HER2/neu, epidermal growth factor receptor (EGFR), erbB2, erbB3/HER3, erbB4, CD44v6, CD44v9, Ki-67, cancer-associated mucin, VEGF, VEGFRs (e.g., VEGFR3), estrogen receptors, Lewis-Y antigen, TGF β 1, IGF-1 receptor, EGF α , c-Kit receptor, transferrin receptor, IL-2R, CDH6, CEA, FOLR1, TROP2, PTK7, SLITRK6, CD142, NECTIN-4, ROR1, ROR2, CD142, CD123, CD22, CD79b, DLL3, SLC family or CO17-1A~~;~~, or

~~22. The antibody or antigen-binding fragment thereof of claim 21, preferably wherein~~
the tumor antigen is CD47~~;~~, or

~~23. The preferably wherein the antibody or antigen-binding fragment thereof of claim~~
~~22,~~ comprises a heavy chain in the format of: VH(anti-CD24)-CH1-Hinge-CH2-CH3-spacer-scFv(anti-CD47), associated with a light chain in the format of VL(anti-CD24)-CL.

~~24.~~ The antibody or antigen-binding fragment thereof of any one of the preceding claims, wherein the antibody or antigen-binding fragment is linked to one or more conjugates, optionally, wherein the conjugate is covalently attached either directly or via a linker~~;~~, or

~~25. The antibody or antigen-binding fragment thereof of claim 24, preferably wherein~~
the conjugate comprises a clearance-modifying agent, a chemotherapeutic agent, a toxin, a radioactive isotope, a lanthanide, a luminescent label, a fluorescent label, an enzyme-substrate label, a DNA-alkylators, a topoisomerase inhibitor, a tubulin-

binders, or other anticancer drugs, or

~~26. The antibody or antigen-binding fragment thereof of any one of the preceding claims,~~
preferably wherein the antibody or antigen-binding fragment is capable of specifically binding to CD24, and optionally wherein the CD24 are derived from human or cynomolgus monkey, and optionally wherein the CD24 is a recombinant CD24 or a CD24 expressed on a cell surface.

~~27. An antibody or antigen-binding fragment thereof, which competes for the same epitope with the antibody or antigen-binding fragment thereof of any one of the preceding claims, or~~

~~28. The preferably wherein the antibody or antigen-binding fragment thereof of claim~~
~~27, which~~ competes for the same epitope with the antibody or antigen-binding fragment thereof comprising: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3, wherein the LCDR1 comprises an amino acid sequence selected from the group consisting of SEQ ID NO: 107, 184, 185, 186, 187 and 188, the LCDR2 comprises an amino acid sequence of SEQ ID NO: 108, and the LCDR3 comprises an amino acid sequence of SEQ ID NO: 37, or

~~29. The preferably wherein the antibody or antigen-binding fragment thereof of claim~~
~~27, which~~ competes for the same epitope with the antibody or antigen-binding fragment thereof comprising: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3 of SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100 respectively, or

~~30. The preferably wherein the antibody or antigen-binding fragment thereof of claim~~
~~28 or 29, which~~ selectively binds to CD24 expressed in a cancer cell over a non-cancer cell.

~~31. A pharmaceutical composition comprising the antibody or antigen-binding fragment thereof of any one of the preceding claims, and a pharmaceutically~~

acceptable carrier~~-, or~~

~~32. The preferably wherein the pharmaceutical composition of claim 31, further comprising a second therapeutic agent, optionally, wherein the second therapeutic agent is an antagonist against one or more immunoinhibitory molecules, or an anti-cancer agent (e.g., Oxaliplatin, Atezolizumab, Rituximab)~~-, or~~~~

~~33. The pharmaceutical composition of claim 32, preferably wherein the second therapeutic agent is a CD47 antagonist, optionally, wherein the CD47 antagonist is a SIRP α -Fc fusion protein or variant thereof, or an anti-CD47 antibody or antigen-binding fragment thereof.~~

~~934. An isolated polynucleotide encoding the antibody or antigen-binding fragment thereof of any one of claims 1-726, or~~

~~35. The preferably wherein the isolated polynucleotide of claim 34, which comprises a nucleotide sequence selecting from a group consisting of SEQ ID NO: 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 102, 110, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219 and 220.~~

~~1036. A vector comprising the isolated polynucleotide of claim 935 or 35.~~

~~1137. A host cell comprising the vector of claim 1036.~~

~~1238. A method of expressing the antibody or antigen-binding fragment thereof of any one of claims 1-726, comprising culturing the host cell of claim 1137 under the condition at which the vector of claim 1036 is expressed.~~

~~1339. The antibody or antigen-binding fragment thereof of any of claims 1-7 or the pharmaceutical composition of claim 8 for use in a A-method of treating a disease or condition in a subject that would benefit from modulation of CD24 activity, comprising administering to the subject a therapeutically effective amount of the antibody or antigen-binding fragment thereof of any of claims 1-26 or the pharmaceutical composition of any one of claims 31-33, or~~

~~40. The method of claim 39, preferably wherein the disease or condition is a CD24 related disease or condition~~-, or~~~~

~~41. The method of claim 39, preferably wherein the disease or condition is cancer, adaptive immune disease, autoimmune disease, inflammatory disease, or infectious~~

disease-, or

~~42. The method of claim 41, preferably~~ wherein the cancer is lung cancer, bronchial cancer, bone cancer, liver and bile duct cancer, pancreatic cancer, breast cancer, liver cancer, ovarian cancer, testicle cancer, kidney cancer, bladder cancer, head and neck cancer, spine cancer, brain cancer, cervix cancer, uterine cancer, endometrial cancer, colon cancer, colorectal cancer, rectal cancer, anal cancer, esophageal cancer, gastrointestinal cancer, skin cancer, prostate cancer, pituitary cancer, stomach cancer, vagina cancer, thyroid cancer, glioblastoma, astrocytoma, melanoma, myelodysplastic syndrome, sarcoma, teratoma, adenocarcinoma, leukemia, myeloma and lymphoma, optionally, wherein the cancer is chemoresistant-, or

~~43. The method of claim 41, preferably~~ wherein the disease or condition is hematological cancer chosen from B-cell lymphomas, optionally Hodgkin's lymphoma, non-Hodgkin's lymphoma (NHL), acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), multiple myeloma (MM), diffuse large B cell lymphoma (DLBCL), Marginal zone B-cell lymphoma (MZL), Mantle cell lymphoma (MCL), Richter's syndrome, Burkitt's lymphoma or follicular lymphoma-, or

~~44. The method of claim 39, preferably~~ wherein the subject is human-, or

~~45. The method of claim 39, comprising administering to the subject preferably~~ wherein a therapeutically effective amount of a second therapeutic agent is to be further administered to the subject, optionally, wherein the second therapeutic agent is an antagonist against one or more immunoinhibitory molecules-, or

~~46. The method of claim 45, preferably~~ wherein the second therapeutic agent is a CD47 antagonist, optionally, wherein the CD47 antagonist is a SIRP α -Fc fusion protein or variant thereof, or an anti-CD47 antibody or antigen-binding fragment thereof-, or

~~47. The method of any of claims 39-46, preferably~~ wherein the administration is via oral, nasal, intravenous, subcutaneous, sublingual, or intramuscular administration.

~~1448. A method of modulating CD24 activity in a CD24-expressing cell, comprising exposing the CD24-expressing cell to~~The antibody or antigen-binding fragment thereof of any one of claims 1-7 for use in a method of modulating CD24 activity in a CD24-expressing cell.

~~1549. A~~The antibody or antigen-binding fragment thereof of any one of claims 1-7 for use in a method of detecting presence or amount of CD24 in a sample, comprising contacting the sample with~~wherein the antibody or antigen-binding fragment thereof of any one of claims 1-26 is to be contacted with the sample, and determining the presence or the amount of CD24 in the sample~~is to be determined.

~~1650. A~~The antibody or antigen-binding fragment thereof of any one of claims 1-7 for use in a method of diagnosing a CD24 related disease or condition in a subject, wherein comprising: a) obtaining the antibody or antigen-binding fragment thereof is to be contacted with a sample obtained from the subject; b) contacting the sample obtained from the subject with the antibody or antigen-binding fragment thereof of any one of claims 1-26; c) determining presence or amount of CD24 in the sample is to be determined; and~~cd) correlating the presence or the amount of CD24~~is to be correlated to existence or status of the CD24 related disease or condition in the subject.

~~51. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-26 in the manufacture of a medicament for treating a CD24 related disease or condition in a subject.~~

~~52. The use of claim 51, wherein the medicament further comprises a second therapeutic agent, optionally, wherein the second therapeutic agent is an antagonist against one or more immunoinhibitory molecules.~~

~~53. The use of claim 52, wherein the second therapeutic agent is a CD47 antagonist, optionally, wherein the CD47 antagonist is SIRP α -Fc fusion protein or variant thereof, or an anti-CD47 antibody or antigen-binding fragment thereof.~~

~~54. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-26 in the manufacture of a diagnostic reagent for diagnosing a CD24 related disease or condition.~~

1755. A kit comprising the antibody or antigen-binding fragment thereof of any of claims 1-~~726~~, useful in detecting CD24, optionally recombinant CD24, CD24 expressed on cell surface, or CD24-expressing cells.
1856. A chimeric antigen receptor (CAR) comprising an antigen binding domain, a transmembrane domain, a costimulatory signaling region, and a TCR signaling domain, wherein the antigen binding domain specifically binds to CD24 and comprises an antigen binding fragment of any one of claims 1-~~726~~, or
- ~~57. The CAR of claim 56, preferably~~ wherein the antigen binding fragment is a Fab or a scFv, or
- ~~58. preferably wherein the CAR of claim 56 or 57, which is bispecific, or~~
- ~~59. The CAR of claim 58, preferably~~ wherein the CAR is capable of further specifically binding to a second antigen other than CD24, or a second epitope on CD24, or
- ~~60. The CAR of claim 59, preferably~~ wherein the second antigen is a tumor antigen, or
- ~~61. The CAR of claim 56, preferably~~ wherein the TCR signaling domain is selected from the group consisting of: an intracellular signal regions sequence of CD3ζ, FcγRIγ, CD27, CD28, CD137, CD134, MyD88, CD40, CD278, TLRs, or a combination thereof, or
- ~~62. The CAR of claim 56, preferably~~ wherein the transmembrane region comprises a transmembrane region of CD3, CD4, CD8 or CD28.
1963. A nucleic acid sequence encoding the chimeric antigen receptor (CAR) of ~~any one of claims 1856-62~~.
2064. A cell comprising the nucleic acid sequence of claim 1963.
2165. A cell genetically modified to express the CAR of ~~any one of claims 56-62~~.
- ~~66. The cell of claim 1865, or preferably~~ wherein the cell is immune cell, optionally, wherein the immune cell is T lymphocyte, NK cell, monocyte, macrophage or NKT lymphocyte.
2267. A vector comprising the nucleic acid sequence of claim 1963.

- ~~2368. The cell genetically modified to express the CAR of claim 1 for use in a A~~
method for stimulating a T cell-mediated immune response to a CD24-expressing
cell or tissue in a mammal, ~~the method comprising administering to the mammal~~
~~wherein~~ an effective amount of ~~the a-cell~~ genetically modified to express the
CAR ~~of any one of claims 56-62~~ is to be administered to the mammal.
- ~~2469. The cell of claim 21 for use in a A~~ method of treating a mammal having a
CD24 related disease or condition, ~~comprising administering to the mammal~~
~~wherein~~ an effective amount of ~~the a-cell of claim 65~~ is to be administered to the
mammal, thereby treating the mammal, ~~or~~
- ~~70. The method of claim 69, preferably~~ wherein the cell is an autologous T cell, ~~or~~
- ~~71. The method of claim 69, preferably~~ wherein the CD24 related disease or
condition is cancer, ~~or~~
- ~~72. The method of claim 69, preferably~~ wherein the mammal is a human subject.
- ~~2573. An anti-CD24 antibody or antigen-binding fragment thereof that only binds to~~
~~the glycosylated or sialylated CD24 for use in a~~ method of treating cancer in a
subject in need thereof, ~~comprising administering an or preferably wherein the~~
anti-CD24 antibody or antigen-binding fragment thereof ~~that only binds to the~~
~~glycosylated or sialylated CD24, preferably, only binds to the sialic acid of CD24,~~
~~or~~
- ~~74. The method of claim 73, preferably~~ wherein the anti-CD24 antibody or antigen-
binding fragment thereof selectively binds to CD24 expressed in a cancer cell over
a non-cancer cell, ~~or~~
- ~~75. The method of claim 74, preferably~~ wherein the anti-CD24 antibody or antigen-
binding fragment thereof competes for the same epitope with the antibody or
antigen-binding fragment thereof comprising: a heavy chain variable region
comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 104, SEQ ID NO: 105,
and SEQ ID NO: 106 respectively; and a light chain variable region comprising
LCDR1, LCDR2, and LCDR3, wherein the LCDR1 comprises an amino acid

sequence selected from the group consisting of SEQ ID NO: 107, 184, 185, 186, 187 and 188, the LCDR2 comprises an amino acid sequence of SEQ ID NO: 108, and the LCDR3 comprises an amino acid sequence of SEQ ID NO: 37, or comprising: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3 of SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100 respectively, or

~~76. The method of claim 75, preferably~~ wherein the anti-CD24 antibody or antigen-binding fragment thereof comprises: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3, wherein the LCDR1 comprises an amino acid sequence selected from the group consisting of SEQ ID NO: 107, 184, 185, 186, 187 and 188, the LCDR2 comprises an amino acid sequence of SEQ ID NO: 108, and the LCDR3 comprises an amino acid sequence of SEQ ID NO: 37, or comprises: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3 of SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100 respectively.

26. Use of the cell genetically modified to express the CAR of claim 1 in the manufacture of a medicament for stimulating a T cell-mediated immune response to a CD24-expressing cell or tissue in a mammal.

27. Use of the cell of claim 21 in the manufacture of a medicament for treating a mammal having a CD24 related disease or condition, or preferably wherein the cell is an autologous T cell, or preferably wherein the CD24 related disease or condition is cancer, or preferably wherein the mammal is a human subject.

28. Use of an anti-CD24 antibody or antigen-binding fragment thereof that only binds to the glycosylated or sialylated CD24 in the manufacture of a medicament for treating cancer in a subject in need thereof, or preferably wherein the anti-CD24 antibody or antigen-binding fragment thereof only binds to the sialic acid of CD24,

or preferably wherein the anti-CD24 antibody or antigen-binding fragment thereof selectively binds to CD24 expressed in a cancer cell over a non-cancer cell, or preferably wherein the anti-CD24 antibody or antigen-binding fragment thereof competes for the same epitope with the antibody or antigen-binding fragment thereof comprising: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3, wherein the LCDR1 comprises an amino acid sequence selected from the group consisting of SEQ ID NO: 107, 184, 185, 186, 187 and 188, the LCDR2 comprises an amino acid sequence of SEQ ID NO: 108, and the LCDR3 comprises an amino acid sequence of SEQ ID NO: 37, or comprising: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3 of SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100 respectively, or preferably wherein the anti-CD24 antibody or antigen-binding fragment thereof comprises: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 104, SEQ ID NO: 105, and SEQ ID NO: 106 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3, wherein the LCDR1 comprises an amino acid sequence selected from the group consisting of SEQ ID NO: 107, 184, 185, 186, 187 and 188, the LCDR2 comprises an amino acid sequence of SEQ ID NO: 108, and the LCDR3 comprises an amino acid sequence of SEQ ID NO: 37, or comprises: a heavy chain variable region comprising HCDR1, HCDR2, and HCDR3 of SEQ ID NO: 95, SEQ ID NO: 96, and SEQ ID NO: 97 respectively; and a light chain variable region comprising LCDR1, LCDR2, and LCDR3 of SEQ ID NO: 98, SEQ ID NO: 99, and SEQ ID NO: 100 respectively.