

CLAIMS

1. An antibody or antigen-binding fragment thereof, wherein the antibody or antigen-binding fragment comprises a heavy chain variable (V_H) region having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% sequence identity to the V_H region amino acid sequence selected from any one of SEQ ID NOs:110-115, 247-256, 518-531 and 533; and a light chain variable (V_L) region having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the V_L region amino acid sequence selected from any one of SEQ ID NOs:116-127, 257-267, 534-550 and 552-557.

2. The antibody or antigen-binding fragment thereof of claim 1, wherein the antibody or antigen-binding fragment comprises a V_H region having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98% or 99% sequence identity to the V_H region amino acid sequence selected from any one of SEQ ID NOs:110, 256 and 519; and a V_L region having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the V_L region amino acid sequence selected from any one of SEQ ID NOs:47, 51, 194 and 416.

3. An antibody or antigen-binding fragment thereof, comprising:

- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 116, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:111 and 117, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 118, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 119, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 120, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 121, respectively;
- a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 122, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 123, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:112 and 124, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:113 and 125, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:114 and 126, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:115 and 127, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:247 and 257, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:248 and 258, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:249 and 259, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:250 and 260, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:251 and 261, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:252 and 262, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:253 and 263, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:254 and 264, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:255 and 265, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:256 and 266, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:256 and 267, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:518 and 534, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:519 and 535, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:115 and 536, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:520 and 264, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:521 and 537, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:522 and 538, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:523 and 539, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:519 and 540, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:524 and 541, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:525 and 261, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:526 and 542, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:527 and 543, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:528 and 544, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:529 and 545, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:528 and 546, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:522 and 547, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:256 and 548, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:530 and 549, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:531 and 550, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:519 and 552, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 553, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 118, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:533 and 554, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:115 and 555, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:524 and 556, respectively; or

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:519 and 557, respectively.

4. The antibody or antigen-binding fragment thereof of claim 3, comprising:

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 116, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOs:110 and 120, respectively;

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOS:256 and 267, respectively; or

a V_H region and a V_L region comprising the amino acid sequence having at least 90% sequence identity to SEQ ID NOS:519 and 535, respectively.

5. An antibody or antigen-binding fragment thereof, comprising:

a heavy chain variable (V_H) region comprising a heavy chain complementarity determining region 1 (CDR-H1), CDR-H2, and CDR-H3, wherein: the CDR-H1 comprises the amino acid sequence selected from any one of SEQ ID NOs:1-3 and 140-144; the CDR-H2 comprises the amino acid sequence selected from any one of SEQ ID NOs:4-6, 145-148 and 372-374; and the CDR-H3 comprises the amino acid sequence selected from any one of SEQ ID NOs:7-11, 149-157, 279-287 and 376-378; and

a light chain variable (V_L) region comprising a heavy chain complementarity determining region 1 (CDR-L1), CDR-L2, and CDR-L3, wherein: the CDR-L1 comprises the amino acid sequence selected from any one of SEQ ID NOs: 26-36, 174-178, 380-392 and 394-398; the CDR-L2 comprises the amino acid sequence selected from any one of SEQ ID NOs: 37-46, 179-183, 399-409 and 411-414; and the CDR-L3 comprises the amino acid sequence selected from any one of SEQ ID NOs:47-58, 184-194, 415-427 and 429-433.

6. The antibody or antigen-binding fragment thereof of claim 5, wherein:
the CDR-H1 comprises the amino acid sequence selected from any one of SEQ ID NOs:1 and 2; the CDR-H2 comprises the amino acid sequence selected from any one of SEQ ID NOs:4 and 5; and the CDR-H3 comprises the amino acid sequence selected from any one of SEQ ID NOs: 7 and 157; and

the CDR-L1 comprises the amino acid sequence selected from any one of SEQ ID NOs: 26, 30, 178 and 380; the CDR-L2 comprises the amino acid sequence selected from any one of SEQ ID NOs: 37, 39, 183 or 400; and the CDR-L3 comprises the amino acid sequence selected from any one of SEQ ID NOs: 47, 51, 194 and 416.

7. An antibody or antigen-binding fragment thereof, comprising a heavy chain variable (V_H) region and a light chain variable (V_L) region, wherein:

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:26, 37, and 47, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 8, respectively, and the V_L region comprises a CDR-L1,

CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:27, 38, and 48, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:28, 39, and 49, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:29, 40, and 50, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:30, 39, and 51, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:31, 41, and 52, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:32, 42, and 53, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:30, 39, and 54, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 9, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:33, 43, and 55, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1,

CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:34, 44, and 56, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 11, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:35, 45, and 57, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:36, 46, and 58, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:140, 145, and 149, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 184, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:141, 145, and 149, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 185, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:141, 145, and 150, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 186, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:142, 146, and 151, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 187, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 152, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:175, 180, and 188, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:143, 147, and 153, respectively, and the V_L region comprises a CDR-

L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 189, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:144, 148, and 154, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:176, 181, and 190, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 155, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:177, 182, and 191, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 156, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:174, 179, and 192, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 157, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:178, 183, and 193, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 157, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:178, 183, and 194, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 6, and 376, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:30, 399, and 415, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:380, 400, and 416, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1,

CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:33, 43, and 421, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 155, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:177, 182, and 191, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 372, and 376, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:381, 401, and 417, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 376, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:382, 402, and 418, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 377, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:383, 403, and 419, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:384, 39, and 54, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:385, 180, and 58, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 373, and 152, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:175, 180, and 188, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 11, respectively, and the V_L region comprises a CDR-L1,

CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:386, 404, and 420, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 378, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:33, 43, and 421, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 9, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:387, 405, and 422, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 9, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:388, 406, and 423, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 9, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:388, 407, and 424, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:3, 6, and 376, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:389, 408, and 425, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 157, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:390, 183, and 193, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 374, and 9, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:391, 409, and 426, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1,

CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:392, 40, and 427, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:394, 39, and 429, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:395, 411, and 430, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:28, 39, and 49, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:396, 412, and 431, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:396, 412, and 58, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 10, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:397, 413, and 432, respectively; or

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:398, 414, and 433, respectively.

8. The antibody or antigen-binding fragment thereof of claim 7, wherein

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:26, 37, and 47, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:30, 39, and 51, respectively;

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:2, 5, and 157, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:178, 183, and 194, respectively; or

the V_H region comprises a CDR-H1, CDR-H2, and CDR-H3 comprising the amino acid sequence of SEQ ID NOS:1, 4, and 7, respectively, and the V_L region comprises a CDR-L1, CDR-L2, and CDR-L3 comprising the amino acid sequence of SEQ ID NOS:380, 400, and 416, respectively.

9. An antibody or antigen-binding fragment thereof, comprising:

a heavy chain complementarity determining region 1 (CDR-H1), CDR-H2, and CDR-H3, respectively, comprising the amino acid sequences of CDR-H1, CDR-H2, and CDR-H3 contained within the V_H region amino acid sequence selected from any one of SEQ ID NOS:110-115, 247-256, 518-531 and 533; and/or

a light chain complementarity determining region 1 (CDR-L1), CDR-L2, and CDR-L3, respectively, comprising the amino acid sequences of CDR-L1, CDR-L2, and CDR-L3 contained within the V_L region amino acid sequence selected from any one of SEQ ID NOS:116-127, 257-267, 534-550 and 552-557.

10. The antibody or antigen-binding fragment thereof of claim 9, wherein the CDR-H1, CDR-H2, and CDR-H3, respectively, comprise the amino acid sequences of CDR-H1, CDR-H2, and CDR-H3 contained within the V_H region amino acid sequence selected from any one of SEQ ID NOS: 110, 256 and 519; and

a light chain complementarity determining region 1 (CDR-L1), CDR-L2, and CDR-L3, respectively, comprising the amino acid sequences of CDR-L1, CDR-L2, and CDR-L3 contained within the V_L region amino acid sequence selected from any one of SEQ ID NOs: 116, 120, 267 and 535.

11. An antibody or antigen-binding fragment thereof, comprising a heavy chain variable (V_H) region and a light chain variable (V_L) region, wherein:

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region is or comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:116;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:111, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:117;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:118;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:119;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:120;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:121;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:122;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:123;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:112, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:124;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:113, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:125;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:114, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:126;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:115, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:127;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:247, and the V_L region is or comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:257;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:248, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:258;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:249, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:259;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:250, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:260;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:251, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:261;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:252, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:262;

L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:557, respectively.

12. The antibody or antigen-binding fragment thereof of claim 11, wherein:

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:116;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:110, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:120;

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:256, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:267; or

the V_H region comprises a CDR-H1, CDR-H2 and CDR-H3 contained within the V_H region amino acid sequence of SEQ ID NO:519, and the V_L region comprises a CDR-L1, CDR-L2 and CDR-L3 contained within the V_L region amino acid sequence of SEQ ID NO:535.

13. The antibody or antigen-binding fragment thereof of any of claims 1, 3, 5, 7, 9, and 11, wherein:

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 116, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:111 and 117, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 118, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 119, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 120, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 121, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 122, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 123, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:112 and 124, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:113 and 125, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:114 and 126, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:115 and 127, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:247 and 257, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:248 and 258, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:249 and 259, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:250 and 260, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:251 and 261, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:252 and 262, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:253 and 263, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:254 and 264, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:255 and 265, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:256 and 266, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:256 and 267, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:518 and 534, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:519 and 535, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:115 and 536, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:520 and 264, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:521 and 537, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:522 and 538, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:523 and 539, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:519 and 540, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:524 and 541, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:525 and 261, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:526 and 542, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:527 and 543, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:528 and 544, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:529 and 545, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:528 and 546, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:522 and 547, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:256 and 548, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:530 and 549, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:531 and 550, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:519 and 552, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 553, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 118, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:533 and 554, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:115 and 555, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:524 and 556, respectively; or

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:519 and 557, respectively.

14. The antibody or antigen-binding fragment thereof of any of claims 1-12, wherein:
the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 116, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOs:110 and 120, respectively;

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOS:256 and 267, respectively; or

the V_H and V_L regions of the antibody or antigen-binding fragment thereof comprise the amino acid sequences of SEQ ID NOS:519 and 535, respectively.

15. The antibody or antigen-binding fragment thereof of any of claims 1-14, wherein the antibody or antigen-binding fragment specifically binds to a BCMA protein.

16. The antibody or antigen-binding fragment thereof of claim 15, wherein the BCMA protein is a human BCMA protein, a mouse BCMA protein, or a non-human primate BCMA protein.

17. The antibody or antigen-binding fragment thereof of claim 15 or claim 16, wherein the BCMA protein is a human BCMA protein.

18. The antibody or antigen-binding fragment thereof of any of claims 1-17, wherein the antibody or antigen-binding fragment further specifically binds to mouse BCMA or non-human primate BCMA.

19. The antibody or antigen-binding fragment thereof of any of claims 16-18, wherein the human BCMA protein comprises an amino acid sequence of SEQ ID NO:367 or 368.

20. The antibody or antigen-binding fragment thereof of any of claims 1-19, wherein:
(a) the antibody or antigen-binding fragment is human; and/or
(b) the antibody is a human antibody.

21. The antibody or antigen-binding fragment thereof of any of claims 1-20, wherein the antibody or antigen-binding fragment is recombinant and/or monoclonal.

22. The antibody or antigen-binding fragment of any of claims 1-21, that is an antigen-binding fragment.

23. The antibody or antigen-binding fragment thereof of claim 22, wherein the fragment comprises an scFv.

24. The antibody or antigen-binding fragment thereof of any of claims 1-23, wherein:

(a) the V_H region is amino-terminal to the V_L region; or

(b) the V_H region is carboxy-terminal to the V_L region.

25. The antibody or antigen-binding fragment thereof of claim 23, wherein the scFv comprises the amino acid sequence selected from any one of SEQ ID NOs:128-139, 268-278, 558-576 and 578-583, or an amino acid sequence having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the amino acid sequence selected from any one of SEQ ID NOs:128-139, 268-278, 558-576 and 578-583.

26. The antibody or antigen-binding fragment thereof of claim 23 or claim 25, wherein the scFv comprises the amino acid sequence selected from any one of SEQ ID NOs: 128, 132, 278 and 559, or an amino acid sequence having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to the amino acid sequence selected from any one of SEQ ID NOs: 128, 132, 278 and 559.

27. The antibody or antigen-binding fragment thereof of any of claims 1-26, further comprising at least a portion of an immunoglobulin constant region.

28. A single chain cell-surface protein, comprising the antibody or antigen-binding fragment of any of claims 1-26.

29. A conjugate, comprising the antibody or antigen-binding fragment of any of claims 1-27 and a heterologous molecule or moiety.

30. A chimeric antigen receptor (CAR) comprising an extracellular portion comprising the antibody or antigen-binding fragment of any of claims 1-27 and an intracellular signaling region.

31. The chimeric antigen receptor of claim 30, wherein the intracellular signaling domain is or comprises a primary signaling domain, a signaling domain that is capable of inducing a primary activation signal in a T cell, a signaling domain of a T cell receptor (TCR)

component, and/or a signaling domain comprising an immunoreceptor tyrosine-based activation motif (ITAM).

32. The chimeric antigen receptor of claim 30 or claim 31, wherein the intracellular signaling domain is or comprises an intracellular signaling domain of a CD3 chain, optionally a CD3-zeta (CD3 ζ) chain, or a signaling portion thereof, optionally a human CD3 ζ or a signaling portion thereof.

33. The chimeric antigen receptor of any of claims 30-32, further comprising a transmembrane domain between the extracellular domain and the intracellular signaling region.

34. The chimeric antigen receptor of claim 33, wherein the transmembrane domain comprises a transmembrane portion of CD28, optionally a human CD28.

35. The chimeric antigen receptor of any of claims 30-34, wherein the intracellular signaling region further comprises a costimulatory signaling domain.

36. The chimeric antigen receptor of claim 35, wherein the costimulatory signaling domain comprises an intracellular signaling domain of a CD28, a 4-1BB or an ICOS or a signaling portion thereof.

37. The chimeric antigen receptor of claim 35 or claim 36, wherein the costimulatory signaling domain comprises an intracellular signaling domain of a 4-1BB, optionally a human 4-1BB.

38. A polynucleotide encoding the antibody or antigen-binding fragment thereof of any of claims 1-27, the single chain cell surface protein of claim 28, the conjugate of claim 29 or the chimeric antigen receptor of any of claims 30-37.

39. A vector, comprising the polynucleotide of claim 38.

40. An engineered cell comprising a receptor comprising the antibody or antigen-binding fragment of any of claims 1-27 or the conjugate of claim 29; the single chain cell surface protein of claim 28; or the chimeric antigen receptor of any of claims 30-37.

41. The engineered cell of claim 40, wherein the engineered cell is a T cell.

42. A composition comprising the antibody or antigen-binding fragment thereof of any of claims 1-27, the conjugate of claim 29, the single chain cell surface protein of claim 28, the chimeric antigen receptor of any of claims 30-37, or the engineered cell of claim 40 or claim 41.

43. A composition of claim 42 for use in treating a disease or disorder associated with BCMA.

44. Use of the composition of claim 42 in the manufacture of a medicament for the treatment of a disease or disorder associated with BCMA.

45. The composition for use of claim 43 or the use of claim 44, wherein the disease or disorder associated with BCMA is an autoimmune disease or disorder or a cancer.

46. The composition for use or the use of claim 45, wherein the cancer is a lymphoma, a leukemia, or a plasma cell malignancy.

47. The composition for use or the use of claim 46, wherein the plasma cell malignancy is multiple myeloma (MM) or plasmacytoma.