CLAIMS

1. An antibody or antigen-binding fragment thereof capable of specifically binding to CTLA4, comprising:

(1) the following three heavy chain CDRs: a VH CDR1 as set forth in SEQ ID NO: 48, a VH CDR2 as set forth in SEQ ID NO: 49, a VH CDR3 as set forth in SEQ ID NO: 50; and, the following three light chain CDRs: a VL CDR1 as set forth in SEQ ID NO: 51, a VL CDR2 as set forth in SEQ ID NO: 52, a VL CDR3 as set forth in SEQ ID NO: 53; or,

(2) the following three heavy chain CDRs: a VH CDR1 as set forth in SEQ ID NO: 54, a VH CDR2 as set forth in SEQ ID NO: 55, a VH CDR3 as set forth in SEQ ID NO: 56; and, the following three light chain CDRs: a VL CDR1 as set forth in SEQ ID NO: 57, a VL CDR2 as set forth in SEQ ID NO: 58, a VL CDR3 as set forth in SEQ ID NO: 59; or

(3) a CDR1 as set forth in SEQ ID NO: 60; a CDR2 as set forth in SEQ ID NO: 61; and, a CDR3 as set forth in SEQ ID NO: 62; or

(4) a CDR1 as set forth in SEQ ID NO: 63; a CDR2 as set forth in SEQ ID NO: 64; and, CDR3 as set forth in SEQ ID NO: 65; or

(5) a CDR1 as set forth in SEQ ID NO: 66; a CDR2 as set forth in SEQ ID NO: 67; and, a CDR3 as set forth in SEQ ID NO: 68; or,

(6) a CDR1 as set forth in SEQ ID NO: 69; a CDR2 as set forth in SEQ ID NO: 70; and, a CDR3 as set forth in SEQ ID NO: 71.

2. The antibody or antigen-binding fragment thereof of claim 1, wherein the antibody or antigen-binding fragment thereof comprises:

(1) a VH having the sequence set forth in SEQ ID NO: 3 or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in SEQ ID NO: 3; and a VL having the sequence set forth in SEQ ID NO: 4 or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence

identity to the sequence set forth in SEQ ID NO: 4; or,

(2) a VH having the sequence set forth in SEQ ID NO: 5 or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in SEQ ID NO: 5; and a VL having the sequence set forth in SEQ ID NO: 6 or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in SEQ ID NO: 6; or,

wherein the antibody or antigen-binding fragment thereof comprises an amino acid sequence selected from the group consisting of:

(i) the sequence set forth in any one of SEQ ID NOs: 7, 8, 9, or 10;

(ii) a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in any one of SEQ ID NOs: 7, 8, 9, or 10.

3. An antibody or antigen-binding fragment thereof capable of specifically binding to CCR8, comprising:

the following three heavy chain CDRs: a VH CDR1 as set forth in SEQ ID NO: 137, a VH CDR2 as set forth in SEQ ID NO: 138, a VH CDR3 as set forth in SEQ ID NO: 139; and, the following three light chain CDRs: VL CDR1 as set forth in SEQ ID NO: 75, VL CDR2 as set forth in SEQ ID NO: 76, VL CDR3 as set forth in SEQ ID NO: 77.

4. The antibody or antigen-binding fragment thereof of claim 3, wherein the antibody or antigen-binding fragment thereof comprises:

a VH having the sequence set forth in SEQ ID NO: 78 or 1, or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in SEQ ID NO: 78 or 1;

and

a VL having the sequence set forth in SEQ ID NO: 2, or a sequence having at least 80%, at least 85%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or 100% sequence identity to the sequence set forth in SEQ ID NO: 2.

5. The antibody or antigen-binding fragment thereof of any one of claims 1-4, wherein the antibody or antigen-binding fragment thereof further comprises a constant region derived from a human immunoglobulin;

preferably, the heavy chain of the antibody or antigen-binding fragment thereof comprises a heavy chain constant region derived from a human immunoglobulin or a variant thereof;

preferably, the heavy chain constant region has a LALA mutation and/or a knob-into-hole modification;

preferably, the heavy chain constant region has the sequence set forth in any one of SEQ ID NOs: 12-17, 79-82;

preferably, the light chain of the antibody or antigen-binding fragment thereof comprises a light chain constant region derived from a human immunoglobulin;

preferably, the light chain constant region has the sequence set forth in any one of SEQ ID NOs: 11, 81, 82;

preferably, the antibody or antigen-binding fragment thereof is hypofucosylated or afucosylated;

more preferably, wherein the antigen-binding fragment is selected from Fab, Fab', (Fab')2, Fv, disulfide-linked Fv, scFv, diabody, and single domain antibody (sdAb); and/or, the antibody is a murine antibody, chimeric antibody, humanized antibody, or multispecific antibody.

6. An isolated nucleic acid molecule encoding the antibody or antigen-binding fragment thereof of any one of claims 1-5.

7. A vector comprising the nucleic acid molecule of claim 6; preferably,

wherein the vector is a cloning vector or an expression vector.

8. A host cell comprising the nucleic acid molecule of claim 6 or the vector of claim 7;

preferably, wherein the host cell is a mammalian cell;

preferably, wherein the host cell has low or no fucosylation activity, or the host cell is selected from a mammalian cell lacking expression of a gene encoding fucosyltransferase.

9. A multispecific antibody comprising the antibody or antigen-binding fragment thereof of any one of claims 1-5.

10. A multispecific antibody that specifically binds to CCR8 and CTLA4, preferably, the multispecific antibody is a bispecific antibody, wherein the bispecific antibody comprises a first antigen-binding domain specific for CTLA4 and a second antigen-binding domain specific for CCR8;

wherein the first antigen-binding domain comprises: the antibody or antigen-binding fragment thereof of claim 1 or 2; and/or

wherein the second antigen-binding domain comprises: the antibody or antigen-binding fragment thereof of claim 3 or 4.

11. The multispecific antibody of claim 10, further comprising an Fc domain comprising a first monomer and a second monomer;

preferably, wherein the first antigen-binding domain and the second antigen-binding domain are linked to the N-terminus of the first monomer and the second monomer of the Fc domain, respectively, optionally via a linker.

12. The multispecific antibody of claim 11, wherein the Fc domain comprises a modification to promote dimerization of the first monomer and the second monomer; preferably, the modification comprises an amino acid substitution in the CH3 domain of the Fc domain; or

wherein the Fc domain comprises a modification to promote controlled Fab-arm Exchange (cFAE); preferably, the modification comprises an amino acid substitution in the CH3 domain of the Fc domain;

preferably, wherein the modification comprises a "knob" modification in one of the two monomers of the Fc domain and a "hole" modification in the other of the two monomers of the Fc domain to form a "knob-into-hole" modification; preferably, the two monomers of the Fc domain comprise the amino acid sequences set forth in SEQ ID NOs: 16 and 17, respectively, or comprise the amino acid sequences set forth in SEQ ID NOs: 79 and 80, respectively; or

wherein the modification comprises a substitution selected from F405L and/or R411T in one of the two monomers of the Fc domain and a substitution selected from T370K and/or K409R in the other of the two monomers of the Fc domain to form a modification that promotes cFAE; preferably, the two monomers of the Fc domain comprise the amino acid sequences set forth in SEQ ID NOs: 13 and 14, respectively.

13. The multispecific antibody of any one of claims 10-12, which is hypofucosylated or afucosylated.

14. The multispecific antibody of any one of claims 10-13, wherein the multispecific antibody comprises:

(1) a first peptide chain comprising the sequence set forth in SEQ ID NO: 100, a second peptide chain comprising the sequence set forth in SEQ ID NO: 99, a third peptide chain comprising the sequence set forth in SEQ ID NO: 97, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 98; or

(2) a first peptide chain comprising the sequence set forth in SEQ ID NO: 114, a second peptide chain comprising the sequence set forth in SEQ ID NO: 113, a third peptide chain comprising the sequence set forth in SEQ ID NO: 115, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 116; or

(3) a first peptide chain comprising the sequence set forth in SEQ ID NO: 86, a second peptide chain comprising the sequence set forth in SEQ ID NO: 85, a

third peptide chain comprising the sequence set forth in SEQ ID NO: 87, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 88; or

(4) a first peptide chain comprising the sequence set forth in SEQ ID NO: 29, a second peptide chain comprising the sequence set forth in SEQ ID NO: 28, a third peptide chain comprising the sequence set forth in SEQ ID NO: 30, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 31; or

(5) a first peptide chain comprising the sequence set forth in SEQ ID NO: 154, a second peptide chain comprising the sequence set forth in SEQ ID NO: 152, a third peptide chain comprising the sequence set forth in SEQ ID NO: 153, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 155; or

(6) a first peptide chain comprising the sequence set forth in SEQ ID NO: 150, a second peptide chain comprising the sequence set forth in SEQ ID NO: 148, a third peptide chain comprising the sequence set forth in SEQ ID NO: 149, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 151; or

(7) a first peptide chain comprising the sequence set forth in SEQ ID NO: 96, a second peptide chain comprising the sequence set forth in SEQ ID NO: 95, a third peptide chain comprising the sequence set forth in SEQ ID NO: 93, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 94; or

(8) a first peptide chain comprising the sequence set forth in SEQ ID NO: 110, a second peptide chain comprising the sequence set forth in SEQ ID NO: 109, a third peptide chain comprising the sequence set forth in SEQ ID NO: 111, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 112; or

(9) a first peptide chain comprising the sequence set forth in SEQ ID NO: 33, a second peptide chain comprising the sequence set forth in SEQ ID NO: 32, a third peptide chain comprising the sequence set forth in SEQ ID NO: 34, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 35; or

(10) a first peptide chain comprising the sequence set forth in SEQ ID NO: 90, a second peptide chain comprising the sequence set forth in SEQ ID NO: 89, a third peptide chain comprising the sequence set forth in SEQ ID NO: 91, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 92; or

(11) a first peptide chain comprising the sequence set forth in SEQ ID NO:

158, a second peptide chain comprising the sequence set forth in SEQ ID NO: 156, a third peptide chain comprising the sequence set forth in SEQ ID NO: 157, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 159; or

(12) a first peptide chain comprising the sequence set forth in SEQ ID NO: 104, a second peptide chain comprising the sequence set forth in SEQ ID NO: 103, a third peptide chain comprising the sequence set forth in SEQ ID NO: 101, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 102; or

(13) a first peptide chain comprising the sequence set forth in SEQ ID NO: 108, a second peptide chain comprising the sequence set forth in SEQ ID NO: 107, a third peptide chain comprising the sequence set forth in SEQ ID NO: 105, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 106; or

(14) a first peptide chain comprising the sequence set forth in SEQ ID NO: 118, a second peptide chain comprising the sequence set forth in SEQ ID NO: 117, a third peptide chain comprising the sequence set forth in SEQ ID NO: 119, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 120; or

(15) a first peptide chain comprising the sequence set forth in SEQ ID NO: 122, a second peptide chain comprising the sequence set forth in SEQ ID NO: 121, a third peptide chain comprising the sequence set forth in SEQ ID NO: 123, and a fourth peptide chain comprising the sequence set forth in SEQ ID NO: 124.

15. The multispecific antibody of any one of claims 10-13, wherein the multispecific antibody comprises:

(1) a first peptide chain comprising the sequence set forth in SEQ ID NO: 38, a second peptide chain comprising the sequence set forth in SEQ ID NO: 37, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 36;

(2) a first peptide chain comprising the sequence set forth in SEQ ID NO: 41, a second peptide chain comprising the sequence set forth in SEQ ID NO: 40, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 39;

(3) a first peptide chain comprising the sequence set forth in SEQ ID NO: 44, a second peptide chain comprising the sequence set forth in SEQ ID NO: 43, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 42;

(4) a first peptide chain comprising the sequence set forth in SEQ ID NO: 47, a second peptide chain comprising the sequence set forth in SEQ ID NO: 46, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 45;

(5) a first peptide chain comprising the sequence set forth in SEQ ID NO: 127, a second peptide chain comprising the sequence set forth in SEQ ID NO: 126, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 125;

(6) a first peptide chain comprising the sequence set forth in SEQ ID NO: 130, a second peptide chain comprising the sequence set forth in SEQ ID NO: 129, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 128;

(7) a first peptide chain comprising the sequence set forth in SEQ ID NO: 133, a second peptide chain comprising the sequence set forth in SEQ ID NO: 132, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 131;

(8) a first peptide chain comprising the sequence set forth in SEQ ID NO: 136, a second peptide chain comprising the sequence set forth in SEQ ID NO: 135, and a third peptide chain comprising the sequence set forth in SEQ ID NO: 134.

16. An isolated nucleic acid molecule comprising a nucleotide sequence encoding the multispecific antibody of any one of claims 9-15 or at least one peptide chain thereof.

17. A vector comprising the isolated nucleic acid molecule of claim 16;

preferably, wherein the vector comprises nucleotide sequences encoding the respective peptide chains of the multispecific antibody, and the nucleotide sequences encoding the respective peptide chains are present on the same or different vectors.

18. A host cell comprising the isolated nucleic acid molecule of claim 16 or the vector of claim 17;

preferably, wherein the host cell has low or no fucosylation activity, or the host cell may be a mammalian cell lacking expression of a gene encoding fucosyltransferase.

19. An immunoconjugate comprising the antibody or antigen-binding fragment thereof of any one of claims 1-5 or the multispecific antibody of any one of claims 9-15, and a therapeutic agent linked to the antibody or antigen-binding fragment thereof or the multispecific molecule;

preferably, wherein the therapeutic agent is selected from a cytotoxic agent;

preferably, wherein the therapeutic agent is selected from an alkylating agent, a mitotic inhibitor, an anti-tumor antibiotic, an antimetabolite, a topoisomerase inhibitor, a tyrosine kinase inhibitor, a radionuclide agent, and any combination thereof;

preferably, wherein the immunoconjugate is an antibody-drug conjugate (ADC).

20. A pharmaceutical composition comprising the antibody or antigen-binding fragment thereof of any one of claims 1-5, or the multispecific antibody of any one of claims 9-15, and a pharmaceutically acceptable carrier and/or excipient;

preferably, wherein the pharmaceutical composition further comprises an additional pharmaceutically active agent;

preferably, wherein the additional pharmaceutically active agent is a drug having anti-tumor activity, such as an alkylating agent, a mitotic inhibitor, an anti-tumor antibiotic, an antimetabolite, a topoisomerase inhibitor, a tyrosine kinase inhibitor, a radionuclide agent, a radiosensitizer, an anti-angiogenic agent, a cytokine, a molecular targeting drug, an immune checkpoint inhibitor, or an oncolytic virus;

preferably, wherein the pharmaceutical composition further comprises an anti-PD-1 antibody;

preferably, wherein the pharmaceutical composition comprises the multispecific antibody of any one of claims 9-15 and an anti-PD-1 antibody.

21. The antibody or antigen-binding fragment thereof of any one of claims 1-5, or the multispecific molecule of any one of claims 9-15, or the immunoconjugate

of claim 19, or the pharmaceutical composition of claim 20 for use in:

(1) increasing immune cell activity *in vitro* or *in vivo* in a subject;

(2) enhancing an immune response in a subject;

(3) preventing and/or treating a tumor in a subject; or

(4) preventing and/or treating an infection in a subject.

22. The antibody or antigen-binding fragment thereof or the multispecific molecule or the immunoconjugate or the pharmaceutical composition for use of claim 21, wherein the tumor expresses CCR8 and/or CTLA4;

preferably, wherein the CCR8 and/or CTLA4 is expressed on the surface of the tumor cell;

preferably, wherein the tumor is selected from non-small cell lung cancer, small cell lung cancer, renal cell carcinoma, colorectal cancer, ovarian cancer, breast cancer, pancreatic cancer, gastric cancer, bladder cancer, esophageal cancer, mesothelioma, melanoma, head and neck cancer, thyroid cancer, sarcoma, prostate cancer, glioblastoma, cervical cancer, thymic cancer, leukemia, lymphoma, myeloma, mycosis fungoides, Merkel cell carcinoma, and other hematologic malignancies, such as classical Hodgkin's lymphoma (CHL), primary mediastinal large B-cell lymphoma, T-cell/histiocyte rich B-cell lymphoma, EBV-positive and negative PTLD and EBV-associated diffuse large B-cell lymphoma (DLBCL), plasmablastic lymphoma, extranodal NK/T-cell lymphoma, nasopharyngeal carcinoma and HHV8-associated primary effusion lymphoma, Hodgkin's lymphoma, central nervous system (CNS) tumors, such as primary CNS lymphoma, spinal axis tumor, brainstem glioma;

preferably, wherein the infection is selected from a viral infection, a bacterial infection, a fungal infection, and a parasitic infection;

preferably, wherein the subject is a mammal, such as a human, a cynomolgus monkey, or a mouse.