CLAIMS

1. An antibody or an antigen-binding fragment thereof, comprising a VH that comprises four VH framework regions (VH FR1-4) and three VH complementarity determining regions (VH CDR1-3) in the following N-terminal to C-terminal order: VH FR1-VH CDR1-VH FR2-VH CDR2-VH FR3-VH CDR3-VH FR4, wherein VH FR1, VH FR2, VH FR3 and VH FR4 comprise the amino acid sequence of $\mathbf{X_{H1}}$Q$\mathbf{X_{H3}}$QLVQSGAEVKK$\mathbf{X_{H5}}$G$\mathbf{X_{H6}}$SVKVSCKAS (SEQ ID NO: 5),

WVRQAPG$\mathbf{X_{H12}}\mathbf{X_{H13}}$LEWMG (SEQ ID NO: 6),

YAQK$\mathbf{X_{H16}}$Q$\mathbf{X_{H17}}$RVT$\mathbf{X_{H18}}$T$\mathbf{X_{H19}}$D$\mathbf{X_{H21}}$S$\mathbf{X_{H22}}$STAYMEL$\mathbf{X_{H25}}$SLR$\mathbf{X_{H31}}\mathbf{X_{H27}}DTA\mathbf{X_{H28}}$YYC (SEQ ID NO: 7), and

WG$\mathbf{X_{H29}}$GT$\mathbf{X_{H30}}$VTVSS (SEQ ID NO: 4) respectively,

wherein $\mathbf{X_{H1}}$ is M or no amino acid, $\mathbf{X_{H3}}$ is M, $\mathbf{X_{H5}}$ is P or T, $\mathbf{X_{H6}}$ is A, S, or T, $\mathbf{X_{H12}}$ is K, $\mathbf{X_{H13}}$ is G, R, or A, $\mathbf{X_{H16}}$ is F or L, $\mathbf{X_{H17}}$ is G, D, or E, $\mathbf{X_{H18}}$ is M or I, $\mathbf{X_{H19}}$ is R, T, E or A, $\mathbf{X_{H21}}$ is T, R, M, E, or K, $\mathbf{X_{H22}}$ is I, A T, or M, $\mathbf{X_{H25}}$ is S or R, $\mathbf{X_{H31}}$ is S or A, $\mathbf{X_{H27}}$ is D or E, and $\mathbf{X_{H28}}$ is V or M, $\mathbf{X_{H29}}$ is Q or R, and $\mathbf{X_{H30}}$ is L, M or T;

wherein the antibody or antigen-binding fragment thereof specifically binds to CD47 and comprises a VH that comprises four VH framework regions (VH FR1-4) and three VH complementarity determining regions (VH CDR1-3) in the following N-terminal to C-terminal order: VH FR1-VH CDR1-VH FR2-VH CDR2-VH FR3-VH CDR3-VH FR4, wherein VH CDR1 comprises the amino acid sequence of GFNIKDYYLH (SEQ ID NO: 59); VH CDR2 comprises the amino acid sequence of WIDPDQGDTE (SEQ ID NO: 60); and VH CDR3 comprises the amino acid sequence of NAAYGSSSYPMDY(SEQ ID NO: 61);

wherein the antibody or antigen-binding fragment thereof comprises a VL that comprises four VL framework regions (VL FR1-4) and three VL complementarity determining regions (VL CDR1-3) in the following N-terminal to C-terminal order: VL FR1-VL CDR1-VL FR2-VL CDR2-VL FR3-VL CDR3-VL FR4, wherein:

(A) VL CDR1 comprises the amino acid sequence of $\mathbf{X_{C1}}$ASQDIHRYLS (SEQ ID NO: 62), wherein $\mathbf{X_{C1}}$ is K or R; VL CDR2 comprises the amino acid sequence of RANRLVS (SEQ ID NO: 63); and VL CDR3 comprises the amino acid sequence of LQYDEFPYT (SEQ ID NO: 64); or

(B) VL CDR1 comprises the amino acid sequence of $\mathbf{X_{C1}}$ASQDIHRYLS (SEQ ID NO: 62), wherein $\mathbf{X_{C1}}$ is K or R; VL CDR2 comprises the amino acid sequence of R$\mathbf{X_{C2}X_{C3}}$RFVD (SEQ ID NO: 65), wherein $\mathbf{X_{C2}}$ is any amino acid with a polar or charged side chain, and $\mathbf{X_{C3}}$ is V, I, E, or S; and VL CDR3 comprises the amino acid sequence of LQYDEFPYT (SEQ ID NO: 64).

2. The antibody or antigen-binding fragment of claim 1, wherein $\mathbf{X_{H1}}$ is M or no amino acid, $\mathbf{X_{H3}}$ is M, $\mathbf{X_{H5}}$ is P, $\mathbf{X_{H6}}$ is S, $\mathbf{X_{H12}}$ is K, $\mathbf{X_{H13}}$ is G, $\mathbf{X_{H16}}$ is F, $\mathbf{X_{H17}}$ is G, $\mathbf{X_{H18}}$ is I, $\mathbf{X_{H19}}$ is R, $\mathbf{X_{H21}}$ is R, $\mathbf{X_{H22}}$ is T, $\mathbf{X_{H25}}$ is R, $\mathbf{X_{H31}}$ is A, $\mathbf{X_{H27}}$ is E, and $\mathbf{X_{H28}}$ is V, $\mathbf{X_{H29}}$ is Q, and $\mathbf{X_{H30}}$ is L.

3. The antibody or antigen-binding fragment of claim 1, wherein $\mathbf{X_{H1}}$ is M or no amino acid, $\mathbf{X_{H3}}$ is M, $\mathbf{X_{H5}}$ is P, $\mathbf{X_{H6}}$ is S, $\mathbf{X_{H12}}$ is K, $\mathbf{X_{H13}}$ is G, $\mathbf{X_{H16}}$ is F, $\mathbf{X_{H17}}$ is G, $\mathbf{X_{H18}}$ is I, $\mathbf{X_{H19}}$ is R, $\mathbf{X_{H21}}$ is R, $\mathbf{X_{H22}}$ is T, $\mathbf{X_{H25}}$ is R, $\mathbf{X_{H31}}$ is A, $\mathbf{X_{H27}}$ is E, and $\mathbf{X_{H28}}$ is V, $\mathbf{X_{H29}}$ is Q, and $\mathbf{X_{H30}}$ is T.

4. The antibody or antigen-binding fragment of claim 1, wherein $\mathbf{X_{H1}}$ is M or no amino acid, $\mathbf{X_{H3}}$ is M, $\mathbf{X_{H5}}$ is P, $\mathbf{X_{H6}}$ is S, $\mathbf{X_{H12}}$ is K, $\mathbf{X_{H13}}$ is G, $\mathbf{X_{H16}}$ is F, $\mathbf{X_{H17}}$ is G, $\mathbf{X_{H18}}$ is I, $\mathbf{X_{H19}}$ is R, $\mathbf{X_{H21}}$ is R, $\mathbf{X_{H22}}$ is T, $\mathbf{X_{H25}}$ is R, $\mathbf{X_{H31}}$ is S, $\mathbf{X_{H27}}$ is E, and $\mathbf{X_{H28}}$ is V, $\mathbf{X_{H29}}$ is Q, and $\mathbf{X_{H30}}$ is L.

5. The antibody or antigen-binding fragment of claim 1, wherein $\mathbf{X_{H1}}$ is M or no amino acid, $\mathbf{X_{H3}}$ is M, $\mathbf{X_{H5}}$ is P, $\mathbf{X_{H6}}$ is S, $\mathbf{X_{H12}}$ is K, $\mathbf{X_{H13}}$ is G, $\mathbf{X_{H16}}$ is F, $\mathbf{X_{H17}}$ is G, $\mathbf{X_{H18}}$ is I, $\mathbf{X_{H19}}$ is R, $\mathbf{X_{H21}}$ is R, $\mathbf{X_{H22}}$ is T, $\mathbf{X_{H25}}$ is R, $\mathbf{X_{H31}}$ is S, $\mathbf{X_{H27}}$ is E, and $\mathbf{X_{H28}}$ is V, $\mathbf{X_{H29}}$ is Q, and $\mathbf{X_{H30}}$ is T.

6. The antibody or antigen-binding fragment of any of claims 1-5, wherein VL FR1, VL FR2, VL FR3 and VL FR4 comprise the amino acid sequence of
NIQMTQSPS$\mathbf{X_{L1}X_{L2}}$SASVGDRVTITC (SEQ ID NO: 8);
W$\mathbf{X_{L3}}$QQKPGK$\mathbf{X_{L4}}$PKHLIY (SEQ ID NO: 9);
GVPSRFSGSGSGTEFTLTISSLQPEDFATYYC (SEQ ID NO: 10); and
FGGGTKVEIK (SEQ ID NO: 11), respectively,
wherein $\mathbf{X_{L1}}$ is A or S, $\mathbf{X_{L2}}$ is M or L, $\mathbf{X_{L3}}$ is F or Y, and $\mathbf{X_{L4}}$ is V or A.

7. The antibody or antigen-binding fragment of claim 6, wherein $\mathbf{X_{L1}}$ is S, $\mathbf{X_{L2}}$ is L, $\mathbf{X_{L3}}$ is F, and $\mathbf{X_{L4}}$ is V.

8. The antibody or antigen-binding fragment of claim 6, wherein $\mathbf{X_{L1}}$ is S, $\mathbf{X_{L2}}$ is L, $\mathbf{X_{L3}}$ is Y, and $\mathbf{X_{L4}}$ is A.

9. The antibody or antigen-binding fragment of claim 6, wherein $\mathbf{X_{L1}}$ is S, $\mathbf{X_{L2}}$ is M, $\mathbf{X_{L3}}$ is F, and $\mathbf{X_{L4}}$ is V.

10. The antibody or antigen-binding fragment of claim 1, wherein $\mathbf{X_{C2}}$ is Y, E, or H.

11. The antibody or antigen-binding fragment of any of claims 1-10, which comprises a heavy chain constant region that is a human constant region.

12. The antibody or antigen-binding fragment of any of claims 1-11, which comprises a light chain constant region selected from the group consisting of a human kappa constant region and a human lambda constant region.

13. A pharmaceutical composition comprising a therapeutically effective amount of the antibody or antigen-binding fragment of any of claims 1-12, and a pharmaceutically acceptable carrier.

14. Use of an antibody or antigen-binding fragment as defined in any of claims 1-12 or a pharmaceutical composition as defined in claim 13 in the manufacture of a medicament for treating cancer in a subject in need thereof.

15. A polynucleotide comprising a nucleotide sequence encoding the antibody or antigen-binding fragment of any of claims 1-13.

16. A vector comprising the polynucleotide of claim 15.

17. An isolated cell comprising the polynucleotide of claim 15.

18. A method of making an antibody or antigen-binding fragment thereof, comprising (a) culturing an isolated cell comprising the polynucleotide of claim 15; and (b) isolating the antibody or antigen-binding fragment thereof.