

WHAT IS CLAIMED IS:

1. A monoclonal antibody or antibody fragment, wherein the antibody or antibody fragment comprises a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of GYX₁FTX₂YG (SEQ ID NO: 214), wherein X₁ is T, S, or I, and X₂ is N or K, a VHCDR2 amino acid sequence of INTYTGEX₁ (SEQ ID NO: 215), wherein X₁ is P, S, T, or A, and a VHCDR3 amino acid sequence of X₁RYDHX₂MDY (SEQ ID NO: 216), wherein X₁ is A, T, V, or G, and X₂ is A, R, F, T, P, V, S, D, N, H, L, Y, or G; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of QSLX₁NSGTRKNY (SEQ ID NO: 212), wherein X₁ is L, F, or V, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of KQSYX₁LYT (SEQ ID NO: 213), wherein X₁ is T, N, or S.

2. The monoclonal antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment comprises:

(i) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3

amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(v) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 172; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(viii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 173; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(x) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3

amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 176; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 177; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3

amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 180; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 182; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a

VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 185; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a

VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 160, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a

VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xl) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3

amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xli) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xlii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162; or

(xlvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a

VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

3. The monoclonal antibody or antibody fragment of claim 1 or 2, wherein the antibody or antibody fragment comprises a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

4. The monoclonal antibody or antibody fragment of any one of claims 1-3, wherein said antibody or antibody fragment comprises:

X₁X₂QLX₃X₄SGX₅X₆X₇X₈KPGX₉SX₁₀X₁₁X₁₂SCKX₁₃SGYTFTNYGMNWRQAPGX₁₄GLX₁₅WX₁₆GWINTYTGTEPTYADDFKGRX₁₇TX₁₈X₁₉X₂₀DX₂₁SX₂₂X₂₃TX₂₄YX₂₅X₂₆X₂₇X₂₈X₂₉LX₃₀X₃₁X₃₂DTAVYFCARYDHAMDYWGQGTXX₃₃VTVSS (SEQ ID NO: 18),

wherein X₁ is Q or E, X₂ is I or V, X₃ is V or Q, X₄ is Q or E, X₅ is A, P, or G, X₆ is E or G, X₇ is V or L, X₈ is V or K, X₉ is A, E, G, or S, X₁₀ is V or L, X₁₁ is K or R, X₁₂ is V, L, or I, X₁₃ is A or T, X₁₄ is K or Q, X₁₅ is E or K, X₁₆ is M or V, X₁₇ is F or V, X₁₈ is F, M, or I, X₁₉ is T or S, X₂₀ is T, R, or A, X₂₁ is T, D, or E, X₂₂ is T, A, or K, X₂₃ is S or N, X₂₄ is L or A, X₂₅ is M or L, X₂₆ is E or Q, X₂₇ is L or M, X₂₈ is R, S, T, or N, X₂₉ is S or G, X₃₀ is R, K, or M, X₃₁ is S or T, X₃₂ is D or E, and X₃₃ is L, S, or T;

and a light chain variable sequence having a sequence of

X₁X₂X₃X₄TQSPX₅SLX₆X₇SX₈GX₉RX₁₀TIX₁₁CKSSQSLLNSGTRKNYLAWYQQKX₁₂GX₁₃X₁₄PX₁₅LLIYWTSTRESGVPX₁₆RFSGSGSGTDFTLTIX₁₇X₁₈LQX₁₉EDVAX₂₀YYCKQSYTLTYFGX₂₁GTX₂₂EIK (SEQ ID NO: 26),

wherein X₁ is E or D, X₂ is I or V, X₃ is V or Q, X₄ is L or M, X₅ is D or S, X₆ is A or S, X₇ is V or A, X₈ is L or V, X₉ is E or D, X₁₀ is A or V, X₁₁ is N or T, X₁₂ is A or P, X₁₃ is Q or K, X₁₄ is S, V, or P, X₁₅ is K or R, X₁₆ is D or S, X₁₇ is S, D, or N, X₁₈ is S or T, X₁₉ is A or P, X₂₀ is V or T, X₂₁ is Q or G, and X₂₂ is L or V.

5. The monoclonal antibody or antibody fragment of claim 4, wherein said antibody or antibody fragment comprises:

(i) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(ii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(iii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(iv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(v) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(vi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence

according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(vii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(viii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(ix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(x) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence

according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(xv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a

sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(xx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a

sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22; or

(xxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23.

6. The monoclonal antibody or antibody fragment of any one of claims 1-3, wherein said antibody or antibody fragment comprises a heavy chain variable sequence having a sequence of

QIX₁LVQSGX₂EVKKPGASVKVSCKASGYX₃FTX₄YGMNWVRQAPGQGLEWMGWINTYT
GEX₅X₆YX₇DDFKGRFTFTTDTSTX₈TX₉YMX₁₀X₁₁RSLRSDDTAVYFCX₁₂RYDHX₁₃MDYWGQG
X₁₄LVTVSS (SEQ ID NO: 104)

wherein X₁ is Q or H, X₂ is A, D, T, V, S, or P, X₃ is T, S, or I, X₄ is N or K, X₅ is P, S, T, or A, X₆ is T, R, K, or I, X₇ is A, T, V, S, or G, X₈ is S, R, or T, X₉ is A, V, or G, X₁₀ is E or D, X₁₁ is L or V, X₁₂ is A, T, V, or G, X₁₃ is A, R, F, T, P, V, S, D, N, H, L, Y, or G, and X₁₄ is T or S;

and a light chain variable sequence having a sequence of

EIVLTQSPDSLX₁VSLGERATIX₂CKSSQSLX₃NSGTRKNYLX₄WYQX₅KX₆GQSPX₇LX₈IYWT
STRESGVPDRFSX₉SGSGTDFTLX₁₀IDX₁₁LQX₁₂EDVAX₁₃YYCKQSYX₁₄LYTFGGGTKVEIK
(SEQ ID NO: 158),

wherein X₁ is A, T, or S, X₂ is N or K, X₃ is L, F, or V, X₄ is A, S, or T, X₅ is Q or K, X₆ is A, P, or S, X₇ is K or N, X₈ is L, V, or I, X₉ is G or A, X₁₀ is T or S, X₁₁ is S or R, X₁₂ is A or T, X₁₃ is V, I, or L, and X₁₄ is T, N, or S.

7. The monoclonal antibody or antibody fragment of claim 6, wherein said antibody or antibody fragment comprises:

(i) a heavy chain variable sequence having a sequence according to SEQ ID NO: 26, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 26; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(ii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 27, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 27; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(iii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 28, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 28; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(iv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 29, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 29; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(v) a heavy chain variable sequence having a sequence according to SEQ ID NO: 30, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 30; and a light chain variable sequence having a sequence according to SEQ ID NO: 106, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 106;

(vi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 31, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 31; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(vii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 32, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 32; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(viii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 30, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 30; and a light chain variable sequence having a sequence according to SEQ ID NO: 107, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 107;

(ix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 33, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 33; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(x) a heavy chain variable sequence having a sequence according to SEQ ID NO: 34, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 34; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 30, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 30; and a light chain variable sequence having a sequence according to SEQ ID NO: 108, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 108;

(xii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 30, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 30; and a light chain variable sequence having a sequence according to SEQ ID NO: 109, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 109;

(xiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 35, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 35; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 36, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 36; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 37, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 37; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 26, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 26; and a light chain variable sequence having a sequence according to SEQ ID NO: 107, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 107;

(xvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 38, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 38; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 31, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 31; and a light chain variable sequence having a sequence according to SEQ ID NO: 110, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 110;

(xix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 39, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 39; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 40, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 40; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 34, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 34; and a light chain variable sequence having a sequence according to SEQ ID NO: 111, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 111;

(xxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 41, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 41; and a light chain variable sequence having a sequence according to SEQ ID NO: 109, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 109;

(xxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 30, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 30; and a light chain variable sequence having a sequence according to SEQ ID NO: 112, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 112;

(xxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 28, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 28; and a light chain variable sequence having a sequence according to SEQ ID NO: 113, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 113;

(xxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 32, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 32; and a light chain variable sequence having a sequence according to SEQ ID NO: 114, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 114;

(xxvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 42, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 42; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 36, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 36; and a light chain variable sequence having a sequence according to SEQ ID NO: 115, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 115;

(xxviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 43, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 43; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 32, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 32; and a light chain variable sequence having a sequence according to SEQ ID NO: 109, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 109;

(xxx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 44, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 44; and a light chain variable sequence having a sequence according to SEQ ID NO: 116, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 116;

(xxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 35, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 35; and a light chain variable sequence having a sequence according to SEQ ID NO: 117, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 117;

(xxxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 45, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 45; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 46, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 46; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 36, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 36; and a light chain variable sequence having a sequence according to SEQ ID NO: 118, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 118;

(xxxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 47, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 47; and a light chain variable sequence having a sequence according to SEQ ID NO: 115, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 115;

(xxxvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 48, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 48; and a light chain variable sequence having a sequence according to SEQ ID NO: 109, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 109;

(xxxvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 49, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 49; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxxviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 50, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 50; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xxxix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 51, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 51; and a light chain variable sequence having a sequence according to SEQ ID NO: 106, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 106;

(xl) a heavy chain variable sequence having a sequence according to SEQ ID NO: 52, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 52; and a light chain variable sequence having a sequence according to SEQ ID NO: 119, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 119;

(xli) a heavy chain variable sequence having a sequence according to SEQ ID NO: 53, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 53; and a light chain variable sequence having a sequence according to SEQ ID NO: 108, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 108;

(xlii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 54, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 54; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(xliii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 55, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 55; and a light chain variable sequence having a sequence according to SEQ ID NO: 116, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 116;

(xliv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 56, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 56; and a light chain variable sequence having a sequence according to SEQ ID NO: 116, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 116;

(xlv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 57, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 57; and a light chain variable sequence having a sequence according to SEQ ID NO: 120, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 120;

(xlvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 58, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 58; and a light chain variable sequence having a sequence according to SEQ ID NO: 121, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 121;

(xlvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 59, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 59; and a light chain variable sequence having a sequence according to SEQ ID NO: 122, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 122;

(xlviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 60, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 60; and a light chain variable sequence having a sequence according to SEQ ID NO: 108, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 108;

(xlix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 61, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 61; and a light chain variable sequence having a sequence according to SEQ ID NO: 123, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 123;

(l) a heavy chain variable sequence having a sequence according to SEQ ID NO: 62, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 62; and a light chain variable sequence having a sequence according to SEQ ID NO: 114, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 114;

(li) a heavy chain variable sequence having a sequence according to SEQ ID NO: 63, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 63; and a light chain variable sequence having a sequence according to SEQ ID NO: 124, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 124;

(lii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 64, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 64; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(liii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 65, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 65; and a light chain variable sequence having a sequence according to SEQ ID NO: 125, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 125;

(liv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 66, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 66; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(lv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 67, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 67; and a light chain variable sequence having a sequence according to SEQ ID NO: 125, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 125;

(lvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 68, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 68; and a light chain variable sequence having a sequence according to SEQ ID NO: 126, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 126;

(lvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 69, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 69; and a light chain variable sequence having a sequence according to SEQ ID NO: 127, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 127;

(lviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 70, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 70; and a light chain variable sequence having a sequence according to SEQ ID NO: 128, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 128;

(lix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 71, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 71; and a light chain variable sequence having a sequence according to SEQ ID NO: 117, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 117;

(lx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 72, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 72; and a light chain variable sequence having a sequence according to SEQ ID NO: 129, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 129;

(lxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 73, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 73; and a light chain variable sequence having a sequence according to SEQ ID NO: 130, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 130;

(lxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 74, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 74; and a light chain variable sequence having a sequence according to SEQ ID NO: 131, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 131;

(lxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 73, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 73; and a light chain variable sequence having a sequence according to SEQ ID NO: 132, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 132;

(lxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 75, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 75; and a light chain variable sequence having a sequence according to SEQ ID NO: 133, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 133;

(lxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 76, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 76; and a light chain variable sequence having a sequence according to SEQ ID NO: 134, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 134;

(lxvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 77, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 77; and a light chain variable sequence having a sequence according to SEQ ID NO: 107, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 107;

(lxvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 78, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 78; and a light chain variable sequence having a sequence according to SEQ ID NO: 135, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 135;

(lxviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 79, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 79; and a light chain variable sequence having a sequence according to SEQ ID NO: 136, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 136;

(lix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 80, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 80; and a light chain variable sequence having a sequence according to SEQ ID NO: 137, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 137;

(lxx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 41, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 41; and a light chain variable sequence having a sequence according to SEQ ID NO: 138, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 138;

(lxxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 81, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 31; and a light chain variable sequence having a sequence according to SEQ ID NO: 139, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 139;

(lxxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 82, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 82; and a light chain variable sequence having a sequence according to SEQ ID NO: 105, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 105;

(lxxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 83, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 83; and a light chain variable sequence having a sequence according to SEQ ID NO: 126, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 126;

(lxxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 84, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 84; and a light chain variable sequence having a sequence according to SEQ ID NO: 140, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 140;

(lxxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 85, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 85; and a light chain variable sequence having a sequence according to SEQ ID NO: 141, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 141;

(lxxvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 86, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 86; and a light chain variable sequence having a sequence according to SEQ ID NO: 141, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 141;

(lxxvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 87, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 87; and a light chain variable sequence having a sequence according to SEQ ID NO: 117, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 117;

(lxxviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 88, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 88; and a light chain variable sequence having a sequence according to SEQ ID NO: 142, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 142;

(lxxix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 89, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 89; and a light chain variable sequence having a sequence according to SEQ ID NO: 143, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 143;

(lxxx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 90, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 90; and a light chain variable sequence having a sequence according to SEQ ID NO: 144, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 144;

(lxxxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 91, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 91; and a light chain variable sequence having a sequence according to SEQ ID NO: 109, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 109;

(lxxxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 92, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 92; and a light chain variable sequence having a sequence according to SEQ ID NO: 145, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 145;

(lxxxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 93, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 93; and a light chain variable sequence having a sequence according to SEQ ID NO: 146, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 146;

(lxxxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 94, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 94; and a light chain variable sequence having a sequence according to SEQ ID NO: 147, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 147;

(lxxxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 95, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 95; and a light chain variable sequence having a sequence according to SEQ ID NO: 148, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 148;

(lxxxvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 96, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 96; and a light chain variable sequence having a sequence according to SEQ ID NO: 149, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 149;

(lxxxvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 97, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 97; and a light chain variable sequence having a sequence according to SEQ ID NO: 150, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 150;

(lxxxviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 98, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 98; and a light chain variable sequence having a sequence according to SEQ ID NO: 151, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 151;

(lxxxix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 99, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 99; and a light chain variable sequence having a sequence according to SEQ ID NO: 152, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 152;

(xc) a heavy chain variable sequence having a sequence according to SEQ ID NO: 100, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 100; and a light chain variable sequence having a sequence according to SEQ ID NO: 136, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 136;

(xci) a heavy chain variable sequence having a sequence according to SEQ ID NO: 91, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 91; and a light chain variable sequence having a sequence according to SEQ ID NO: 153, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 153;

(xcii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 101, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 101; and a light chain variable sequence having a sequence according to SEQ ID NO: 154, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 154;

(xciii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 102, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 102; and a light chain variable sequence having a sequence according to SEQ ID NO: 155, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 155;

(xciv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 36, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 36; and a light chain variable sequence having a sequence according to SEQ ID NO: 156, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 156; or

(xc) a heavy chain variable sequence having a sequence according to SEQ ID NO: 103, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 103; and a light chain variable sequence having a sequence according to SEQ ID NO: 157, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 157.

8. The monoclonal antibody or antibody fragment of any one of claims 1-3, wherein said antibody or antibody fragment comprises a heavy chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 7 and a light chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 8.

9. The monoclonal antibody or antibody fragment of claim 8, wherein said antibody or antibody fragment comprises a heavy chain variable sequence having at least 95% identity to SEQ ID NO: 7 and a light chain variable sequence having at least 95% identity to SEQ ID NO: 8.

10. The monoclonal antibody or antibody fragment of claim 9, wherein said antibody or antibody fragment comprises a heavy chain variable sequence having a sequence according to

SEQ ID NO: 7 and a light chain variable sequence having a sequence according to SEQ ID NO: 8.

11. The monoclonal antibody or antibody fragment of any one of claims 1-10, wherein said antibody or antibody fragment is encoded by a heavy chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 9 and a light chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 10.

12. The monoclonal antibody or antibody fragment of claim 11, wherein said antibody or antibody fragment is encoded by a heavy chain variable sequence having at least 95% identity to SEQ ID NO: 9 and a light chain variable sequence having at least 95% identity to SEQ ID NO: 10.

13. The monoclonal antibody or antibody fragment of claim 12, wherein said antibody or antibody fragment is encoded by a heavy chain variable sequence according to SEQ ID NO: 9 and a light chain variable sequence according to SEQ ID NO: 10.

14. The monoclonal antibody or antibody fragment of any one of claims 1-13, wherein the antibody or antibody fragment is capable of binding to HSP70.

15. The monoclonal antibody or antibody fragment of any one of claims 1-14, wherein said antibody or antibody fragment is a humanized antibody.

16. The monoclonal antibody or antibody fragment of any one of claims 1-15, wherein the antibody fragment is a monovalent scFv (single chain fragment variable) antibody, divalent scFv, Fab fragment, F(ab')₂ fragment, F(ab')₃ fragment, Fv fragment, or single chain antibody.

17. The monoclonal antibody or antibody fragment of any one of claims 1-16, wherein said antibody or antibody fragment is a chimeric antibody, bispecific antibody, or BiTE.

18. The monoclonal antibody or antibody fragment of any one of claims 1-17, wherein said antibody or antibody fragment is an IgG antibody or a recombinant IgG antibody or antibody fragment.

19. The monoclonal antibody or antibody fragment of any one of claims 1-18, wherein said antibody is an IgG1, IgG2, IgG3, or IgG4 antibody, or a recombinant IgG1, IgG2, IgG3, or IgG4 antibody or antibody fragment.
20. The monoclonal antibody or antibody fragment of any one of claims 1-19, wherein said antibody or antibody fragment comprises SEQ ID NOs: 217-221.
21. The monoclonal antibody or antibody fragment of any one of claims 1-20, wherein the antibody or antibody fragment is conjugated or fused to an imaging agent or a cytotoxic agent.
22. The monoclonal antibody or antibody fragment of claim any one of claims 1-21, wherein the antibody or antibody fragment is labeled.
23. The monoclonal antibody or antibody fragment of claim 22, wherein the label is a fluorescent label, an enzymatic label, or a radioactive label.
24. A monoclonal antibody or antibody fragment, which competes for binding to the same epitope as the monoclonal antibody or an antibody fragment according to any one of claims 1-23.
25. A monoclonal antibody or antibody fragment that binds to an epitope on HSP70 recognized by an antibody or antibody fragment of any one of claims 1-24.
26. A monoclonal antibody or antibody fragment, wherein the monoclonal antibody or antibody fragment binds to an epitope of HSP70 defined by a peptide corresponding to K573-Q601 of SEQ ID NO: 11.
27. The monoclonal antibody or antibody fragment of claim 26, wherein, when bound to HSP70, the monoclonal antibody or antibody fragment binds to one or two of the following residues: H594, K595, and Q601 of SEQ ID NO:11.
28. The monoclonal antibody or antibody fragment of claim 26 or 27, wherein, when bound to HSP70, the monoclonal antibody or antibody fragment binds to all of the following residues: H594, K595, and Q601 of SEQ ID NO:11.

29. The monoclonal antibody or antibody fragment of claim 27 or 28, wherein, when bound to HSP70, the monoclonal antibody or antibody fragment additionally binds to at least one of the following residues: K573, E576, W580, R596, and E598 of SEQ ID NO:11.
30. The monoclonal antibody or antibody fragment of claim 27 or 28, wherein, when bound to HSP70, the monoclonal antibody or antibody fragment binds to at least two, three, four, or five of the following residues: K573, E576, W580, R596, and E598 of SEQ ID NO:11.
31. The monoclonal antibody or antibody fragment of any one of claims 26-30, wherein, when bound to HSP70, the monoclonal antibody or antibody fragment binds to all of the following residues: K573, E576, W580, H594, K595, R596, E598, and Q601 of SEQ ID NO:11.
32. A monoclonal antibody or antibody fragment, wherein, when bound to HSP70, the antibody or antibody fragment enhances the uptake of tumor-derived ADP-HSP70-peptide antigen complexes by immune effector cells.
33. The monoclonal antibody or antibody fragment of any one of claims 24-43, wherein said antibody or antibody fragment is a humanized antibody.
34. The monoclonal antibody or antibody fragment of any one of claims 24-33, wherein the antibody fragment is a monovalent scFv (single chain fragment variable) antibody, divalent scFv, Fab fragment, F(ab')₂ fragment, F(ab')₃ fragment, Fv fragment, or single chain antibody.
35. The monoclonal antibody or antibody fragment of any one of claims 24-34, wherein said antibody or antibody fragment is a chimeric antibody or bispecific antibody.
36. The monoclonal antibody or antibody fragment of any one of claims 24-35, wherein said antibody is an IgG antibody or a recombinant IgG antibody or antibody fragment.
37. The monoclonal antibody or antibody fragment of any one of claims 24-36, wherein said antibody is an IgG1, IgG2, IgG3, or IgG4 antibody, or a recombinant IgG1, IgG2, IgG3, or IgG4 antibody or antibody fragment.

38. The monoclonal antibody or antibody fragment of any one of claims 24-37, wherein said antibody or antibody fragment comprises SEQ ID NOs: 217-221.
39. The monoclonal antibody or antibody fragment of any one of claims 24-38, wherein the antibody or antibody fragment is conjugated or fused to an imaging agent or a cytotoxic agent.
40. The monoclonal antibody or antibody fragment of any one of claims 24-39, wherein the monoclonal antibody or antibody fragment is the monoclonal antibody or antibody fragment of any one of claims 1-23.
41. An isolated nucleic acid encoding the antibody heavy and/or light chain variable region of the antibody or antibody fragment of any of claims 1-41.
42. The isolated nucleic acid of claim 41, comprising a nucleotide sequence that is at least 85% identical to SEQ ID NO: 9 or 10.
43. An expression vector comprising the nucleic acid of claim 41 or 42.
44. A hybridoma or engineered cell comprising a nucleic acid encoding an antibody or antibody fragment of any one of claims 1-40.
45. A hybridoma or engineered cell comprising a nucleic acid of claim 41 or 42.
46. A method of making the monoclonal antibody or antibody fragment of any one of claims 1-36, the method comprising culturing the hybridoma or engineered cell of claim 44 or 45 under conditions that allow expression of the antibody or antibody fragment and optionally isolating the antibody from the culture.
47. A pharmaceutical formulation comprising one or more antibody or antibody fragment of any one of claims 1-40.
48. A method of treating a patient having a cancer, the method comprising administering an effective amount of the antibody or antibody fragment of any one of claims 1-40.
49. The method of claim 48, wherein the method enhances uptake of HSP70 by antigen presenting cells.

50. The method of claim 49, wherein the uptake of HSP70 by antigen presenting cells is mediated by human FcγR2A and/or human FcγR2B.
51. The method of any one of claims 48-50, further defined as a method for enhancing cytotoxic T cell-mediated antitumor immunity.
52. The method of claim any one of claims 48-51, further defined as a method for increasing sensitivity to immunotherapy.
53. The method of any one of claims 48-52, further defined as a method of enhancing uptake of tumor-derived ADP-HSP70-peptide antigen complexes by immune effector cells.
54. The method of any one of claims 48-53, further defined as a method of enhancing antigen presentation by dendritic cells.
55. The method of any one of claims 48-54, further defined as a method of enhancing CD4+ and CD8+ T-cell responses to tumor antigens.
56. The method of any one of claims 48-55, wherein the cancer is a pancreatic cancer or a prostate cancer.
57. The method of any one of claims 48-56, further comprising administering at least a second anti-cancer therapy.
58. The method of claim 57, wherein the second anti-cancer therapy is a chemotherapy, immunotherapy, radiotherapy, gene therapy, surgery, hormonal therapy, anti-angiogenic therapy or cytokine therapy.
59. A chimeric antigen receptor (CAR) protein comprising an antigen binding domain that binds to human HSP70.
60. The CAR protein of claim 59, wherein the CAR protein comprises:
- (i) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(v) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 172; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(viii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 173; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(x) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3, and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 176; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 177; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 180; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 182; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 185; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166 a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 160, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xli) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xlii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xlii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162; or

(xlv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

61. The CAR protein of claim 59 or 60, wherein the antigen binding domain comprises a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

62. The CAR of any one of claims 59-61, wherein the antigen binding domain comprises a heavy chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 7 and a light chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 8.

63. The CAR of any one of claims 59-62, wherein the antigen binding domain comprises a heavy chain variable sequence having at least 95% identity to SEQ ID NO: 7 and a light chain variable sequence having at least 95% identity to SEQ ID NO: 8.

64. The CAR of any one of claims 59-63, wherein the antigen binding domain comprises a heavy chain variable sequence having a sequence according to SEQ ID NO: 7 and a light chain variable sequence having a sequence according to SEQ ID NO: 8.
65. The CAR of any one of claims 59-64, wherein the antigen binding domain is encoded by a heavy chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 9 and a light chain variable sequence having at least 70%, 80%, or 90% identity to SEQ ID NO: 10.
66. The CAR of any one of claims 59-65, wherein the antigen binding domain is encoded by a heavy chain variable sequence having at least 95% identity to SEQ ID NO: 9 and a light chain variable sequence having at least 95% identity to SEQ ID NO: 10.
67. The CAR of any one of claims 59-66, wherein the antigen binding domain is encoded by a heavy chain variable sequence according to SEQ ID NO: 9 and a light chain variable sequence according to SEQ ID NO: 10.
68. The CAR of any one of claims 59-67, wherein the CAR is capable of binding to HSP70.
69. The CAR of any one of claims 59-68, wherein the antigen binding domain is a humanized antigen-binding domain.
70. The CAR of any one of claims 59-69, further comprising a hinge domain, a transmembrane domain, and an intracellular signaling domain.
71. The CAR of claim 70, wherein the hinge domain is a CD8a hinge domain or an IgG4 hinge domain.
72. The CAR of claim 70 or 71, wherein the transmembrane domain is a CD8a transmembrane domain or a CD28 transmembrane domain.
73. The CAR of any one of claims 70-72, wherein the intracellular signaling domain comprises a CD3z intracellular signaling domain.
74. A nucleic acid molecule encoding a CAR of any one of claims 59-73.

75. The nucleic acid molecule of claim 74, wherein the sequence encoding the CAR is operatively linked to expression control sequences.
76. The nucleic acid molecule of claim 74 or 75, further defined as an expression vector.
77. An engineered cell comprising a nucleic acid molecule encoding a chimeric antigen receptor (CAR) comprising an antigen binding domain that binds to human HSP70.
78. The cell of claim 77, wherein the nucleic acid molecule encodes a CAR of any one of claims 59-73.
79. The cell of claim 77 or 78, wherein the cell is a T cell.
80. The cell of claim 77 or 78, wherein the cell is an NK cell.
81. The cell of any one of claims 77-80, wherein the nucleic acid is integrated into the genome of the cell.
82. The cell of any one of claims 77-81, wherein the cell is a human cell.
83. A pharmaceutical composition comprising a population of cells in accordance with any one of claims 77-82 in a pharmaceutically acceptable carrier.
84. A method of treating cancer in a human patient in need thereof comprising administering to the patient an anti-tumor effective amount of a cell therapy comprising one or more cells in accordance with any one of claims 78-82.
85. The method of claim 84, wherein the cells are allogeneic cells.
86. The method of claim 84, wherein the cells are autologous cells.
87. The method of any one of claims 84-86, wherein the cells are HLA matched to the subject.
88. The method of any one of claims 84-87, wherein the cancer is a pancreatic cancer or a prostate cancer.
89. The method of any one of claims 84-88, further comprising administering at least a second anti-cancer therapy.

90. The method of claim 89, wherein the second anti-cancer therapy is a chemotherapy, immunotherapy, radiotherapy, gene therapy, surgery, hormonal therapy, anti-angiogenic therapy or cytokine therapy.
91. A method of detecting HSP70 in an in vitro sample, the method comprising contacting the in vitro sample with an antibody or antibody fragment of any one of claims 1-36 and detecting the binding of the antibody or antibody fragment to the sample.
92. The method of claim 91, wherein the detecting is by flow cytometry, mass spectrometry, western blot, immunohistochemistry, ELISA, or RIA.
93. An antibody or antibody fragment of any of claims 1-40, a pharmaceutical composition of claim 47, a cell of any of claims 77-82, or a pharmaceutical composition of claim 83 for use in treating a cancer in a subject.
94. Use of an antibody or antibody fragment of any of claims 1-40, a pharmaceutical composition of claim 47, a cell of any of claims 77-82, or a pharmaceutical composition of claim 83, in the manufacture of a medicament for treating a cancer in a subject.

WHAT IS CLAIMED IS:

1. A monoclonal antibody or antibody fragment that binds HSP70, wherein the antibody or antibody fragment comprises a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of GYX₁FTX₂YG (SEQ ID NO: 214), wherein X₁ is T, S, or I, and X₂ is N or K, a VHCDR2 amino acid sequence of INTYTGEX₁ (SEQ ID NO: 215), wherein X₁ is P, S, T, or A, and a VHCDR3 amino acid sequence of X₁RYDHX₂MDY (SEQ ID NO: 216), wherein X₁ is A, T, V, or G, and X₂ is A, R, F, T, P, V, S, D, N, H, L, Y, or G; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of QSLX₁NSGTRKNY (SEQ ID NO: 212), wherein X₁ is L, F, or V, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of KQSYX₁LYT (SEQ ID NO: 213), wherein X₁ is T, N, or S.

2. The monoclonal antibody or antibody fragment of claim 1, wherein said antibody or antibody fragment comprises:

(i) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(v) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 172; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(viii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 173; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(x) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 176; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 177; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 180; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 182; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 185; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166 a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 160, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xl) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xli) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xlii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlili) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162; or

(xlvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

3. The monoclonal antibody or antibody fragment of claim 1 or 2, wherein the antibody or antibody fragment comprises a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

4. The monoclonal antibody or antibody fragment of any one of claims 1-3, wherein said antibody or antibody fragment comprises:

X₁X₂QLX₃X₄SGX₅X₆X₇X₈KPGX₉SX₁₀X₁₁X₁₂SCKX₁₃SGYTFTNYGMNWRQAPGX₁₄GLX₁₅WX₁₆G
WINTYTGEPTYADDFKGRX₁₇TX₁₈X₁₉X₂₀DX₂₁SX₂₂X₂₃TX₂₄YX₂₅X₂₆X₂₇X₂₈X₂₉LX₃₀X₃₁X₃₂DTA
VYFCARYDHAMDYWGQGTGX₃₃VTVSS (SEQ ID NO: 18),

wherein X₁ is Q or E, X₂ is I or V, X₃ is V or Q, X₄ is Q or E, X₅ is A, P, or G, X₆ is E or G, X₇ is V or L, X₈ is V or K, X₉ is A, E, G, or S, X₁₀ is V or L, X₁₁ is K or R, X₁₂ is V, L, or I, X₁₃ is A or T, X₁₄ is K or Q, X₁₅ is E or K, X₁₆ is M or V, X₁₇ is F or V, X₁₈ is F, M, or I, X₁₉ is T or S, X₂₀ is T, R, or A, X₂₁ is T, D, or E, X₂₂ is T, A, or K, X₂₃ is S or N, X₂₄ is L or A, X₂₅ is M or L, X₂₆ is E or Q, X₂₇ is L or M, X₂₈ is R, S, T, or N, X₂₉ is S or G, X₃₀ is R, K, or M, X₃₁ is S or T, X₃₂ is D or E, and X₃₃ is L, S, or T;

and a light chain variable sequence having a sequence of

X₁X₂X₃X₄TQSPX₅SLX₆X₇SX₈GX₉RX₁₀TIX₁₁CKSSQSLLNSGTRKNYLAWYQQKX₁₂GX₁₃X₁₄PX₁₅LLIYWTSTRESGVPX₁₆RFSGSGSGTDFTLTIX₁₇X₁₈LQX₁₉EDVAX₂₀YYCKQSYTLYTFGX₂₁GTKX₂₂EIK (SEQ ID NO: 26),

wherein X₁ is E or D, X₂ is I or V, X₃ is V or Q, X₄ is L or M, X₅ is D or S, X₆ is A or S, X₇ is V or A, X₈ is L or V, X₉ is E or D, X₁₀ is A or V, X₁₁ is N or T, X₁₂ is A or P, X₁₃ is Q or K, X₁₄ is S, V, or P, X₁₅ is K or R, X₁₆ is D or S, X₁₇ is S, D, or N, X₁₈ is S or T, X₁₉ is A or P, X₂₀ is V or T, X₂₁ is Q or G, and X₂₂ is L or V.

5. The monoclonal antibody or antibody fragment of claim 4, wherein said antibody or antibody fragment comprises:

(i) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(ii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99%

identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(iii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(iv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(v) a heavy chain variable sequence having a sequence according to SEQ ID NO: 12, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 12; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(vi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(vii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(viii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(ix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(x) a heavy chain variable sequence having a sequence according to SEQ ID NO: 13, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 13; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to

SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(xv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 14, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 14; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xvi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xvii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xviii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xix) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22;

(xx) a heavy chain variable sequence having a sequence according to SEQ ID NO: 15, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 15; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23;

(xxi) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 19, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 19;

(xxii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 20, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 20;

(xxiii) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 21, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 21;

(xxiv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to

SEQ ID NO: 22, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 22; or

(xxv) a heavy chain variable sequence having a sequence according to SEQ ID NO: 16, or a heavy chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 16; and a light chain variable sequence having a sequence according to SEQ ID NO: 23, or a light chain variable sequence having at least 70%, 80%, 90%, 95%, 96%, 97%, 98%, or 99% identity to SEQ ID NO: 23.

6. The monoclonal antibody or antibody fragment of any one of claims 1-3, wherein said antibody or antibody fragment comprises a heavy chain variable sequence having at least 95% identity to SEQ ID NO: 7 and a light chain variable sequence having at least 95% identity to SEQ ID NO: 8.

7. The monoclonal antibody or antibody fragment of any one of claims 1-6, wherein said antibody or antibody fragment is a humanized antibody.

8. The monoclonal antibody or antibody fragment of any one of claims 1-7, wherein the antibody fragment is a monovalent scFv (single chain fragment variable) antibody, divalent scFv, Fab fragment, F(ab')₂ fragment, F(ab')₃ fragment, Fv fragment, single chain antibody, chimeric antibody, bispecific antibody, or BiTE.

9. The monoclonal antibody or antibody fragment of any one of claims 1-8, wherein said antibody or antibody fragment is an IgG antibody or a recombinant IgG antibody or antibody fragment.

10. The monoclonal antibody or antibody fragment of any one of claims 1-9, wherein said antibody is an IgG1, IgG2, IgG3, or IgG4 antibody, or a recombinant IgG1, IgG2, IgG3, or IgG4 antibody or antibody fragment.

11. The monoclonal antibody or antibody fragment of any one of claims 1-10, wherein said antibody or antibody fragment comprises SEQ ID NOs: 217-221.

12. An isolated nucleic acid encoding the antibody heavy and/or light chain variable region of the antibody or antibody fragment of any of claims 1-11.

13. A hybridoma or engineered cell comprising a nucleic acid encoding an antibody or antibody fragment of any one of claims 1-11.

14. A method of making the monoclonal antibody or antibody fragment of any one of claims 1-11, the method comprising culturing the hybridoma or engineered cell of claim 13 under conditions that allow expression of the antibody or antibody fragment and optionally isolating the antibody from the culture.

15. A pharmaceutical formulation comprising one or more antibody or antibody fragment of any one of claims 1-11.

16. A chimeric antigen receptor (CAR) protein comprising an antigen binding domain that binds to human HSP70, wherein the CAR protein comprises:

(i) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(iv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid

sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(v) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 172; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(vii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(viii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 173; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(ix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(x) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 176; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 171; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 177; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 179; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 159, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 180; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 182; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 181; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 185; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166 a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 174; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 160, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxx) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 175; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 169, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxiv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 167, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxvii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxviii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xxxix) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 184; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xl) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 178; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 163;

(xli) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 164, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 170; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162;

(xlii) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlili) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xliv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 166, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6;

(xlv) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 165, a VHCDR2 amino acid sequence of SEQ ID NO: 2, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 161, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 162; or

(xlvi) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 1, a VHCDR2 amino acid sequence of SEQ ID NO: 168, and a VHCDR3 amino acid sequence of SEQ ID NO: 183; and a light chain variable region (VL) comprising a VLCDR1 amino acid sequence of SEQ ID NO: 4, a VLCDR2 amino acid sequence of SEQ ID NO: 5, and a VLCDR3 amino acid sequence of SEQ ID NO: 6.

17. An engineered cell comprising a nucleic acid molecule encoding a chimeric antigen receptor (CAR) of claim 16.

18. An antibody or antibody fragment of any of claims 1-11, a pharmaceutical composition of claim 15, a cell of claim 17, for use in treating a cancer in a subject.

19. Use of an antibody or antibody fragment of any of claims 1-11, a pharmaceutical composition of claim 15, a cell of claim 17, in the manufacture of a medicament for treating a cancer in a subject.

20. The use of claim 19, wherein the cancer is a pancreatic cancer or a prostate cancer.