WHAT IS CLAIMED IS:

1. An antigen-binding protein that binds to a human Claudin6 (CLDN6) protein(SEQ ID NO: 200), wherein:
    a. the antigen-binding protein binds to Extracellular Loop 2 (EL2) of an extracellular domain (ECD) of CLDN6 and does not bind to Extracellular Loop 1 (EL1) of the ECD of CLDN6; or
    b. does not bind to any of Claudin3 (CLDN3), Claudin4 (CLDN4), and Claudin9 (CLDN9) and inhibits binding of a reference antibody to CLDN6 endogenously expressed by OVCA429 cells with less than about 1200 nM; or
    c. a combination thereof.

2. The antigen- binding protein of claim 1, which binds to an epitope within the amino acid sequence of WTAHAIIRDFYNPLVAEAQKREL (SEQ ID NO: 2).

3. The antigen-binding protein of claim 2, which binds to the amino acid sequence of TAHAIIRDFYNPL (SEQ ID NO: 3) or LVAEAQKREL (SEQ ID NO: 4) of CLDN 6.

4. The antigen-binding protein of any one of claims 1 to 3, which does not bind to any one or more of Claudin3 (CLDN3), Claudin4 (CLDN4), and Claudin9 (CLDN9).

5. The antigen-binding protein of claim 4, which does not bind to CLDN3.

6. The antigen-binding protein of claim 5, which binds to CLDN6, CLDN4, and CLDN9.

7. The antigen-binding protein of claim 5, which does not bind to CLDN9.

8. The antigen-binding protein of claim 7, which binds to CLDN6 and CLDN4.

9. The antigen-binding protein of claim 5, which does not bind to CLDN4.

10. The antigen-binding protein of claim 9, which binds to CLDN6 and CLDN9.

11. The antigen-binding protein of any one of the previous claims, wherein the reference antibody comprises a light chain variable sequence of SEQ ID NO: 181 and a heavy chain variable sequence of SEQ ID NO: 182 or a light chain variable sequence of SEQ ID NO: 185 and a heavy chain variable sequence of SEQ ID NO: 186.

12. The antigen-binding protein of any one of the previous claims comprising:

a. a heavy chain CDR1 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 11, 17, 23, 29, 35, 41, 47, 53, 59, 65, 71, 77, 83, 89, 95, 101, 107, 113, 119, 125, and 131, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
b. a heavy chain CDR2 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 86, 102, 108, 114, 120, 126, and 132, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
c. a heavy chain CDR3 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103, 109, 115, 121, 127, and 133, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
d. a light chain CDR1 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 8, 14, 20, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104, 110, 116, 122, and 128, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
e. a light chain CDR2 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105, 111, 117, 123, and 129, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
f. a light chain CDR3 amino acid sequence set forth in Table A or a sequence selected from the group consisting of: SEQ ID NOs: 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, 100, 106, 112, 118, 124, and 130, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity;
g. a combination of any two or more of (a)-(f).

13. The antigen-binding protein of claim 12, wherein the variant sequence has at least about 80% or at least or about 85% sequence identity.

14. The antigen-binding protein of claim 13, wherein the variant sequence has at least about 90% sequence identity or at least or about 95% sequence identity.

15. The antigen-binding protein of claim 12, comprising a light chain CDR1 amino acid sequence, a light chain CDR2 amino acid sequence, and a light chain CDR3 amino acid sequence set forth in Table A and 1 or 2 of the heavy chain CDR amino acid sequences set forth in Table A.

16. The antigen-binding protein of claim 12, comprising a heavy chain CDR1 amino acid sequence, a heavy chain CDR2 amino acid sequence, and a heavy chain CDR3 amino acid sequence set forth in Table A and 1 or 2 of the light chain CDR amino acid sequences set forth in Table A.

17. The antigen-binding protein of any one of claims 12-16, comprising six CDR amino acid sequences selected from the group consisting of:
    a. SEQ ID NOs: 74-79;
    b. SEQ ID NOs: 50-55;
    c. SEQ ID NOs: 122-127;
    d. SEQ ID NOs: 26-31;
    e. SEQ ID NOs: 128-133;
    f. SEQ ID NOs: 38-43;
    g. SEQ ID NOs: 62-67;
    h. SEQ ID NOs: 80-85;
    i. SEQ ID NOs: 44-49;
    j. SEQ ID NOs: 86-91;
    k. SEQ ID NOs: 104-109;
    l. SEQ ID NOs: 56-61;
    m. SEQ ID NOs: 32-37;
    n. SEQ ID NOs: 110-115;
    o. SEQ ID NOs: 98-103;
    p. SEQ ID NOs: 92-97;
    q. SEQ ID NOs: 116-121;
    r. SEQ ID NOs: 8-13;
    s. SEQ ID NOs: 68-73;
    t. SEQ ID NOs: 14-19; and

u. SEQ ID NOs: 20-25.

18. The antigen-binding protein of any one of claims 12-19, comprising:
    a. a heavy chain variable region amino acid sequence set forth in in Table B or a sequence selected from the group consisting of: 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, and 175, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
    b. a light chain variable region amino acid sequence set forth in in Table B or a sequence selected from the group consisting of: 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, and 176, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
    c. both (a) and (b).

19. The antigen-binding protein of claim 18, wherein the variant sequence has at least about 80% or at least about 85% sequence identity.

20. The antigen-binding protein of claim 19, wherein the variant sequence has at least about 90% or at least about 95% sequence identity.

21. The antigen-binding protein of claim 18, comprising a pair of amino acid sequences selected from the group consisting of:
    a. SEQ ID NOs: 156 and 157;
    b. SEQ ID NOs: 148 and 149;
    c. SEQ ID NOs: 172 and 173;
    d. SEQ ID NOs: 140 and 141;
    e. SEQ ID NOs: 174 and 175;
    f. SEQ ID NOs: 144 and 145;
    g. SEQ ID NOs: 152 and 153;
    h. SEQ ID NOs: 158 and 159;
    i. SEQ ID NOs: 146 and 147;
    j. SEQ ID NOs: 160 and 161;
    k. SEQ ID NOs: 166 and 167;
    l. SEQ ID NOs: 150 and 151;

m. SEQ ID NOs: 142 and 143;
n. SEQ ID NOs: 168 and 169;
o. SEQ ID NOs: 164 and 165;
p. SEQ ID NOs: 162 and 163;
q. SEQ ID NOs: 170 and 171;
r. SEQ ID NOs: 134 and 135;
s. SEQ ID NOs: 154 and 155;
t. SEQ ID NOs: 136 and 137; and
u. SEQ ID NOs: 138 and 139.

22. The antigen-binding protein of any one of the previous claims, which is an antibody.

23. The antigen-binding protein of claim 22, which is a monoclonal antibody.

24. The antigen-binding protein of claim 22 or 23, which is an IgG.

25. The antigen-binding protein of any one of the previous claims, which inhibits at least about 50% colony growth in a soft agar 3D proliferation assays.

26. The antigen-binding protein of any one of the previous claims, which inhibits tumor growth in xenograft mice injected with human cancer cells.

27. The antigen-binding protein of claim 26, which inhibits tumor growth of in xenograft mice injected with ovarian cancer cells, melanoma cancer cells, bladder cancer cells, or endometrial cancer cells.

28. The antigen-binding protein of claim 27, which inhibits at least 50% tumor growth in xenograft mice injected with ovarian cancer cells, bladder cancer cells, or endometrial cancer cells.

29. An antigen-binding protein comprising (a) an HC CDR1 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 11, 17, 23, 29, 35, 41, 47, 53, 59, 65, 71, 77, 83, 89, 95, 101, 107, 113, 119, 125, 131, 452, 455, 461, 465, and 472, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; (b) an HC CDR2 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 86, 102, 108, 114,

120, 126, 132, 475, 456, 462, 466, 468, and 473; or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; (c) an HC CDR3 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103, 109, 115, 121, 127, 133, 453, 457, 463, 467, 469, and 474; or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; (d) a LC CDR1 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 8, 14, 20, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104, 110, 116, 122, 128, 449, 476, 458, 464, and 470; or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; (e) an LC CDR2 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105, 111, 117, 123, 129, 450, 477, 459, and 471; or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; (f) an LC CDR3 amino acid sequence set forth in Table A or A1 or a sequence selected from the group consisting of: SEQ ID NOs: 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, 100, 106, 112, 118, 124, 130, 451, 454, and 460, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or (g) a combination of any two or more of (a)-(f).

30. An antigen-binding protein comprising six CDR amino acid sequences selected from the group consisting of:
    a. SEQ ID NOs: 74-79;
    b. SEQ ID NOs: 50-55;
    c. SEQ ID NOs: 122-127;
    d. SEQ ID NOs: 26-31;
    e. SEQ ID NOs: 128-133;
    f. SEQ ID NOs: 38-43;
    g. SEQ ID NOs: 62-67;
    h. SEQ ID NOs: 80-85;
    i. SEQ ID NOs: 44-49;
    j. SEQ ID NOs: 86-91;
    k. SEQ ID NOs: 104-109;
    l. SEQ ID NOs: 56-61;

m. SEQ ID NOs: 32-37;
n. SEQ ID NOs: 110-115;
o. SEQ ID NOs: 98-103;
p. SEQ ID NOs: 92-97;
q. SEQ ID NOs: 116-121;
r. SEQ ID NOs: 8-13;
s. SEQ ID NOs: 68-73;
t. SEQ ID NOs: 14-19;
u. SEQ ID NOs: 20-25;
v. SEQ ID NOs: 449-453 and 475;
w. SEQ ID NOs: 476-477, 454-457;
x. SEQ ID NOs: 458-463;
y. SEQ ID NOs: 57, 58, 464-467;
z. SEQ ID NOs: 68-71 and 468-469; and
aa. SEQ ID NOs: 112, and 470-474.

31. An antigen-binding protein comprising:
    a. a heavy chain variable region amino acid sequence set forth in in Table B or a sequence selected from the group consisting of: SEQ ID NOs: 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, and 175, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
    b. a light chain variable region amino acid sequence set forth in in Table B or a sequence selected from the group consisting of: SEQ ID NOs: 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, and 176, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
    c. both (a) and (b).

32. The antigen-binding protein of claim 31, wherein the variant sequence has at least about 85% sequence identity or about 90% or about 95% sequence identity.

33. An antigen-binding protein comprising a pair of amino acid sequences selected from the group consisting of:

a. SEQ ID NOs: 156 and 157;
b. SEQ ID NOs: 148 and 149;
c. SEQ ID NOs: 172 and 173;
d. SEQ ID NOs: 140 and 141;
e. SEQ ID NOs: 174 and 175;
f. SEQ ID NOs: 144 and 145;
g. SEQ ID NOs: 152 and 153;
h. SEQ ID NOs: 158 and 159;
i. SEQ ID NOs: 146 and 147;
j. SEQ ID NOs: 160 and 161;
k. SEQ ID NOs: 166 and 167;
l. SEQ ID NOs: 150 and 151;
m. SEQ ID NOs: 142 and 143;
n. SEQ ID NOs: 168 and 169;
o. SEQ ID NOs: 164 and 165;
p. SEQ ID NOs: 162 and 163;
q. SEQ ID NOs: 170 and 171;
r. SEQ ID NOs: 134 and 135;
s. SEQ ID NOs: 154 and 155;
t. SEQ ID NOs: 136 and 137; and
u. SEQ ID NOs: 138 and 139.

34. An antigen-binding protein comprising:

a. a heavy chain variable region amino acid sequence set forth in Table C or a sequence selected from the group consisting of: SEQ ID NOs: 376-379, 384-387, 391-396, 403-408, 412-413, 416-419, and 422-427, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
b. a light chain variable region amino acid sequence set forth in in Table C or a sequence selected from the group consisting of: SEQ ID NOs: 380-383, 388-390, 397-402, 409-411, 414-415, and 420-421, or a variant sequence thereof which differs by only one or two amino acids or which has at least or about 70% sequence identity; or
c. both (a) and (b).

35. The antigen-binding protein of claim 6, wherein the variant sequence has at least about 85% sequence identity.

36. The antigen-binding protein of claim 7, wherein the variant sequence has at least about 90% or about 95% sequence identity.

37. An antigen-binding protein comprising a pair of amino acid sequences selected from the group consisting of:
    a. SEQ ID NOs: 376 and 380;
    b. SEQ ID NOs: 377 and 380;
    c. SEQ ID NOs: 377 and 381;
    d. SEQ ID NOs: 377 and 382;
    e. SEQ ID NOs: 377 and 383;
    f. SEQ ID NOs: 378 and 381;
    g. SEQ ID NOs: 378 and 382;
    h. SEQ ID NOs: 378 and 383;
    i. SEQ ID NOs: 379 and 381;
    j. SEQ ID NOs: 379 and 382;
    k. SEQ ID NOs: 379 and 383;
    l. SEQ ID NOs: 384 and 388;
    m. SEQ ID NOs: 385 and 388;
    n. SEQ ID NOs: 385 and 389;
    o. SEQ ID NOs: 386 and 388;
    p. SEQ ID NOs: 386 and 389;
    q. SEQ ID NOs: 387 and 389;
    r. SEQ ID NOs: 422 and 389;
    s. SEQ ID NOs: 391 and 397;
    t. SEQ ID NOs: 392 and 397;
    u. SEQ ID NO: 393 and 398;
    v. SEQ ID NO: 394 and 398;
    w. SEQ ID NO: 395 and 398;
    x. SEQ ID NO: 396 and 398;
    y. SEQ ID NO: 423 and 398;
    z. SEQ ID NO: 424 and 398;
    aa. SEQ ID NO: 425 and 398;

bb. SEQ ID NO: 426 and 398
cc. SEQ ID NO: 427 and 398;
dd. SEQ ID NO: 403 and 409;
ee. SEQ ID NO: 404 and 409;
ff. SEQ ID NO: 405 and 410;
gg. SEQ ID NO: 405 and 411;
hh. SEQ ID NO: 406 and 410;
ii. SEQ ID NO: 406 and 411;
jj. SEQ ID NO: 407 and 410;
kk. SEQ ID NO: 407 and 411;
ll. SEQ ID NO: 408 and 410;
mm. SEQ ID NO: 408 and 411;
nn. SEQ ID NO: 412 and 414;
oo. SEQ ID NO: 413 and 414;
pp. SEQ ID NO: 416 and 420;
qq. SEQ ID NO: 417 and 420;
rr. SEQ ID NO: 417 and 421;
ss. SEQ ID NO: 418 and 420;
tt. SEQ ID NO: 418 and 421;
uu. SEQ ID NO: 419 and 420; and
vv. SEQ ID NO: 419 and 421;

38. An antigen-binding protein comprising:

(A) an HC CDR1 comprising the amino acid sequence of YTFTXYT, wherein X is T, V, D, or S (SEQ ID NO: 452), optionally, comprising the amino acid sequence of YTFTTYT (SEQ ID NO: 11);

(B) an HC CDR2 comprising the amino acid sequence of IXPSSGYT, wherein X is Q, S, A, or N (SEQ ID NO: 475), optionally, comprising the amino acid sequence of INPSSGYT (SEQ ID NO: 12);

(C) an HC CDR3 comprising the amino acid sequence of AXGDYYVAY, wherein X is N, Q, H, or D (SEQ ID NO: 453), optionally, comprising the amino acid sequence of ANGDYYVAY (SEQ ID NO:13);

(D) an LC CDR1 comprising the amino acid sequence of SSVSSXY, wherein X is T, V, F, or D (SEQ ID NO: 449), optionally, comprising the amino acid sequence of SSVSSTY (SEQ ID NO: 8);

(E) an LC CDR2 comprising the amino acid sequence of XTX, wherein X at position 1 is S, T, Q, or A and X at position 3 is S, T, D, or Q (SEQ ID NO: 450), optionally, comprising the amino acid sequence of STS (SEQ ID NO: 9); and

(F) an LC CDR3 comprising the amino acid sequence of HXYXRSPLT, wherein X at position 2 is Q, H, or S and X at position 4 is H, Y, Q, or S (SEQ ID NO: 451), optionally, comprising the amino acid sequence of HQYHRSPLT (SEQ ID NO: 10).

39. An antigen-binding protein comprising:

(A) an HC CDR1 comprising the amino acid sequence of FTFSXYX, wherein X at position 5 is N, S, R, Q, or A and X at position 7 is W, H, Y, F (SEQ ID NO: 455), optionally, comprising the amino acid sequence of FTFSNYW (SEQ ID NO: 23);

(B) an HC CDR2 comprising the amino acid sequence of IRLKXDXYAT, wherein X at position 5 is S, N, A, or T and X at position 7 is Q, S, A, N (SEQ ID NO: 456), optionally, comprising the amino acid sequence of IRLKSDNYAT (SEQ ID NO: 24);

(C) an HC CDR3 comprising the amino acid sequence of XDGPPSGX, wherein X at position 1 is N, D, or T and X at position 8 is S, T, A, C, or Y (SEQ ID NO: 457), optionally, comprising the amino acid sequence of NDGPPSGC (SEQ ID NO: 25);

(D) an LC CDR1 comprising the amino acid sequence of EXIYSY, wherein X is Q, S, A, D, or N (SEQ ID NO: 476), optionally, comprising the amino acid sequence of ENIYSY (SEQ ID NO: 20);

(E) an LC CDR2 comprising the amino acid sequence of XAK, wherein X at position 1 is Q, S, A, D, or N (SEQ ID NO: 477), optionally, comprising the amino acid sequence of NAK (SEQ ID NO: 21); and

(F) an LC CDR3 comprising the amino acid sequence of QXHYXVPWT, wherein X at position 2 is H, Q, S, or T and X at position 5 is T, S, N, or G (SEQ ID NO: 454), optionally, comprising the amino acid sequence of QHHYTVPWT (SEQ ID NO: 22).

40. An antigen-binding protein comprising:

(A) an HC CDR1 comprising the amino acid sequence of YTXTXYT, wherein X at position 3 is F, Y, S, or T and X at position 5 is S, T, Y, or D (SEQ ID NO: 461), optionally, comprising the amino acid sequence of YTFTSYT (SEQ ID NO: 29);

(B) an HC CDR2 comprising the amino acid sequence of IXPSSXYT, wherein X at position 2 is Q, S, A, or N and X at position 6 is T, S, V, D, or G (SEQ ID NO: 462), optionally, comprising the amino acid sequence of INPSSTYT (SEQ ID NO: 30);

(C) an HC CDR3 comprising the amino acid sequence of XRGEXGGFAY, wherein X at position 1 is S, A, T, or V and X at position 5 is L, V, or F (SEQ ID NO: 463), optionally, comprising the amino acid sequence of SRGELGGFAY (SEQ ID NO: 31);

(D) an LC CDR1 comprising the amino acid sequence of QSLVHSXGXTY, wherein X at position 7 is D, N, E, Q, S, or A and X at position 9 is Q, S, A, D, or N (SEQ ID NO: 458), optionally, comprising the amino acid sequence of QSLVHSDGNTY (SEQ ID NO: 26);

(E) an LC CDR2 comprising the amino acid sequence of XVX, wherein X at position 1 is K, Q, or R and X at position 3 is S, T, or V (SEQ ID NO: 459), optionally, comprising the amino acid sequence of KVS (SEQ ID NO: 27); and

(F) an LC CDR3 comprising the amino acid sequence of SXXTHVPYT, wherein X at position 2 is Q, H, or T and X at position 3 is S, G, T, or D (SEQ ID NO: 460), optionally, comprising the amino acid sequence of SQSTHVPYT (SEQ ID NO: 28).

41. A conjugate comprising an antigen-binding protein of any one of the previous claims.

42. A fusion protein comprising an antigen-binding protein of any one of the previous claims.

43. A nucleic acid comprising a nucleotide sequence encoding an antigen binding protein of any one of the previous claims, a conjugate of claim 41, or a fusion protein of claim 42.

44. A vector comprising the nucleic acid of claim 43.

45. A host cell comprising the nucleic acid of claim 43 or the vector of claim 44.

46. A method of producing an antigen-binding protein that binds to a Claudin6 (CLDN6) protein, comprising (i) culturing the host cell of claim 45 in a cell culture medium, wherein the host cell comprises a nucleic acid comprising a nucleotide sequence encoding an antigen binding protein of any one of the previous claims, and (ii) harvesting the antigen-binding protein from the cell culture medium.

47. A method of producing a fusion protein comprising an antigen-binding protein that binds to a Claudin6 (CLDN6) protein, comprising (i) culturing the host cell of claim 45 in a cell culture medium, wherein the host cell comprises a nucleic acid comprising a nucleotide sequence encoding a fusion protein of claim 30, and (ii) harvesting the fusion protein from the cell culture medium.

48. A method of producing a pharmaceutical composition comprising combining an antigen-binding protein of any one of claims 1 to 40, a conjugate of claim 41, a fusion protein of claim 42, a nucleic acid of claim 43, a vector of claim 44, a host cell of claim 45, or a combination thereof, and a pharmaceutically acceptable carrier, diluent or excipient

49. A pharmaceutical composition comprising an antigen-binding protein of any one of claims 1 to 40, a conjugate of claim 41, a fusion protein of claim 42, a nucleic acid of claim 43, a vector of claim 44, a host cell of claim 45, or a combination thereof, and a pharmaceutically acceptable carrier, diluent or excipient.

50. A method of treating a subject with a CLDN6-expressing cancer comprising administering to the subject a pharmaceutical composition of claim 49 in an amount effective to treat the cancer.

51. A method of inhibiting tumor growth in a subject, comprising administering to the subject a pharmaceutical composition of claim 49 in an amount effective to inhibit tumor growth.

52. A method of reducing tumor size in a subject, comprising administering to the subject a pharmaceutical composition of claim 49 in an amount effective to reduce tumor size.

53. A method of preventing the recurrence of cancer in a subject, comprising administering to the subject a pharmaceutical composition of claim 49 in an amount effective to prevent the recurrence of cancer.

54. A method of treating cancer in a subject diagnosed to be a low over-expresser of CLDN6, comprising administering to the subject a pharmaceutical composition of claim 49 in an amount effective to prevent the recurrence of cancer

55. The method of any one of claims 50-54 wherein the administering induces apoptosis in tumor cells.

56. The method of any one of claims 50-55 wherein the administering induces apoptosis in cells expressing CLDN6

57. A method of detecting Claudin6 (CLDN6) in a sample, comprising contacting the sample with an antigen-binding protein of any one of claims 1 to 40, a conjugate of claim 41, or a fusion protein of claim 42, and assaying for an immunocomplex comprising the antigen-binding protein, conjugate or fusion protein bound to CLDN6.

58. A method of diagnosing a Claudin6 (CLDN6)-positive cancer in a subject, comprising contacting a biological sample comprising cells or tissue obtained from the subject with an antigen-binding protein of any one of claims 1 to 40, a conjugate of claim 41, or a fusion protein of claim 42, and assaying for an immunocomplex comprising the antigen-binding protein, conjugate or fusion protein bound to CLDN6.

CLAIMS

1. An antibody that binds to Claudin 6 (CLDN6) or antigen-binding fragment thereof wherein the antibody or antigen-binding fragment is selected from a group consisting of

(a) an antibody that binds CLDN6 or antigen-binding fragment thereof comprising:

(i) an HC CDR1 comprising the amino acid sequence of FTFSXYX (SEQ ID NO: 455), wherein X at position 5 is N and X at position 7 is W;

(ii) an HC CDR2 comprising the amino acid sequence of IRLKXDXYAT (SEQ ID NO: 456), wherein X at position 5 is S and X at position 7 is N;

(iii) an HC CDR3 comprising the amino acid sequence of XDGPPSGX (SEQ ID NO: 457), wherein X at position 1 is N and X at position 8 is S;

(iv) an LC CDR1 comprising the amino acid sequence of EXIYSY (SEQ ID NO: 476), wherein X is N;

(v) an LC CDR2 comprising the amino acid sequence of XAK (SEQ ID NO: 477), wherein X at position 1 is N; and

(vi) an LC CDR3 comprising the amino acid sequence of QXHYXVPWT (SEQ ID NO: 454), wherein X at position 2 is H and X at position 5 is T; and

(b) an antibody that binds CLDN6 or antigen-binding fragment thereof comprising the heavy chain (HC) CDR1-3 amino acid sequences of SEQ ID NOs: 23, 24, and 25, and the light chain (LC) CDR1-3 amino acid sequences of SEQ ID NOs: 20, 21, and 22.

2. The antibody or antigen-binding fragment thereof according to claim 1, wherein the antibody is

(i) a monoclonal antibody, and/or

(ii) a human, chimeric, or humanized antibody.

3. The antibody or antigen-binding fragment thereof according to any of the preceding claims, wherein the antibody is a humanized antibody comprising the heavy chain variable domain sequence as provided in SEQ ID NO: 387 and light chain variable domain sequence as provided in SEQ ID NO: 389.

4. A pharmaceutical composition comprising:
   a) an antibody or antigen-binding fragment thereof according to any of the preceding claims;
   b) a conjugate comprising the antibody or antigen-binding fragment thereof of (a);
   c) a fusion protein comprising the antibody or antigen-binding fragment thereof of (a);
   d) a nucleic acid encoding the antibody or antigen-binding fragment thereof of (a);
   e) a vector comprising the nucleic acid of (d);
   f) a cell comprising the nucleic acid of (d) or the vector of (e); or
   g) a combination thereof;

   and a pharmaceutically acceptable carrier, diluent or excipient.

5. The antibody or antigen-binding fragment thereof according to any of claims 1 to 3 or the pharmaceutical composition according to claim 4 for use in treating cancer.

6. An *in vitro* method for detecting Claudin 6 (CLDN6) in a sample comprising (a) contacting the antibody or antigen-binding fragment thereof according to any of claims 1 to 3 with the sample, and (b) assaying for an immunocomplex comprising the antibody or antigen-binding fragment thereof bound to CLDN6.

7. The antibody or antigen-binding fragment thereof according to any of claims 1 to 3 or the pharmaceutical composition according to claim 4 for use in a method diagnosing *in vivo* a Claudin 6 (CLDN6)-positive cancer in a subject.

8. A method of producing the pharmaceutical composition of claim 4, comprising combining a pharmaceutically acceptable carrier, diluent, or excipient; and any one of items (a)-(g) of claim 4.

9. A nucleic acid comprising a nucleotide sequence encoding
i. an antibody or antigen-binding fragment thereof of any one of claims 1 to 3, or
ii. a fusion protein comprising the antigen-binding protein of any one of claims 1 to 3.

10. A vector comprising the nucleic acid of claim 9.

11. A host cell comprising the nucleic acid of claim 9 or the vector of claim 10.

12. A method of producing an antibody or antigen-binding fragment thereof or a fusion protein thereof that binds to a Claudin 6 (CLDN6) protein, comprising
i. culturing the host cell of claim 11 in a cell culture medium, and
ii. harvesting the antibody or antigen-binding fragment thereof or the fusion protein from the cell culture medium.