

CLAIMS

1. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, comprising heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences selected from the group consisting of:
 - (a) SEQ ID NOs:458-463, respectively;
 - (b) SEQ ID NOs:5-10, respectively;
 - (c) SEQ ID NOs:15-20, respectively;
 - (d) SEQ ID NOs:25-30, respectively;
 - (e) SEQ ID NOs:35-40, respectively;
 - (f) SEQ ID NOs:45-50, respectively;
 - (g) SEQ ID NOs:55-60, respectively;
 - (h) SEQ ID NOs:65-70, respectively;
 - (i) SEQ ID NOs:75-80, respectively;
 - (j) SEQ ID NOs:85-90, respectively;
 - (k) SEQ ID NOs:95-100, respectively;
 - (l) SEQ ID NOs:105-110, respectively;
 - (m) SEQ ID NOs:115-120, respectively;
 - (n) SEQ ID NOs:125-130, respectively;
 - (o) SEQ ID NOs:135-140, respectively;
 - (p) SEQ ID NOs:145-150, respectively;
 - (q) SEQ ID NOs:155-160, respectively;
 - (r) SEQ ID NOs:165-170, respectively;
 - (s) SEQ ID NOs:175-180, respectively;
 - (t) SEQ ID NOs:185-190, respectively; and
 - (u) SEQ ID NOs:195-200, respectively.
2. The antibody or antigen-binding fragment thereof of claim 1, wherein the antibody or antigen-binding fragment thereof comprises a VH comprising the amino acid sequence of

SEQ ID NO:11, 21, 31, 41, 464, 51, 61, 71, 81, 91, 101, 111, 121, 131, 141, 151, 161, 171, 181, 191, or 201.

3. The antibody or antigen-binding fragment thereof of claim 1 or claim 2, wherein the antibody or antigen-binding fragment thereof comprises a VL comprising the amino acid sequence of SEQ ID NO:12, 22, 32, 42, 52, 62, 72, 82, 92, 102, 112, 122, 132, 142, 152, 162, 172, 182, 192, or 202.
4. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, wherein the antibody or antigen-binding fragment thereof comprises a heavy chain variable region and a light chain variable region, wherein the heavy chain variable region comprises the amino acid sequence of SEQ ID NO:11, 21, 31, 41, 464, 51, 61, 71, 81, 91, 101, 111, 121, 131, 141, 151, 161, 171, 181, 191, or 201.
5. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, wherein the antibody comprises a heavy chain variable region and a light chain variable region, wherein the light chain variable region comprises the amino acid sequence of SEQ ID NO:12, 22, 32, 42, 52, 62, 72, 82, 92, 102, 112, 122, 132, 142, 152, 162, 172, 182, 192, or 202.
6. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, comprising a heavy chain variable region and a light chain variable region comprising the amino acid sequences of:
 - (a) SEQ ID NOs:464 and 42, respectively;
 - (b) SEQ ID NOs:11 and 12, respectively;
 - (c) SEQ ID NOs:21 and 22, respectively;
 - (d) SEQ ID NOs:31 and 32, respectively;
 - (e) SEQ ID NOs:41 and 42, respectively;
 - (f) SEQ ID NOs:51 and 52, respectively;
 - (g) SEQ ID NOs:61 and 62, respectively;
 - (h) SEQ ID NOs:71 and 72, respectively;

- (i) SEQ ID NOs:81 and 82, respectively;
- (j) SEQ ID NOs:91 and 92, respectively;
- (k) SEQ ID NOs:101 and 102, respectively;
- (l) SEQ ID NOs:111 and 112, respectively;
- (m) SEQ ID NOs:121 and 122, respectively;
- (n) SEQ ID NOs:131 and 132, respectively;
- (o) SEQ ID NOs:141 and 142, respectively;
- (p) SEQ ID NOs:151 and 152, respectively;
- (q) SEQ ID NOs:161 and 162, respectively;
- (r) SEQ ID NOs:171 and 172, respectively;
- (s) SEQ ID NOs:181 and 182, respectively;
- (t) SEQ ID NOs:191 and 192, respectively; or
- (u) SEQ ID NOs:201 and 202, respectively.

7. The antibody or antigen-binding fragment thereof of any one of claims 1-6, wherein the antibody or antigen-binding fragment further comprises a heavy chain constant region.
8. The antibody or antigen-binding fragment thereof of claim 7, wherein the heavy chain constant region is selected from the group consisting of human immunoglobulins IgG₁, IgG₂, IgG₃, IgG₄, IgA₁, and IgA₂ heavy chain constant regions.
9. The antibody or antigen-binding fragment thereof of any one of claims 1-8, wherein the antibody or antigen-binding fragment further comprises a light chain constant region.
10. The antibody or antigen-binding fragment thereof of claim 9, wherein the light chain constant region is selected from the group consisting of human immunoglobulins IgGκ and IgGλ light chain constant regions.
11. The antibody or antigen-binding fragment thereof of any one of claims 1-6, wherein the antibody or antigen-binding fragment further comprises a heavy chain constant region and a light chain constant region, wherein the heavy chain constant region is a human IgG₁ heavy

chain constant region, and wherein the light chain constant region is a human IgGκ light chain constant region.

12. The antibody or antigen-binding fragment thereof of any one of claims 1-6, wherein the antibody or antigen-binding fragment thereof comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:13, 23, 33, 43, 469, 53, 63, 73, 83, 93, 103, 113, 123, 133, 143, 153, 163, 173, 183, 193, or 203.
13. The antibody or antigen-binding fragment thereof of any one of claims 1-6 or 12, wherein the antibody or antigen-binding fragment thereof comprises a light chain comprising the amino acid sequence of SEQ ID NO:14, 24, 34, 44, 54, 64, 74, 84, 94, 104, 114, 124, 134, 144, 154, 164, 174, 184, 194, or 204.
14. The antibody or antigen-binding fragment thereof of any one of claims 1-6, wherein the antibody or antigen-binding fragment thereof comprises a heavy chain and light chain comprising the amino acid sequences of:
 - (a) SEQ ID NOs:469 and 44, respectively;
 - (b) SEQ ID NOs:13 and 14, respectively;
 - (c) SEQ ID NOs:23 and 24, respectively;
 - (d) SEQ ID NOs:33 and 34, respectively;
 - (e) SEQ ID NOs:43 and 44, respectively;
 - (f) SEQ ID NOs:53 and 54, respectively;
 - (g) SEQ ID NOs:63 and 64, respectively;
 - (h) SEQ ID NOs:73 and 74, respectively;
 - (i) SEQ ID NOs:83 and 84, respectively;
 - (j) SEQ ID NOs:93 and 94, respectively;
 - (k) SEQ ID NOs:103 and 104, respectively;
 - (l) SEQ ID NOs:113 and 114, respectively;
 - (m) SEQ ID NOs:123 and 124, respectively;
 - (n) SEQ ID NOs:133 and 134, respectively;
 - (o) SEQ ID NOs:143 and 144, respectively;
 - (p) SEQ ID NOs:153 and 154, respectively;

- (q) SEQ ID NOs:163 and 164, respectively;
 - (r) SEQ ID NOs:173 and 174, respectively;
 - (s) SEQ ID NOs:183 and 184, respectively;
 - (t) SEQ ID NOs:193 and 194, respectively; or
 - (u) SEQ ID NOs:203 and 204, respectively.
15. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, wherein the antibody or antigen-binding fragment thereof comprises the VH CDR1, VH CDR2, VH CDR3, VL CDR1, VL CDR2, and VL CDR3 of an antibody selected from the group consisting of 15461, 20500, 20501, 20502, 20502.1, 22208, 15462, 22213, 15465, 20506, 15483, 20513, 22216, 15489, 20516, 15472, 15503, 15495, 15478, 15441, and 20496.
16. The antibody or antigen-binding fragment thereof of claim 15, wherein the CDRs are the Kabat-defined CDRs, the Chothia-defined CDRs, or the AbM-defined CDRs.
17. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, wherein the antibody or antigen-binding fragment thereof comprises the Chothia-defined or AbM-defined VH CDR1, VH CDR2, VH CDR3, VL CDR1, VL CDR2, and VL CDR3 of 20502.1.
18. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, comprising the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs: 458-463, respectively.
19. The antibody or antigen-binding fragment thereof of claim 18, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:464 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:42 or (ii) the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:469 and a light chain comprising the amino acid sequence of SEQ ID NO:44.

20. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, comprising the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs:35-40, respectively.
21. The antibody or antigen-binding fragment thereof of claim 20, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:41 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:42 or (ii) the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:43 and a light chain comprising the amino acid sequence of SEQ ID NO:44.
22. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4, comprising the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs:65-70, respectively.
23. The antibody or antigen-binding fragment thereof of claim 22, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:71 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:72 or (ii) wherein the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:73 and a light chain comprising the amino acid sequence of SEQ ID NO:74.
24. An isolated antibody or antigen-binding fragment thereof that binds to the same epitope of human B7-H4 as the antibody or antigen-binding fragment thereof of any one of claims 1-23.
25. The antibody or antigen-binding fragment thereof of any one of claims 1-24, wherein the antibody or antigen-binding fragment thereof is a human antibody or antigen-binding fragment thereof.

26. The antibody or antigen-binding fragment thereof of any one of claims 1, 15-20, 22, or 24, wherein the antibody or antigen-binding fragment thereof is a murine, humanized, or chimeric antibody or antigen-binding fragment thereof.
27. The antibody or antigen-binding fragment thereof of any one of claims 1-26, wherein the antibody or antigen-binding fragment thereof induces T cell proliferation.
28. The antibody or antigen-binding fragment thereof of claim 27, wherein the antibody or antigen-binding fragment increases T cell proliferation by at least 21% as compared to treatment with a control antibody.
29. The antibody or antigen-binding fragment thereof of claim 27, wherein the antibody or antigen-binding fragment increases T cell proliferation by about 5% to about 35% as compared to treatment with a control antibody.
30. The antibody or antigen-binding fragment thereof of any one of claims 1-29, wherein the antibody or antigen-binding fragment thereof induces CD4⁺ T cell proliferation.
31. The antibody or antigen-binding fragment thereof of claim 30, wherein the antibody or antigen-binding fragment thereof increases CD4⁺ T cell proliferation by at least 9% as compared to treatment with a control antibody.
32. The antibody or antigen-binding fragment thereof of claim 30, wherein the antibody or antigen-binding fragment thereof increases CD4⁺ T cell proliferation by about 5% to about 15% as compared to treatment with a control antibody.
33. The antibody or antigen-binding fragment thereof of any one of claims 1-32, wherein the antibody or antigen-binding fragment thereof induces CD8⁺ T cell proliferation.
34. The antibody or antigen-binding fragment thereof of claim 33, wherein the antibody or antigen-binding fragment thereof increases CD8⁺ T cell proliferation by at least 11% as compared to treatment with a control antibody.

35. The antibody or antigen-binding fragment thereof of claim 34, wherein the antibody or antigen-binding fragment thereof increases CD8⁺ T cell proliferation by about 5% to about 15% as compared to treatment with a control antibody.
36. The antibody or antigen-binding fragment thereof of any one of claims 1-35, wherein the antibody or antigen-binding fragment thereof induces interferon-gamma (IFN γ) production.
37. The antibody or antigen-binding fragment thereof of claim 36, wherein the antibody or antigen-binding fragment thereof is capable of increasing production of IFN γ by at least 2 fold, at least 3 fold, at least 4 fold, and at least 5 fold, at least 6 fold, at least 7 fold, at least 8 fold, about 2 fold to about 10 fold, or about 3 fold to about 10 fold.
38. The antibody or antigen-binding fragment thereof of any one of claims 1-37, wherein the antibody or antigen-binding fragment thereof is capable of inducing antibody dependent cell mediated cytotoxicity (ADCC) in a B7-H4-expressing cell.
39. The antibody or antigen-binding fragment thereof of claim 38, wherein the antibody or antigen-binding fragment thereof induces specific lysis in at least 20%, at least 30%, at least 40%, about 20% to about 50%, or about 30% to about 50% of B7-H4 expressing cells.
40. The antibody or antigen-binding fragment thereof of any one of claims 1-39, wherein the antibody or antigen-binding fragment thereof inhibits tumor growth in a murine CT26 colorectal carcinoma model, a murine breast carcinoma 4T1 model, or a melanoma cell line B16-moB7-H4/H3 model.
41. The antibody or antigen-binding fragment thereof of claim 40, wherein the antibody or antigen-binding fragment thereof reduces tumor growth by at least 25%, at least 30%, at least 40%, at least 45%, or at least 50% as compared to treatment with a control antibody.
42. The antibody or antigen-binding fragment thereof of any one of claims 27-41, wherein the induction of T cell proliferation, the induction of CD4⁺ T cell proliferation, the induction of CD8⁺ T cell proliferation, the induction of IFN γ production, the ADCC activity, and/or the inhibition of tumor growth is dose-dependent.

43. The antibody or antigen-binding fragment thereof of any one of claims 1-42, wherein the antibody or antigen-binding fragment thereof binds to cynomolgus monkey B7-H4.
44. The antibody or antigen-binding fragment thereof of any one of claims 1-43, wherein the antibody or antigen-binding fragment thereof binds to rat B7-H4.
45. The antibody or antigen-binding fragment thereof of any one of claims 1-44 wherein the antibody or antigen-binding fragment thereof binds to mouse B7-H4.
46. The antibody or antigen-binding fragment thereof of any one of claims 1-45, wherein the antibody or antigen-binding fragment thereof binds to the IgV domain of human B7-H4.
47. The antibody or antigen-binding fragment thereof of any one of claims 1-46, wherein the antibody or antigen-binding fragment thereof is afucosylated.
48. The antibody or antigen binding fragment thereof of any one of claims 1-47, which is a full length antibody.
49. The antibody or antigen binding fragment thereof of any one of claims 1-47, which is an antigen binding fragment.
50. The antigen binding fragment of claim 49, wherein said antigen binding fragment comprises a Fab, Fab', F(ab')₂, single chain Fv (scFv), disulfide linked Fv, V-NAR domain, IgNar, intrabody, IgGΔCH2, minibody, F(ab')₃, tetrabody, triabody, diabody, single-domain antibody, DVD-Ig, Fcab, mAb², (scFv)₂, or scFv-Fc.
51. The antibody or antigen-binding fragment thereof of any one of claims 1-50, further comprising a detectable label.
52. The antibody or antigen-binding fragment thereof of any one of claims 1-50, wherein the antibody or antigen-binding fragment thereof is conjugated to a toxin.

53. The antibody or antigen-binding fragment thereof of claim 52, wherein the toxin is cytostatic or cytotoxic.
54. The antibody or antigen-binding fragment thereof of claim 52 or claim 53, wherein the toxin is cytotoxic.
55. An isolated polynucleotide comprising a nucleic acid molecule encoding the heavy chain variable region or heavy chain of the antibody or antigen-binding fragment thereof of any one of claims 1-54.
56. The isolated polynucleotide of claim 55, wherein the nucleic acid molecule encodes the VH of SEQ ID NO:11, 21, 31, 41, 464, 51, 61, 71, 81, 91, 101, 111, 121, 131, 141, 151, 161, 171, 181, 191, or 201 or the heavy chain of SEQ ID NO:13, 23, 33, 43, 469, 53, 63, 73, 83, 93, 103, 113, 123, 133, 143, 153, 163, 173, 183, 193, or 203.
57. The isolated polynucleotide of claim 55, wherein the nucleic acid molecule comprises the sequence of SEQ ID NO:213, 223, 233, 243, 470, 253, 263, 273, 283, 293, 303, 313, 323, 333, 343, 353, 363, 373, 383, 393, or 403.
58. The isolated polynucleotide of claim 55, wherein the nucleic acid molecule comprises (i) the sequence of SEQ ID NO:213, 223, 233, 243, 470, 253, 263, 273, 283, 293, 303, 313, 323, 333, 343, 353, 363, 373, 383, 393, or 403 and (ii) the sequence of SEQ ID NO:408.
59. An isolated polynucleotide comprising a nucleic acid molecule encoding the light chain variable region or light chain of the antibody or antigen-binding fragment thereof of any one of claims 1-54.
60. The isolated polynucleotide of claim 59, wherein the nucleic acid molecule encodes the VL of SEQ ID NO:12, 22, 32, 42, 52, 62, 72, 82, 92, 102, 112, 122, 132, 142, 152, 162, 172, 182, 192, or 202 or the light chain of SEQ ID NO:14, 24, 34, 44, 54, 64, 74, 84, 94, 104, 114, 124, 134, 144, 154, 164, 174, 184, 194, or 204.

61. The isolated polynucleotide of claim 59, wherein the nucleic acid molecule comprises the sequence of SEQ ID NO:214, 224, 234, 244, 254, 264, 274, 284, 294, 304, 314, 324, 334, 344, 354, 364, 374, 384, 394, or 404.
62. The isolated polynucleotide of claim 59, wherein the nucleic acid molecule comprises (i) the sequence of SEQ ID NO:214, 224, 234, 244, 254, 264, 274, 284, 294, 304, 314, 324, 334, 344, 354, 364, 374, 384, 394, or 404 and (ii) the sequence of SEQ ID NO:406.
63. An isolated polynucleotide comprising a nucleic acid molecule encoding the heavy chain variable region or heavy chain of the antibody or antigen-binding fragment thereof of any one of claims 1-54 and the light chain variable region or light chain of the antibody or antigen-binding fragment thereof of any one of claims 1-54.
64. An isolated vector comprising the polynucleotide of any one of claims 55-63.
65. A host cell comprising the polynucleotide of any one of claims 55-63, the vector of claim 64, or a first vector comprising the polynucleotide of any one of claims 55-58 and a second vector comprising the polynucleotide of any one of claims 59-62.
66. The host cell of claim 65, which is selected from the group consisting of *E. coli*, *Pseudomonas*, *Bacillus*, *Streptomyces*, yeast, CHO, YB/20, NS0, PER-C6, HEK-293T, NIH-3T3, HeLa, BHK, Hep G2, SP2/0, R1.1, B-W, L-M, COS 1, COS 7, BSC1, BSC40, BMT10 cell, plant cell, insect cell, and human cell in tissue culture.
67. The host cell of claim 65 or 66, wherein the host cell lacks a functional alpha-1,6-fucosyltransferase gene (FUT8) gene.
68. A method of producing an antibody or antigen-binding fragment thereof that binds to human B7-H4 comprising culturing the host cell of any one of claims 65-67 so that the nucleic acid molecule is expressed and the antibody or antigen-binding fragment thereof is produced.

69. An isolated antibody or antigen-binding fragment thereof that specifically binds to human B7-H4 and is encoded by the polynucleotide of any one of claims 55-63.
70. A pharmaceutical composition comprising the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 and a pharmaceutically acceptable excipient.
71. A pharmaceutical composition comprising (i) antibodies or antigen-binding fragments of any one of claims 1-54 or 69 and (ii) a pharmaceutically acceptable excipient, wherein at least 95% of the antibodies or antigen-binding fragments thereof in the composition are afucosylated.
72. A pharmaceutical composition comprising (i) antibodies or antigen-binding fragments thereof that specifically bind to human B7-H4 and comprise the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs:458-460, respectively and (ii) a pharmaceutically acceptable excipient, wherein at least 95% of the antibodies or antigen-binding fragments thereof in the composition are afucosylated.
73. The pharmaceutical composition of claim 72, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:464 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:42 or (ii) the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:469 and a light chain comprising the amino acid sequence of SEQ ID NO:44.
74. A pharmaceutical composition comprising (i) antibodies or antigen-binding fragments thereof that specifically bind to human B7-H4 and comprise the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs:35-40, respectively and (ii) a pharmaceutically acceptable excipient, wherein at least 95% of the antibodies or antigen-binding fragments thereof in the composition are afucosylated.

75. The pharmaceutical composition of claim 74, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:41 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:42 or (ii) the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:43 and a light chain comprising the amino acid sequence of SEQ ID NO:44.
76. A pharmaceutical composition comprising (i) antibodies or antigen-binding fragments thereof that specifically bind to human B7-H4 and comprise the heavy chain variable region (VH) complementarity determining region (CDR) 1, VH CDR2, VH CDR3 and light chain variable region (VL) CDR1, CDR2, and CDR3 sequences of SEQ ID NOs:65-70, respectively and (ii) a pharmaceutically acceptable excipient, wherein at least 95% of the antibodies or antigen-binding fragments thereof in the composition are afucosylated.
77. The pharmaceutical composition of claim 76, wherein (i) the antibody or antigen-binding fragment thereof comprises a variable heavy chain region comprising the amino acid sequence of SEQ ID NO:71 and a variable light chain region comprising the amino acid sequence of SEQ ID NO:72 or (ii) wherein the antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:73 and a light chain comprising the amino acid sequence of SEQ ID NO:74.
78. The pharmaceutical composition of any one of claims 70-77, wherein fucosylation is undetectable in the composition.
79. The pharmaceutical composition of any one of claims 70-78 further comprising an anti-PD-1 antibody or antigen-binding fragment thereof.
80. The pharmaceutical composition of claim 79, wherein the anti-PD-1 antibody or antigen-binding fragment thereof is nivolumab, or pembrolizumab.
81. The pharmaceutical composition of claim 79, wherein the anti-PD-1 antibody or antigen-binding fragment thereof is AMP-514, camrelizumab, tislelizumab, and spartalizumab.

82. The pharmaceutical composition of any one of claims 70-78 further comprising an anti-PD-L1 antibody or antigen-binding fragment thereof.
83. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for inducing T cell proliferation, wherein the use comprises contacting a T cell with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.
84. The use of claim 83, wherein T cell proliferation is increased by at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, or at least 80%.
85. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for inducing CD4+ T cell proliferation, wherein the use comprises contacting a CD4+ T cell with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.
86. The use of claim 85, wherein CD4+ T cell proliferation is increased by at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, or at least 80%.
87. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for inducing CD8+ T cell proliferation, wherein the use comprises contacting a CD8+ T cell with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.
88. The use of claim 87, wherein CD8+ T cell proliferation is increased by at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, or at least 80%.
89. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for inducing interferon gamma production, wherein the use comprises

contacting a T cell with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.

90. The use of claim 89, wherein interferon gamma production is increased by at least 30%, at least 40%, at least 50%, at least 60%, at least 70%, or at least 80%.
91. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for killing a cell expressing B7-H4, wherein the use comprises contacting the cell with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.
92. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for depleting B7-H4-expressing cells from a population of cells, wherein the use comprises contacting the population of cells with the antibody or antigen-binding fragment thereof or the pharmaceutical composition.
93. The use of claim 91 or 92, wherein the killing or depletion occurs via ADCC.
94. The use of any one of claims 83-93, further comprising contacting the T cell, the CD4+ T cell, the CD8+ T cell, the cell, or the population of cells with an anti-PD-1 antibody or antigen-binding fragment thereof.
95. The use of claim 94, wherein the contacting with the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-81 and the contacting with the anti-PD-1 antibody or antigen-binding fragment thereof occur simultaneously.
96. The use of claim 94, wherein the contacting with the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-81 and the contacting with the anti-PD-1 antibody or antigen-binding fragment thereof occur sequentially.

97. The use of any one of claims 83-93, further comprising contacting the T cell, the CD4+ T cell, the CD8+ T cell, the cell, or the population of cells with an anti-PD-L1 antibody or antigen-binding fragment thereof.
98. The use of claim 97, wherein the contacting with the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-78 and the contacting with the anti-PD-L1 antibody or antigen-binding fragment thereof occur simultaneously.
99. The use of claim 97, wherein the contacting with the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-78 and the contacting with the anti-PD-L1 antibody or antigen-binding fragment thereof occur sequentially.
100. The use of any one of claims 83-99, wherein the contacting is *in vitro*.
101. The use of any one of claims 83-99, wherein the contacting is in a subject.
102. Use of an effective amount of the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 in the manufacture of a medicament for treating a B7-H4 expressing cancer in a subject.
103. The use of claim 102, wherein the cancer is selected from the group consisting of breast cancer, ductal carcinoma, endometrial carcinoma, ovarian cancer, non-small cell lung cancer, pancreatic cancer, thyroid cancer, kidney cancer and bladder cancer.
104. The use of claim 103, wherein the breast cancer is triple negative breast cancer or wherein the non-small cell lung cancer is squamous cell carcinoma.
105. The use of claim 103, wherein the non-small cell lung cancer is an adenocarcinoma.
106. The use of claim 102, wherein the cancer is selected from the group consisting of head and neck cancer, small cell lung cancer, gastric cancer, and melanoma.

107. The use of claim 103, wherein the cancer is ovarian cancer that is a serous adenocarcinoma.
108. The use of claim 104, wherein the cancer is breast cancer that is a ductal adenocarcinoma.
109. The use of any one of claims 102-108, wherein the cancer is a PD-1 inhibitor inadequate responder.
110. The use of any one of claims 102-109, wherein the cancer is a PD-L1 inhibitor inadequate responder.
111. The use of any one of claims 102-110, wherein the cancer expresses a low level of PD-L1.
112. The use of any one of claims 102-111, wherein the subject is human.
113. The use of any one of claims 102-112, wherein the medicament is for use in combination with an anti-PD-1 antibody or antigen-binding fragment thereof.
114. The use of claim 113, wherein medicament is for use simultaneously with the anti-PD-1 antibody or antigen-binding fragment thereof.
115. The use of claim 113, wherein medicament is for use sequentially with the anti-PD-1 antibody or antigen-binding fragment thereof.
116. The use of claim 115, wherein the medicament is for use before the anti-PD-1 antibody or antigen-binding fragment thereof.
117. The use of any one of claims 94-96, 100, 101, and 113-116, wherein the anti-PD-1 antibody or antigen-binding fragment thereof is nivolumab or pembrolizumab.

118. The use of any one of claims 94-96, 100, 101, and 113-116, wherein the anti-PD-1 antibody or antigen-binding fragment thereof is AMP-514, camrelizumab, tislelizumab, or spartalizumab.
119. A method for detecting B7-H4 in a sample comprising contacting said sample with the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69.
120. The method of claim 119, wherein the sample is obtained from a cancer in a human subject.
121. A kit comprising the antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69 or the pharmaceutical composition of any one of claims 70-82 and a) a detection reagent, b) a B7-H4 antigen, c) a notice that reflects approval for use or sale for human administration, or d) a combination thereof.
122. An isolated antibody or antigen-binding fragment thereof of any one of claims 1-54 or 69, wherein the antibody or antigen-binding fragment thereof inhibits T cell checkpoint blockade activity of B7-H4.
123. The isolated antibody or antigen-binding fragment thereof of claim 122, wherein the T cell checkpoint blockade activity is measured by an increase in IL-2 production relative to control cells.
124. A pharmaceutical composition comprising (i) antibodies or antigen-binding fragments of any one of claims 1-54 or 69 and (ii) a pharmaceutically acceptable excipient, wherein the antibodies or antigen-binding fragments inhibit T cell checkpoint blockade activity of B7-H4.
125. The pharmaceutical composition of claim 124, wherein the T cell checkpoint blockade activity is measured by an increase in IL-2 production relative to control cells.