What is claimed is:

1. An isolated antibody molecule capable of binding to human Programmed Death-1 (PD-1), comprising:

(a) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 4, a VHCDR2 amino acid sequence of SEQ ID NO: 5, 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: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33;

(b) a 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 VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32;

(c) a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224, a VHCDR2 amino acid sequence of SEQ ID NO: 5, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33; or

(d) a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224; a VHCDR2 amino acid sequence of SEQ ID NO: 2; and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32.

2. The antibody molecule of claim 1, comprising a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 4, a VHCDR2 amino acid sequence of SEQ ID NO: 5, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33.

3. The antibody molecule of claim 1, comprising a 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 VL comprising a VLCDR1 amino

acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32.

4. The antibody molecule of claim 1, comprising a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224, a VHCDR2 amino acid sequence of SEQ ID NO: 5, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33.

5. The antibody molecule of claim 1, comprising a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224; a VHCDR2 amino acid sequence of SEQ ID NO: 2; and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32.

6. The antibody molecule of any of claims 1-5, wherein said antibody molecule is a humanized antibody molecule.

7. The antibody molecule of any of claims 1-6, wherein said antibody molecule is a monospecific antibody molecule.

8. The antibody molecule of any of claims 1-6, wherein said antibody molecule is a bispecific antibody molecule.

9. The antibody molecule of any of claims 1-8, which has a heavy chain variable region comprising at least one framework (FW) region comprising the amino acid sequence of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169, or an amino acid sequence at least 90% identical thereto, or having no more than two amino acid substitutions, insertions or deletions compared to the amino acid sequence of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169.

10. The antibody molecule of any of claims 1-9, which has a heavy chain variable region comprising at least one framework region comprising the amino acid sequence of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169.

11. The antibody molecule of any of claims 1-10, which has a heavy chain variable region comprising at least two, three, or four framework regions comprising the amino acid sequences of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169.

12. The antibody molecule of any of claims 1-11, which comprises a VHFW1 amino acid sequence of SEQ ID NO: 147 or 151, a VHFW2 amino acid sequence of SEQ ID NO: 153, 157, or 160, and a VHFW3 amino acid sequence of SEQ ID NO: 162 or 166, and, optionally, further comprising a VHFW4 amino acid sequence of SEQ ID NO: 169.

13. The antibody molecule of any of claims 1-12, which has a light chain variable region comprising at least one framework region comprising the amino acid sequence of any of SEQ ID NOs: 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208, or an amino acid sequence at least 90% identical thereto, or having no more than two amino acid substitutions, insertions or deletions compared to the amino acid sequence of any of 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208.

14. The antibody molecule of any of claims 1-13, which has a light chain variable region comprising at least one framework region comprising the amino acid sequence of any of SEQ ID NOs: 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208.

15. The antibody molecule of any of claims 1-14, which has a light chain variable region comprising at least two, three, or four framework regions comprising the amino acid sequences of any of SEQ ID NOs: 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208.

16. The antibody molecule of any of claims 1-15, which comprises a VLFW1 amino acid sequence of SEQ ID NO: 174, 177, 181, 183, or 185, a VLFW2 amino acid sequence of

SEQ ID NO: 187, 191, or 194, and a VLFW3 amino acid sequence of SEQ ID NO: 196, 200, 202, or 205, and, optionally, further comprising a VLFW4 amino acid sequence of SEQ ID NO: 208.

17. The antibody molecule of any of claims 1-16, which comprises a heavy chain variable domain comprising an amino acid sequence at least 85% identical to any of SEQ ID NOs: 38, 50, 82, or 86.

18. The antibody molecule of any of claims 1-17, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38, 50, 82, or 86.

19. The antibody molecule of any of claims 1-18, which comprises a light chain variable domain comprising an amino acid sequence at least 85% identical to any of SEQ ID NOs: 42, 46, 54, 58, 62, 66, 70, 74, or 78.

20. The antibody molecule of any of claims 1-19, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 42, 46, 54, 58, 62, 66, 70, 74, or 78.

21. The antibody molecule of any one of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38.

22. The antibody molecule of any of claims 1-21, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 or SEQ ID NO: 91.

23. The antibody molecule of any one of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50.

24. The antibody molecule of any of claims 1-20 and 23, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 or SEQ ID NO: 102.

25. The antibody molecule of any one of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 82.

26. The antibody molecule of any of claims 1-20 and 25, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 84.

27. The antibody molecule of any one of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 86.

28. The antibody molecule of any of claims 1-20 and 27, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 88.

29. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 42.

30. The antibody molecule of any of claims 1-29, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 44.

31. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 46.

32. The antibody molecule of any of claims 1-28 and 31, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 48.

33. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 54.

34. The antibody molecule of any of claims 1-28 and 33, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 56.

35. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 58.

36. The antibody molecule of any of claims 1-28 and 35, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 60.

37. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 62.

38. The antibody molecule of any of claims 1-28 and 37, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 64.

39. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

40. The antibody molecule of any of claims 1-28 and 39, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 68.

41. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70.

42. The antibody molecule of any of claims 1-28 and 41, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 72.

43. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 74.

44. The antibody molecule of any of claims 1-28 and 43, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 76.

45. The antibody molecule of any of claims 1-28, which comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 78.

46. The antibody molecule of any of claims 1-28, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 80.

47. The antibody molecule of claim 45, which comprises a light chain comprising the amino acid sequence of SEQ ID NO: 80.

48. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 42.

49. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

50. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70.

51. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70.

52. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 46.

53. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 46.

54. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 54.

55. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 54.

56. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 58.

57. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 62.

58. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

59. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 74.

60. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 78.

61. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 82 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70.

62. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 82 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

63. The antibody molecule of any of claims 1-20, which comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 86 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

64. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 44.

65. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 56.

66. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

67. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 72.

68. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 102 and a light chain comprising the amino acid sequence of SEQ ID NO: 72.

69. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 44.

70. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 48.

71. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 48.

72. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 56.

73. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 56.

74. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 60.

75. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 64.

76. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

77. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

78. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 72.

79. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 72.

80. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 76.

81. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 80.

82. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 84 and a light chain comprising the amino acid sequence of SEQ ID NO: 72.

83. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 84 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

84. The antibody molecule of any of claims 1-20, which comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 88 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

85. The antibody molecule of any of claims 1-84, which is a Fab, F(ab')2, Fv, or a single chain Fv fragment (scFv).

86. The antibody molecule of any of claims 1-84, which comprises a heavy chain constant region selected from IgG1, IgG2, IgG3, and IgG4.

87. The antibody molecule of claim 86, which comprises a light chain constant region chosen from the light chain constant regions of kappa or lambda.

88. The antibody molecule of claim 86 or 87, which comprises a human IgG4 heavy chain constant region with a mutation at position 228 according to EU numbering or position 108 of SEQ ID NO: 212 or 214 and a kappa light chain constant region.

89. The antibody molecule of claim 86 or 87, which comprises a human IgG4 heavy chain constant region with a Serine to Proline mutation at position 228 according to EU numbering or position 108 of SEQ ID NO: 212 or 214 and a kappa light chain constant region.

90. The antibody molecule of claim 86 or 87, which comprises a human IgG1 heavy chain constant region with an Asparagine to Alanine mutation at position 297 according to EU numbering or position 180 of SEQ ID NO: 216 and a kappa light chain constant region.

91. The antibody molecule of claim 86 or 87, which comprises a human IgG1 heavy chain constant region with an Aspartate to Alanine mutation at position 265 according to EU

numbering or position 148 of SEQ ID NO: 217 and Proline to Alanine mutation at position 329 according to EU numbering or position 212 of SEQ ID NO: 217, and a kappa light chain constant region.

92. The antibody molecule of claim 86 or 87, which comprises a human IgG1 heavy chain constant region with a Leucine to Alanine mutation at position 234 according to EU numbering or position 117 of SEQ ID NO: 218 and Leucine to Alanine mutation at position 235 according to EU numbering or position 118 of SEQ ID NO: 218, and a kappa light chain constant region.

93. The antibody molecule of any of claims 1-92, which is capable of binding to human PD-1 with a dissociation constant (K_D) of less than about 0.2 nM.

94. The antibody molecule of any of claims 1-93, which binds an extracellular Ig-like domain of PD-1.

95. The antibody molecule of any of claims 1-94, which is capable of reducing binding of PD-1 to PD-L1, PD-L2, or both, or a cell that expresses PD-L1, PD-L2, or both.

96. The antibody molecule of any of claims 1-95, which is capable of enhancing an antigen-specific T cell response.

97. The antibody molecule of any of claims 1-96, wherein said antibody molecule has a first binding specificity for PD-1 and a second binding specificity for TIM-3, LAG-3, CEACAM-1, CEACAM-5, PD-L1 or PD-L2.

98. The antibody molecule of any of claims 1-97, wherein said antibody molecule comprises an antigen binding fragment of an antibody, *e.g.*, a half antibody or antigen binding fragment of a half antibody.

99. A pharmaceutical composition comprising the isolated antibody molecule of any of claims 1-98 and a pharmaceutically acceptable carrier, excipient or stabilizer.

100. An isolated nucleic acid encoding the antibody heavy or light chain variable region of the antibody molecule of any of claims 1-98.

101. An isolated nucleic acid encoding heavy chain CDRs 1-3, wherein said nucleic acid comprises a nucleotide sequence of SEQ ID NO: 108-112, 223, 122-126, 133-137, or 144-146.

102. An isolated nucleic acid encoding light chain CDRs 1-3, wherein said nucleic acid comprises a nucleotide sequence of SEQ ID NO: 113-120, 127-132, or 138-143.

103. The nucleic acid of claim 101, further comprising a nucleotide sequence encoding a heavy chain variable domain, wherein said nucleotide sequence is at least 85% identical to any of SEQ ID NO: 39, 51, 83, 87, 90, 95, or 101.

104. The nucleic acid of claim 101, further comprising a nucleotide sequence encoding a heavy chain variable domain, wherein said nucleotide sequence comprises any of SEQ ID NO: 39, 51, 83, 87, 90, 95, or 101.

105. The nucleic acid of claim 103, further comprising a nucleotide sequence encoding a heavy chain, wherein said nucleotide sequence is at least 85% identical to any of SEQ ID NO: 41, 53, 85, 89, 92, 96, or 103.

106. The nucleic acid of claim 104, further comprising a nucleotide sequence encoding a heavy chain, wherein said nucleotide sequence comprises any of SEQ ID NO: 41, 53, 85, 89, 92, 96, or 103.

107. The nucleic acid of claim 102, which further comprises a nucleotide sequence encoding a light chain variable domain, wherein said nucleotide sequence is at least 85% identical to any of SEQ ID NO: 43, 47, 55, 59, 63, 67, 71, 75, 79, 93, 97, 99, 104, or 106.

108. The nucleic acid of claim 102, which further comprises a nucleotide sequence encoding a light chain variable domain, wherein said nucleotide sequence comprises any of SEQ ID NO: 43, 47, 55, 59, 63, 67, 71, 75, 79, 93, 97, 99, 104, or 106.

109. The nucleic acid of claim 107, further comprising a nucleotide sequence encoding a light chain, wherein said nucleotide sequence is at least 85% identical to any of SEQ ID NO: 45, 49, 57, 61, 65, 69, 73, 77, 81, 94, 98, 100, 105 or 107.

110. The nucleic acid of claim 108, further comprising a nucleotide sequence encoding a light chain, wherein said nucleotide sequence comprises any of SEQ ID NO: 45, 49, 57, 61, 65, 69, 73, 77, 81, 94, 98, 100, 105 or 107.

111. An expression vector comprising the nucleic acid of any of claims 100-110.

112. A host cell comprising the nucleic acid of any of claims 100-110.

113. A method of producing an antibody molecule or fragment thereof, comprising culturing the host cell of claim 112 under conditions suitable for gene expression.

114. A method of stimulating an immune response in a subject, comprising administering to a subject in need thereof an isolated antibody molecule of any of claims 1-98, or a pharmaceutical composition of claim 99, in an amount effective to stimulate the immune response.

115. A method of treating a cancer, comprising administering to a subject in need thereof an isolated antibody molecule of any of claims 1-98, or a pharmaceutical composition of claim 99, in an amount effective to treat the cancer.

116. The method of claim 115, wherein the cancer is chosen from a lung cancer, a squamous cell lung cancer, a melanoma, a renal cancer, a liver cancer, a myeloma, a prostate cancer, a breast cancer, an ER+ breast cancer, an IM-TN breast cancer, a colorectal cancer, a colorectal cancer with high microsattelite instability, an EBV+ gastric cancer, a pancreatic cancer, a thyroid cancer, a hematological cancer, a non-Hogdkin's lymphoma, or a leukemia, or a metastatic lesion of the cancer.

117. The method of claim 115, wherein the cancer is chosen from a non-small cell lung cancer (NSCLC), a NSCLC adenocarcinoma, a NSCLC squamous cell carcinoma, a hepatocellular carcinoma, an advanced melanoma, a metastatic renal cell carcinoma, or a multiple myeloma.

118. The method of any of claims 114-117, wherein the antibody molecule is administered in combination with a second therapeutic agent or procedure.

119. The method of claim 118, wherein the second therapeutic agent or procedure is chosen from one or more of chemotherapy, a targeted anti-cancer therapy, an oncolytic drug, a cytotoxic agent, an immune-based therapy, a cytokine, surgical procedure, a radiation procedure, an activator of a costimulatory molecule, an inhibitor of an inhibitory molecule, a vaccine, or a cellular immunotherapy.

120. The method of claim 118, wherein the antibody molecule is administered in combination with an agonist of a costimulatory molecule chosen from one or more of OX40, CD2, CD27, CDS, ICAM-1, LFA-1 (CD11a/CD18), ICOS (CD278), 4-1BB (CD137), GITR, CD30, CD40, BAFFR, HVEM, CD7, LIGHT, NKG2C, SLAMF7, NKp80, CD160, B7-H3 or CD83 ligand.

121. The method of claim 118, wherein the antibody molecule is administered in combination with an inhibitor of an immune checkpoint molecule chosen from one or more of

PD-L1, PD-L2, CTLA-4, TIM-3, LAG-3, CEACAM-1, CEACAM-5, VISTA, BTLA, TIGIT, LAIR1, CD160, 2B4 or TGFR.

122. A method of treating an infectious disease, comprising administering to a subject in need thereof an isolated antibody molecule of any of claims 1-98, or a pharmaceutical composition of claim 99, in an amount effective to treat the infectious disease.

123. A method of detecting PD-1 in a biological sample, comprising (i) contacting the sample or the subject (and optionally, a reference sample or subject) with an isolated antibody molecule of any of claims 1-98 under conditions that allow interaction of the antibody molecule and the polypeptide to occur, and (ii) detecting formation of a complex between the antibody molecule and the sample or the subject (and optionally, the reference sample or subject).

124. An antibody molecule of any of claims 1-98, or a pharmaceutical composition of claim 99, for use in treating a cancer or an infectious disease in a subject.

125. Use of an antibody molecule of any of claims 1-98, or a pharmaceutical composition of claim 99, in the manufacture of a medicament for treating a cancer or an infectious disease in a subject.

CLAIMS

1. An isolated antibody molecule capable of binding to human Programmed Death-1 (PD-1), comprising:

(a) a heavy chain variable region (VH) comprising a VHCDR1 amino acid sequence of SEQ ID NO: 4, a VHCDR2 amino acid sequence of SEQ ID NO: 5, 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: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33;

(b) a 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 VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32;

(c) a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224, a VHCDR2 amino acid sequence of SEQ ID NO: 5, and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 13, a VLCDR2 amino acid sequence of SEQ ID NO: 14, and a VLCDR3 amino acid sequence of SEQ ID NO: 33; or

(d) a VH comprising a VHCDR1 amino acid sequence of SEQ ID NO: 224; a VHCDR2 amino acid sequence of SEQ ID NO: 2; and a VHCDR3 amino acid sequence of SEQ ID NO: 3; and a VL comprising a VLCDR1 amino acid sequence of SEQ ID NO: 10, a VLCDR2 amino acid sequence of SEQ ID NO: 11, and a VLCDR3 amino acid sequence of SEQ ID NO: 32.

2. The antibody molecule of claim 1, wherein said antibody molecule is a humanized antibody molecule, and/or a monospecific antibody molecule or a bispecific antibody molecule.

3. The antibody molecule of claim 1 or 2, which has:

a heavy chain variable region comprising at least one, two, three, or four framework (FW) regions comprising the amino acid sequence of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169, or an amino acid sequence at least 90% identical thereto, or

having no more than two amino acid substitutions, insertions or deletions compared to the amino acid sequence of any of SEQ ID NOs: 147, 151, 153, 157, 160, 162, 166, or 169; and/or

a light chain variable region comprising at least one, two, three, or four framework regions comprising the amino acid sequence of any of SEQ ID NOs: 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208, or an amino acid sequence at least 90% identical thereto, or having no more than two amino acid substitutions, insertions or deletions compared to the amino acid sequence of any of SEQ ID NOs: 174, 177, 181, 183, 185, 187, 191, 194, 196, 200, 202, 205, or 208.

4. The antibody molecule of any of claims 1-3, which comprises:

a heavy chain variable domain comprising an amino acid sequence of SEQ ID NO: 38, 50, 82, or 86, or an amino acid sequence of at least 85% identical to any of SEQ ID NOs: 38, 50, 82, or 86; and/or

a light chain variable domain comprising an amino acid sequence of SEQ ID NO: 42, 46, 54, 58, 62, 66, 70, 74, or 78, or an amino acid sequence at least 85% identical to any of SEQ ID NOs: 42, 46, 54, 58, 62, 66, 70, 74, or 78.

5. The antibody molecule of any one of claims 1-4, which comprises:

a heavy chain variable domain comprising an amino acid sequence chosen from SEQ ID NO: 38; SEQ ID NO: 50, SEQ ID NO: 82, or SEQ ID NO: 86; and/or

a light chain variable domain comprising an amino acid sequence chosen from SEQ ID NO: 42, SEQ ID NO: 46, SEQ ID NO: 54; SEQ ID NO: 58; SEQ ID NO: 62; SEQ ID NO: 66; SEQ ID NO: 70; SEQ ID NO: 74, or SEQ ID NO: 78.

6. The antibody molecule of any of claims 1-4, which comprises:

a heavy chain comprising an amino acid sequence chosen from SEQ ID NO: 40, SEQ ID NO: 91, SEQ ID NO: 52, SEQ ID NO: 102, SEQ ID NO: 84, or SEQ ID NO: 88; and/or

a light chain comprising an amino acid sequence chosen from SEQ ID NO: 44, SEQ ID NO: 48, SEQ ID NO: 56, SEQ ID NO: 60, SEQ ID NO: 64, SEQ ID NO: 68, SEQ ID NO: 72, SEQ ID NO:76, or SEQ ID NO: 80.

7. The antibody molecule of any of claims 1-4, which comprises:

(a) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 42;

(b) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66;

(c) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70;

(d) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70;

(e) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 46;

(f) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 46;

(g) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 54;

(h) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 54;

(i) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 58;

(j) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 62;

(k) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 50 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66;

(l) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 74;

(m) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 38 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 78;

(n) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 82 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 70;

(o) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 82 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66; or

(p) a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO: 86 and a light chain variable domain comprising the amino acid sequence of SEQ ID NO: 66.

8. The antibody molecule of any of claims 1-7, which comprises:

(a) a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 44;

(b) a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 56;

(c) a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 68;

(d) a heavy chain comprising the amino acid sequence of SEQ ID NO: 91 and a light chain comprising the amino acid sequence of SEQ ID NO: 72;

(e) a heavy chain comprising the amino acid sequence of SEQ ID NO: 102 and a light chain comprising the amino acid sequence of SEQ ID NO: 72;

(f) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 44;

(g) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 48;

(h) a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 48;

(i) a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 56;

(j) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 56;

(k) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 60;

(l) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 64;

(m) a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 68;

(n) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 68;

(o) a heavy chain comprising the amino acid sequence of SEQ ID NO: 52 and a light chain comprising the amino acid sequence of SEQ ID NO: 72;

(p) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 72;

(q) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 76;

(r) a heavy chain comprising the amino acid sequence of SEQ ID NO: 40 and a light chain comprising the amino acid sequence of SEQ ID NO: 80;

(s) a heavy chain comprising the amino acid sequence of SEQ ID NO: 84 and a light chain comprising the amino acid sequence of SEQ ID NO: 72;

(t) a heavy chain comprising the amino acid sequence of SEQ ID NO: 84 and a light chain comprising the amino acid sequence of SEQ ID NO: 68; or

(u) a heavy chain comprising the amino acid sequence of SEQ ID NO: 88 and a light chain comprising the amino acid sequence of SEQ ID NO: 68.

9. The antibody molecule of any of claims 1-8, which is a monoclonal antibody, a Fab, a F(ab')2, an Fv, or a single chain Fv fragment (scFv); or comprises

a heavy chain constant region chosen from IgG1, IgG2, IgG3, or IgG4, and/or

a light chain constant region chosen from the light chain constant regions of kappa or lambda.

10. The antibody molecule of claim 9, which comprises:

(a) a human IgG4 heavy chain constant region with a mutation at position 228 according to EU numbering or position 108 of SEQ ID NO: 212 or 214 and a kappa light chain constant region;

(b) a human IgG4 heavy chain constant region with a Serine to Proline mutation at position 228 according to EU numbering or position 108 of SEQ ID NO: 212 or 214 and a kappa light chain constant region;

(c) a human IgG1 heavy chain constant region with an Asparagine to Alanine mutation at position 297 according to EU numbering or position 180 of SEQ ID NO: 216 and a kappa light chain constant region;

(d) a human IgG1 heavy chain constant region with an Aspartate to Alanine mutation at position 265 according to EU numbering or position 148 of SEQ ID NO: 217 and Proline to Alanine mutation at position 329 according to EU numbering or position 212 of SEQ ID NO: 217, and a kappa light chain constant region; or

(e) a human IgG1 heavy chain constant region with a Leucine to Alanine mutation at position 234 according to EU numbering or position 117 of SEQ ID NO: 218 and Leucine to Alanine mutation at position 235 according to EU numbering or position 118 of SEQ ID NO: 218, and a kappa light chain constant region.

11. The antibody molecule of any of claims 1-10, which

(a) is capable of binding to human PD-1 with a dissociation constant (K_D) of less than about 0.2 nM;

(b) binds an extracellular Ig-like domain of PD-1;

(c) is capable of reducing binding of PD-1 to PD-L1, PD-L2, or both, or a cell that expresses PD-L1, PD-L2, or both; and/or

(d) capable of enhancing an antigen-specific T cell response.

12. The antibody molecule of any of claims 1-11, wherein said antibody molecule has a first binding specificity for PD-1 and a second binding specificity for TIM-3, LAG-3, CEACAM-1, CEACAM-5, PD-L1 or PD-L2; and/or

wherein said antibody molecule comprises an antigen binding fragment of an antibody, a half antibody, or an antigen binding fragment of a half antibody.

13. A pharmaceutical composition comprising the isolated antibody molecule of any of claims 1-12 and a pharmaceutically acceptable carrier, excipient or stabilizer.

14. An isolated nucleic acid encoding the antibody heavy or light chain variable region of the antibody molecule of any of claims 1-12.

15. An isolated nucleic acid encoding heavy chain CDRs 1-3 and/or light chain CDRs 1-3, wherein said nucleic acid comprises a nucleotide sequence of SEQ ID NO: 108-120, 223, 122-132, or 133-146.

16. The nucleic acid of claim 15, further comprising:

a nucleotide sequence encoding a heavy chain variable domain, wherein said nucleotide sequence comprises any of SEQ ID NO: 39, 51, 83, 87, 90, 95, or 101 or is at least 85% identical to any of SEQ ID NO: 39, 51, 83, 87, 90, 95, or 101; and/or

a nucleotide sequence encoding a light chain variable domain, wherein said nucleotide sequence comprises any of SEQ ID NO: 43, 47, 55, 59, 63, 67, 71, 75, 79, 93, 97, 99, 104, or 106, or is at least 85% identical to any of SEQ ID NO: 43, 47, 55, 59, 63, 67, 71, 75, 79, 93, 97, 99, 104, or 106.

17. The nucleic acid of claim 16, further comprising:

a nucleotide sequence encoding a heavy chain, wherein said nucleotide sequence comprises any of SEQ ID NO: 41, 53, 85, 89, 92, 96, or 103, or is at least 85% identical to any of SEQ ID NO: 41, 53, 85, 89, 92, 96, or 103; and/or

a nucleotide sequence encoding a light chain, wherein said nucleotide sequence comprises any of SEQ ID NO: 45, 49, 57, 61, 65, 69, 73, 77, 81, 94, 98, 100, 105 or 107, or is at least 85% identical to any of SEQ ID NO: 45, 49, 57, 61, 65, 69, 73, 77, 81, 94, 98, 100, 105 or 107.

18. An expression vector comprising the nucleic acid of any of claims 14-17.

19. A host cell comprising the nucleic acid of any of claims 14-17.

20. A method of producing an antibody molecule or fragment thereof, comprising culturing the host cell of claim 19 under conditions suitable for gene expression.

21. A method of detecting PD-1 in a biological sample, comprising (i) contacting the sample or the subject (and optionally, a reference sample or subject) with an isolated antibody molecule of any of claims 1-12 under conditions that allow interaction of the antibody molecule and the polypeptide to occur, and (ii) detecting formation of a complex between the antibody molecule and the sample or the subject (and optionally, the reference sample or subject).

22. An antibody molecule of any of claims 1-12, or a pharmaceutical composition of claim 13, for use in the stimulation of an immune response or the treatment of a cancer or an infectious disease in a subject.

23. The use of an antibody molecule, or a pharmaceutical composition as claimed in claim 22, wherein the cancer is chosen from a lung cancer, a melanoma, a renal cancer, a liver cancer, a prostate cancer, a breast cancer, a colorectal cancer, a gastric cancer, a pancreatic cancer, a thyroid cancer, a brain cancer, a uterine cancer, a nasopharyngeal cancer, or a hematological cancer, or a metastatic lesion of the cancer,

optionally, wherein:

(a) the lung cancer is chosen from a non-small cell lung cancer (NSCLC), a lung adenocarcinoma, a squamous cell lung carcinoma, or a small cell lung cancer, optionally, wherein the NSCLC comprises a KRAS mutation;

(b) the melanoma is chosen from an advanced melanoma, an unresectable melanoma, a metastatic melanoma, a melanoma with a BRAF mutation, a melanoma with an NRAS mutation, a cutaneous melanoma, or an intraocular melanoma;

(c) the renal cancer is chosen from a renal cell carcinoma (RCC), a metastatic renal cell carcinoma, or a clear cell renal cell carcinoma (CCRCC);

(d) the hematologic cancer is chosen from a lymphoma, a myeloma, or a leukemia;

(e) the brain cancer is a glioblastoma;

(f) the breast cancer is a triple negative breast cancer;

(g) the liver cancer is a hepatocellular carcinoma; or

(h) the cancer is a MSI-high (high microsatellite instability) cancer.

24. The use of an antibody molecule, or a pharmaceutical composition as claimed in claim 22 or 23, wherein the antibody molecule or pharmaceutical composition is to be used in combination with a second therapeutic agent or procedure,

optionally, wherein the second therapeutic agent or procedure is chosen from one or more of chemotherapy, a targeted anti-cancer therapy, an oncolytic drug, a cytotoxic agent, an immune-based therapy, a cytokine, surgical procedure, a radiation procedure, an activator of a costimulatory molecule, an inhibitor of an inhibitory molecule, a vaccine, or a cellular immunotherapy,

optionally, wherein the antibody molecule is to be administered in combination with:

(a) an agonist of a costimulatory molecule chosen from one or more of OX40, CD2, CD27, CDS, ICAM-1, LFA-1 (CD11a/CD18), ICOS (CD278), 4-1BB (CD137), GITR, CD30, CD40, BAFFR, HVEM, CD7, LIGHT, NKG2C, SLAMF7, NKp80, CD160, B7-H3 or CD83 ligand; or

(b) an inhibitor of an immune checkpoint molecule chosen from one or more of PD-L1, PD-L2, CTLA-4, TIM-3, LAG-3, CEACAM-1, CEACAM-5, VISTA, BTLA, TIGIT, LAIR1, CD160, 2B4 or TGFR.

25. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-24, wherein the antibody molecule or pharmaceutical composition is to be used in combination with one or more of the following:

(a) an inhibitor of LAG-3, optionally, wherein the inhibitor of LAG-3 is an anti-LAG-3 antibody molecule, e.g., for the treatment of an NSCLC, a melanoma, an RCC, or a hematologic cancer;

(b) an inhibitor of TIM-3, optionally, wherein the inhibitor of TIM-3 is an anti-TIM-3 antibody molecule, e.g., for the treatment of a melanoma or an RCC;

(c) an inhibitor of PD-L1, optionally, wherein the inhibitor of PD-L1 is an anti-PD-L1 antibody molecule, or is chosen from YW243.55.S70, MPDL3280A, MEDI-4736, MSB-

0010718C, or MDX-1105, e.g., for the treatment of a thyroid cancer, an NSCLC, a triple negative breast cancer, a uterine cancer, or a lymphoma;

(d) an agonist of GITR, optionally, wherein the agonist of GITR is an anti-GITR antibody molecule or a fusion protein, e.g., for the treatment of an NSCLC;

(e) an interleukin, optionally, wherein the interleukin is IL-15, e.g., for the treatment of a solid tumor;

(f) a MEK inhibitor, optionally, wherein the MEK inhibitor is chosen from ARRY-142886, G02442104 (GSK1120212), RDEA436, RDEA119/BAY 869766, AS703026, G00039805 (AZD-6244 or selumetinib), BIX 02188, BIX 02189, CI-1040 (PD-184352), PD0325901, PD98059, U0126, GDC-0973 (Methanone or [3,4-difluoro-2-[(2-fluoro-4-iodophenyl)amino]phenyl][3- hydroxy-3-(25)-2-piperidinyl- 1 -azetidinyl]-), G-38963, G02443714 (AS703206), or a pharmaceutically acceptable salt or solvate thereof, e.g., for the treatment of a triple negative breast cancer, an NSCLC, or a colorectal cancer; or

(g) an FGFR inhibitor, e.g., for the treatment of a hepatocellular carcinoma.

26. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-25, wherein the antibody molecule or pharmaceutical composition is to be used in combination with one or more of the following:

(a) a chemotherapy for the treatment of a lung cancer, optionally, wherein the chemotherapy is a platinum doublet therapy;

(b) an indoleamine-pyrrole 2,3-dioxygenase (IDO) inhibitor for the treatment of a lung cancer, optionally, wherein the IDO inhibitor is INCB24360;

(c) an inhibitor of CTLA-4 for the treatment of a lung cancer or a melanoma, optionally, wherein the inhibitor of CTLA-4 is an anti-CTLA-4 antibody (e.g., ipilimumab) or a soluble ligand of CTLA-4,

optionally, wherein the antibody molecule or pharmaceutical composition is to be further used in combination with a BRAF inhibitor, e.g., vemurafenib or dabrafenib;

(d) a cancer vaccine, e.g., a dendritic cell renal carcinoma (DC-RCC) vaccine;

(e) one or more of: an immune-based therapy, a targeting agent, a VEGF tyrosine kinase inhibitor, an RNAi inhibitor, or an inhibitor of a downstream mediator of VEGF signaling, to treat a renal cancer, optionally, wherein:

(i) the immune-based therapy comprises interleukin-2 or interferon-α;

(ii) the targeting agent is a VEGF inhibitor, e.g., an anti-VEGF antibody;

(iii) the VEGF tyrosine kinase inhibitor is chosen from sunitinib, sorafenib, axitinib, or pazopanib;

(iv) the inhibitor of a downstream mediator of VEGF signaling is an inhibitor of the mammalian target of rapamycin (mTOR), e.g., temsirolimus;

(f) one, two or all of oxaliplatin, leucovorin, or 5-FU, for the treatment of a melanoma, a colorectal cancer, a non-small cell lung cancer, an ovarian cancer, a breast cancer, a prostate cancer, a pancreatic cancer, a hematological cancer, or a renal cell carcinoma; or

(g) a tyrosine kinase inhibitor (e.g., axitinib) for the treatment of a renal cancer.

27. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-26, wherein the subject has, or is identified as having, one or more of:

(a) a cancer that expresses PD-L1;

(b) a cancer that is positive for one, two, or all of PD-L1, CD8, IFN-γ;

(c) a cancer that is triple positive for PD-L1, CD8 and IFN-γ; or

(d) a cancer that is Tumor Infiltrating Lymphocyte (TIL) positive.

28. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-27, wherein the antibody molecule or pharmaceutical composition is to be administered at a dose of about 1 to 30 mg/kg, e.g., at a dose of about 1 to 5 mg/kg, optionally, wherein the antibody molecule or the pharmaceutical composition is to be administered once a week to once every 2, 3, or 4 weeks.

29. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-28, wherein the antibody molecule or pharmaceutical composition is to be used in combination with one or more of: 1) a protein kinase C (PKC) inhibitor; 2) a heat shock protein 90 (HSP90) inhibitor; 3) an inhibitor of a phosphoinositide 3-kinase (PI3K) and/or target of rapamycin (mTOR); 4) an inhibitor of cytochrome P450 (*e.g.*, a CYP17 inhibitor or a 17alpha-Hydroxylase/C17-20 Lyase inhibitor); 5) an iron chelating agent; 6) an aromatase inhibitor; 7) an inhibitor of p53, *e.g.*, an inhibitor of a p53/Mdm2 interaction; 8) an apoptosis inducer; 9) an angiogenesis inhibitor; 10) an aldosterone synthase inhibitor; 11) a smoothened (SMO) receptor inhibitor; 12) a prolactin receptor (PRLR) inhibitor; 13) a Wnt signaling inhibitor; 14) a CDK4/6 inhibitor; 15) a fibroblast growth factor receptor 2

(FGFR2)/fibroblast growth factor receptor 4 (FGFR4) inhibitor; 16) an inhibitor of macrophage colony-stimulating factor (M-CSF); 17) an inhibitor of one or more of c-KIT, histamine release, Flt3 (*e.g.*, FLK2/STK1) or PKC; 18) an inhibitor of one or more of VEGFR-2 (*e.g.*, FLK-1/KDR), PDGFRbeta, c-KIT or Raf kinase C; 19) a somatostatin agonist and/or a growth hormone release inhibitor; 20) an anaplastic lymphoma kinase (ALK) inhibitor; 21) an insulin-like growth factor 1 receptor (IGF-1R) inhibitor; 22) a P-Glycoprotein 1 inhibitor; 23) a vascular endothelial growth factor receptor (VEGFR) inhibitor; 24) a BCR-ABL kinase inhibitor; 25) an FGFR inhibitor; 26) an inhibitor of CYP11B2; 27) a HDM2 inhibitor, *e.g.*, an inhibitor of the HDM2-p53 interaction; 28) an inhibitor of a tyrosine kinase; 29) an inhibitor of c-MET; 30) an inhibitor of JAK; 31) an inhibitor of DAC; 32) an inhibitor of 11β-hydroxylase; 33) an inhibitor of IAP; 34) an inhibitor of PIM kinase; 35) an inhibitor of Porcupine; 36) an inhibitor of BRAF, *e.g.*, BRAF V600E or wild-type BRAF; 37) an inhibitor of HER3; 38) an inhibitor of MEK; or 39) an inhibitor of a lipid kinase.

30. The use of an antibody molecule, or a pharmaceutical composition as claimed in any of claims 22-29, wherein the antibody molecule or pharmaceutical composition is to be used in combination with one or more of Compounds A1 to A51 as described in Table 7.

31. Use of an antibody molecule of any of claims 1-12, or a pharmaceutical composition of claim 13, in the manufacture of a medicament for the stimulation of an immune response or the treatment of a cancer or an infectious disease in a subject.