Claims:

1. An isolated monoclonal antibody, or an antigen-binding portion thereof, that binds human LAG-3, comprising heavy and light chain variable regions, wherein the heavy chain CDR1, CDR2, and CDR3 regions comprise the amino acid sequences of SEQ ID NOs: 15, 16, and 17, and the light chain CDR1, CDR2, and CDR3 regions comprise the amino acid sequences of SEQ ID NOs: 18, 19, and 20.

2. The antibody, or antigen-binding portion thereof, of claim 1, wherein the heavy chain variable region comprises the amino acid sequence of SEQ ID NO: 12.

3. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, wherein the light chain variable region comprises the amino acid sequence of SEQ ID NO: 14.

4. An isolated monoclonal antibody, or an antigen-binding portion thereof, that binds human LAG-3, comprising heavy and light chain variable regions, comprising the amino acid sequences of SEQ ID NOs: 12 and 14, respectively.

5. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, wherein the antibody comprises heavy and light chains comprising the amino acid sequences of SEQ ID NOs: 35 and 37, respectively.

6. An antibody comprising a heavy chain comprising the amino acid sequence of SEQ ID NO: 35 and a light chain comprising the amino acid of SEQ ID NO: 37.

7. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, wherein the antibody comprises a serine to proline mutation at amino acid residue 228.

8. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, wherein the antibody is a full-length antibody.

9. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which exhibits one or a combination of the following properties:

(a) binding to monkey LAG-3;

(b) lack of binding to mouse LAG-3;

(c) binding to LAG-3 major histocompatibility (MHC) class II molecules;

(d) inhibits binding of LAG-3 to major histocompatibility (MHC) class II molecules; or

(e) enhances an immune response.

10. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which enhances interleukin-2 (IL-2) production in an antigen-specific T cell response.

11. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which enhances an anti-tumor immune response.

12. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which binds an epitope of human LAG-3 comprising the amino acid sequence PGHPLAPG (SEQ ID NO: 21).

13. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which binds an epitope of human LAG-3 comprising the amino acid sequence HPAAPSSW (SEQ ID NO: 22) or PAAPSSWG (SEQ ID NO: 23).

14. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which binds to human LAG-3 with a K_D of 0.27×10^{-9} M or less.

15. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which is a human, humanized, or chimeric antibody.

16. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which is an IgGl, IgG2 or IgG4 isotype.

17. The antibody, or antigen-binding portion thereof, of any one of the preceding claims, which is an antibody fragment or a single chain antibody.

18. A bispecific molecule comprising the antibody, or antigen-binding portion thereof, of any one of the preceding claims, and a second antibody or antigen-binding portion thereof.

19. An immunoconjugate comprising the antibody, or antigen-binding portion thereof, of any one of claims 1-17, linked to a therapeutic agent.

20. The immunoconjugate of claim 19, wherein the therapeutic agent is a cytotoxin or a radioactive isotope.

21. A composition comprising the antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, and a pharmaceutically acceptable carrier.

22. The composition of claim 21, further comprising an anti-cancer agent.

23. The composition of claim 22, wherein the agent is an antibody or a chemotherapeutic agent.

24. An isolated nucleic acid encoding the heavy and/or light chain variable region of the antibody, or antigen-binding portion thereof, of any one of claims 1-8.

25. An expression vector comprising the nucleic acid of claim 24.

26. A host cell comprising the expression vector of claim 25.

27. A method for preparing an anti-LAG-3 antibody comprising expressing the antibody in the host cell of claim 26 and isolating the antibody from the host cell.

28. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use in therapy.

29. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use as a medicament.

30. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use in enhancing an immune response in a subject.

31. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 30, wherein the subject is a tumor-bearing subject and an immune response against the tumor is enhanced.

32. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 30, wherein the subject is a virus-bearing subject and an immune response against the virus is enhanced.

33. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 30, wherein the immune response is an antigen-specific T cell response, such that an antigen-specific T cell response is enhanced.

34. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 33, wherein interleukin-2 production by the antigen-specific T cell is enhanced.

35. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use in inhibiting growth of tumor cells in a subject.

36. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use in treating cancer.

37. The antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, for use in the treatment of viral infection in a subject.

38. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to any one of claims 28-37, further wherein at least one additional immunostimulatory antibody is to be administered to the subject.

39. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 38, wherein the at least one immunostimulatory additional antibody is an anti-PD-1 antibody.

40. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 39, wherein the anti-PD-1 antibody is selected from the group consisting of lambrolizumab and AMP514.

41. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 39, wherein the anti-PD-1 antibody comprises the heavy and light chain CDR1, CDR2, and CDR3 regions of 5C4.

42. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 39, wherein the anti-PD-1 antibody comprises the heavy and light chain variable regions of 5C4.

43. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 38, wherein the at least one additional immunostimulatory antibody is an anti-PD-L1 antibody.

44. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 43, wherein the anti-PD-L1 antibody is selected from the group consisting of MPDL3280A (RG7446), MEDI4736, and MDX1105

45. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 38, wherein the at least one additional immunostimulatory antibody is an anti-CTLA-4 antibody.

46. The antibody, or antigen-binding portion thereof, the bispecific molecule, or the immunoconjugate for use according to claim 45, wherein the anti-CTLA-4 antibody is selected from the group consisting of ipilimumab and CP-675206.

47. The use of the antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, in the manufacture of a medicament for enhancing an immune response in a subject.

48. The use according to claim 47, wherein the subject is a tumor-bearing subject and an immune response against the tumor is enhanced.

49. The use according to claim 47, wherein the subject is a virus-bearing subject and an immune response against the virus is enhanced.

50. The use according to claim 47, wherein the immune response is an antigen-specific T cell response, such that an antigen-specific T cell response is enhanced.

51. The use according to claim 50, wherein interleukin-2 production by the antigen-specific T cell is enhanced.

52. The use of the antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, in the manufacture of a medicament for inhibiting growth of tumor cells in a subject.

53. The use of the antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, in the manufacture of a medicament for treating cancer in a subject.

54. The use of the antibody, or antigen-binding portion thereof, of any one of claims 1-17, the bispecific molecule of claim 18, or the immunoconjugate of claim 19 or 20, in the manufacture of a medicament for the treatment of viral infection in a subject.

55. The use according to any one of claims 47-54, further wherein comprising administration of at least one additional immunostimulatory antibody is to be administered to the subject.

56. The use according to claim 55, wherein the at least one additional immunostimulatory antibody is an anti-PD-1 antibody.

57. The use according to claim 56, wherein the anti-PD-1 antibody is selected from the group consisting of lambrolizumab and AMP514.

58. The use according to claim 56, wherein the anti-PD-1 antibody comprises the heavy and light chain CDR1, CDR2, and CDR3 regions of 5C4.

59. The use according to claim 56, wherein the anti-PD-1 antibody comprises the heavy and light chain variable regions of 5C4.

60. The use according to claim 55, wherein the at least one additional immunostimulatory antibody is an anti-PD-L1 antibody.

61. The use according to claim 60, wherein the anti-PD-L1 antibody is selected from the group consisting of MPDL3280A (RG7446), MEDI4736, and MDX1105

62. The use according to claim 55, wherein the at least one additional immunostimulatory antibody is an anti-CTLA-4 antibody.

63. The use according to claim 62, wherein the anti-CTLA-4 antibody is selected from the group consisting of ipilimumab and CP-675206.