

- (18) A host cell transformed with the vector of (17) above.
- (19) A method of preparing an antibody, comprising culturing the host cell of (18) above and collecting an anti-PD-L1 antibody from the resultant culture.
- (20) A DNA encoding a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat.
- (21) A DNA encoding a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.

The present specification encompasses the contents disclosed in the specifications and/or drawings of Japanese Patent Applications No. 2016-159088, No. 2016-159089, No. 2017-110723 and No. 2017-61454 based on which the present patent application claims priority.

In one aspect, the present disclosure refers to an anti-PD-L1 antibody comprising (a) a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat; and (b) a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.

In another aspect, the present disclosure refers to a pharmaceutical composition comprising the antibody as described herein as an active ingredient.

In another aspect, the present disclosure refers to the pharmaceutical composition as described herein for use as a medicament.

In another aspect, the present disclosure refers to use of the pharmaceutical composition as described herein in the manufacture of a medicament for prevention and/or treatment of cancers and/or infections.

In another aspect, the present disclosure refers to an artificial genetic DNA comprising (a') a DNA encoding a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat and (b') a DNA encoding a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of

an animal other than rat.

In another aspect, the present disclosure refers to a vector comprising the artificial genetic DNA as described herein.

In another aspect, the present disclosure refers to a host cell transformed with the vector as described herein.

In another aspect, the present disclosure refers to a method of preparing an antibody, comprising culturing the host cell as described herein and collecting an anti-PD-L1 antibody from the resultant culture.

In another aspect, the present disclosure refers to a DNA encoding (a) a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat; and (b) a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.

In another example, there is provided a DNA encoding a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.

EFFECT OF THE INVENTION

According to the present invention, a novel anti-PD-L1 antibody has been obtained. This antibody is applicable even to those animals other than rat.

BRIEF DESCRIPTION OF THE DRAWINGS

[Fig. 1] Inhibition of the binding of recombinant canine PD-L1 to recombinant canine PD-1. The binding of canine PD-L1-Ig to canine PD-1-Ig was detected on ELISA plates. The optical density (O.D.) without addition of antibody was taken as 100%. O.D. at each antibody concentration was shown as relative value. Among rat anti-bovine PD-L1 monoclonal antibodies 4G12 (Rat IgG2a (κ)), 5A2 (Rat IgG1 (κ)) and 6G7 (Rat IgM (κ)) which showed cross-reaction with canine PD-L1, clones 4G12 and 6G7 exhibited a high binding inhibition capacity.

[Fig. 2] Schematic drawings of pDC6 vector and a rat-canine chimeric anti-PD-L1 antibody.

[Fig. 3] Expression and purification of rat-canine chimeric anti-PD-L1 antibodies c4G12 and c6G7. SDS-PAGE was performed under non-reducing conditions, followed by

CLAIMS

1. An anti-PD-L1 antibody comprising (a) a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat; and (b) a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.
2. The antibody of claim 1, wherein the light chain variable region and the heavy chain variable region are derived from rat.
3. The antibody of claim 2, wherein the light chain variable region is the light chain variable region of a rat anti-bovine PD-L1 antibody and the heavy chain variable region is the heavy chain variable region of a rat anti-bovine PD-L1 antibody.
4. The antibody of claim 3, wherein the light chain variable region has the amino acid sequence as shown in SEQ ID NO. 1 and the heavy chain variable region has the amino acid sequence as shown in SEQ ID NO: 2.
5. The antibody of any one of claims 1 to 4, wherein the light chain constant region of an antibody of an animal other than rat has the amino acid sequence of the constant region of lambda chain or kappa chain.
6. The antibody of any one of claims 1 to 5, wherein the heavy chain constant region of an antibody of an animal other than rat has the amino acid sequence of the constant region of an immunoglobulin equivalent to human IgG4.
7. The antibody of any one of claims 1 to 5, wherein the animal other than rat is bovine and the heavy chain constant region of the bovine antibody has mutations introduced therinto that reduce ADCC activity and/or CDC activity.
8. The antibody of claim 6, wherein the animal other than rat is canine; the light chain constant region of the canine antibody has the amino acid sequence of the constant region of lambda chain; and the heavy chain constant region of the canine antibody has the amino acid sequence of the constant region of an immunoglobulin equivalent to human IgG4.
9. The antibody of claim 7, wherein the light chain constant region of the bovine antibody

- has the amino acid sequence of the constant region of lambda chain and the heavy chain constant region of the bovine antibody has mutations introduced therein that reduces ADCC activity and/or CDC activity.
10. The antibody of claim 8, wherein the light chain constant region of the canine antibody has the amino acid sequence as shown in SEQ ID NO: 3 and the heavy chain constant region of the canine antibody has the amino acid sequence as shown in SEQ ID NO: 4.
 11. The antibody of claim 9, wherein the light chain constant region of the bovine antibody has the amino acid sequence as shown in SEQ ID NO: 100 and the heavy chain constant region of the bovine antibody has the amino acid sequence as shown in SEQ ID NO: 102.
 12. The antibody of any one of claims 1 to 11 which has a four-chain structure comprising two light chains and two heavy chains.
 13. A pharmaceutical composition comprising the antibody of any one of claims 1 to 12 as an active ingredient.
 14. The pharmaceutical composition of claim 13 for use as a medicament.
 15. Use of the pharmaceutical composition of claim 13 in the manufacture of a medicament for prevention and/or treatment of cancers and/or infections.
 16. The use of claim 15, wherein the cancers and/or infections are selected from the group consisting of neoplastic diseases, leukemia, Johne's disease, anaplasmosis, bacterial mastitis, mycotic mastitis, mycoplasma infections (such as mycoplasma mastitis, mycoplasma pneumonia or the like), tuberculosis, *Theileria orientalis* infection, cryptosporidiosis, coccidiosis, trypanosomiasis and leishmaniasis.
 17. An artificial genetic DNA comprising (a') a DNA encoding a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat and (b') a DNA encoding a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.
 18. A vector comprising the artificial genetic DNA of claim 17.
 19. A host cell transformed with the vector of claim 18.

20. A method of preparing an antibody, comprising culturing the host cell of claim 19 and collecting an anti-PD-L1 antibody from the resultant culture.
21. A DNA encoding
- (a) a light chain comprising a light chain variable region containing CDR1 having the amino acid sequence of QSLLYSENQKDY (SEQ ID NO: 37), CDR2 having the amino acid sequence of WAT and CDR3 having the amino acid sequence of GQYLVYPFT (SEQ ID NO: 38) and the light chain constant region of an antibody of an animal other than rat; and
 - (b) a heavy chain comprising a heavy chain variable region containing CDR1 having the amino acid sequence of GYTFTSNF (SEQ ID NO: 39), CDR2 having the amino acid sequence of IYPEYGNT (SEQ ID NO: 40) and CDR3 having the amino acid sequence of ASEEAVISLVY (SEQ ID NO: 41) and the heavy chain constant region of an antibody of an animal other than rat.