1. A monoclonal antibody which binds to an extracellular domain of human ILT7 or a fragment comprising its antigen binding region.

2. The monoclonal antibody or the fragment comprising its antigen binding region according to claim 1, wherein the monoclonal antibody binds to a human interferon producing cell.

3. A monoclonal antibody which is produced by a hybridoma ILT7#11 deposited under Accession number FERM BP-10704 or a hybridoma ILT7#17 deposited under Accession number FERM BP-10705, or a fragment comprising its antigen binding region.

4. The monoclonal antibody or the fragment comprising its antigen binding region according to claim 1, wherein the monoclonal antibody comprises amino acid sequences according to any of the following i) to iii) as CDR1, CDR2, and CDR3 in the heavy chain variable region and the light chain variable region:

i) CDR1 of a heavy chain variable region: SDYAWN (SEQ ID NO: 58);

CDR2 of a heavy chain variable region: YISYSGSTSYNPSLKSR (SEQ ID NO: 59); and

CDR3 of a heavy chain variable region: SPPYYAMDY (SEQ ID NO: 60);

CDR1 of light chain variable region: KASQDVGTAVA (SEQ ID NO: 61);

CDR2 of a light chain variable region: WASTRHT (SEQ ID NO: 62); and

CDR3 of a light chain variable region: QQYSSYPLT (SEQ ID NO: 63);

ii) CDR1 of a heavy chain variable region: SYWIH (SEQ ID NO: 64);

CDR2 of a heavy chain variable region: RIYPGTGSTYYNEKFKG (SEQ ID NO: 65); and

CDR3 of a heavy chain variable region: YPTYDWYFDV (SEQ ID NO: 66);

CDR1 of a light chain variable region: RASQSISNYLH (SEQ ID NO: 67);

CDR2 of a light chain variable region: YASQSIS (SEQ ID NO: 68);

CDR3 of a light chain variable region: QQSNSWPLT (SEQ ID NO: 69);

iii) CDR1 of a heavy chain variable region: SDYAWN (SEQ ID NO: 70);

CDR2 of a heavy chain variable region: YISYSGSTSYNPSLKSR (SEQ ID NO: 71);

CDR3 of a heavy chain variable region: ALPLPWFAY (SEQ ID NO: 72);

CDR1 of a light chain variable region: KASQDVGTAVA (SEQ ID NO: 73);

CDR2 of a light chain variable region: WASTRHT (SEQ ID NO: 74); and

CDR3 of a light chain variable region: QQYSSYPYT (SEQ ID NO: 75).

5. The monoclonal antibody or the fragment comprising its antigen binding region according to claim 1, wherein the monoclonal antibody comprises a mature sequence of an amino acid sequence selected from any of the following combinations (a) to (c) as the heavy chain variable region and the light chain variable region:

a) a heavy chain variable region of SEQ ID NO: 39 and a light chain variable region of SEQ ID NO: 41;

b) a heavy chain variable region of SEQ ID NO: 43 and a light chain variable region of SEQ ID NO: 45; and

c) a heavy chain variable region of SEQ ID NO: 47 and a light chain variable region of SEQ ID NO: 49.

6. A polynucleotide encoding the monoclonal antibody or the fragment comprising its antigen binding region according to claim 4 or 5.

7. A vector comprising a polynucleotide encoding the monoclonal antibody or the fragment comprising its antigen binding region according to claim 4 or 5.

8. A transformed cell retaining the vector according to claim 7 in an expressible manner.

9. A method for producing the monoclonal antibody or the fragment comprising its antigen binding region according to claim 4 or 5,

comprising the steps of: culturing the transformed cell according to claim 8; and recovering the monoclonal antibody or the fragment comprising its antigen binding region from the culture.

10. A hybridoma which produces either of the monoclonal antibodies according to claim 1 or 2.

11. A hybridoma ILT7#11 deposited under Accession number FERM BP-10704 or a hybridoma ILT7#17 deposited under Accession number FERM BP-10705.

12. A method for producing a monoclonal antibody, comprising the steps of: culturing the hybridoma according to claim 11; and collecting the monoclonal antibody from the culture.

13. A method for producing a cell which produces a monoclonal antibody which binds to an extracellular domain of human ILT7, comprising the following step of:

selecting an antibody producing cell which produces an antibody which binds to human ILT7 from the antibody producing cell of an immune animal that has been administered a cell which expresses a exogenous protein comprising an extracellular domain of human ILT7 and a exogenous molecule which associates with human ILT7.

14. The method according to claim 13, wherein the molecule which associates with human ILT7 is a cell membrane protein.

15. The method according to claim 14, wherein the cell membrane protein is Fc receptor γ-chain.

16. The method according to claim 15, wherein the cell expressing human ILT7 and the molecule which associates with human ILT7 is a cell retaining the following (a) and (b) in an expressible manner:

(a) an exogenous polynucleotide encoding an amino acid sequence comprising an extracellular domain of human ILT7; and

(b) an exogenous polynucleotide encoding Fc receptor γ-chain.

17. The method according to claim 16, wherein the cell is an animal cell.

18. The method according to claim 17, wherein the cell is a human-derived cell.

19. The method according to claim 18, wherein the human-derived cell is a 293T cell.

20. The method according to claim 13, additionally comprising a step of cloning the antibody producing cell obtained by the method according to claim 13.

21. A method for producing a monoclonal antibody which binds to an extracellular domain of human ILT7, comprising the steps of: culturing the antibody producing cell by the method according to claim 8; and recovering the monoclonal antibody from the culture.

22. A monoclonal antibody capable of recognizing human ILT7 or a fragment comprising its antigen binding region which can be obtained by the following steps of:

(1) selecting an antibody producing cell which produces the antibody which binds to human ILT7 from the antibody producing cell of an immune animal that has been administered a cell which exogenously expresses a protein comprising an extracellular domain of human ILT7 and a molecule which associates with human ILT7; and

(2) culturing the antibody producing cell selected by step (1) and recovering an antibody capable of recognizing human ILT7 from the culture.

23. An immunogen for producing an antibody which binds to an extracellular domain of human ILT7, comprising an animal cell in which (a) a polynucleotide which encodes an amino acid sequence comprising an extracellular domain of human ILT7, and (b) a polynucleotide which encodes Fc receptor γ-chain are retained in an exogenously expressible manner; or a cell membrane fraction thereof.

24. The immunogen according to claim 23, wherein the animal cell is a human-derived cell.

25. A method for detecting an interferon producing cell, comprising the steps of:

contacting a monoclonal antibody which binds to an extracellular domain of human ILT7 or a fragment comprising its antigen binding region with a test cell; and

detecting the monoclonal antibody or the fragment comprising its antigen binding region which is bound to the cell.

26. A reagent for detecting an interferon producing cell comprising a monoclonal antibody which binds to an extracellular domain

~~of human ILT7 or a fragment comprising its antigen binding region.~~

27. A method for inhibiting the activity of an interferon producing cell, comprising a step of contacting any of the following components with an interferon producing cell:

(a) a monoclonal antibody which binds to human ILT7 and inhibits the activity of an interferon producing cell or a fragment comprising its antigen binding region; and

(b) an immunoglobulin into which a complementarity-determining region of the monoclonal antibody described in (a) is introduced or a fragment comprising its antigen binding region.

28. Use of any of the following components in the manufacture of a medicament for inhibiting the activity of an interferon producing cell in a living organism:

(a) a monoclonal antibody which binds to human ILT7 and inhibits the activity of an interferon producing cell or a fragment comprising its antigen binding region;

(b) an immunoglobulin into which a complementarity-determining region of the monoclonal antibody described in (a) is introduced or the fragment comprising its antigen binding region; and

(c) a polynucleotide which encodes any of the components described in (a) or (b).

29. The method according to claim 27 or the use according to claim 28, wherein the activity of the interferon producing cell is due to either the interferon producing activity or the survival of the interferon producing cell, or both of them.

30. An inhibitor for the activity of an interferon producing cell, comprising any of the following components as an active ingredient:

(a) a monoclonal antibody which binds to human ILT7 and inhibits the activity of an interferon producing cell or a fragment comprising its antigen binding region;

(b) an immunoglobulin into which a complementarity-determining region of the monoclonal antibody described in (a) is introduced or a fragment comprising its antigen binding region; and

(c) a polynucleotide which encodes any of the components described in (a) or (b).

31. The inhibitor for the activity of an interferon producing cell according to claim 30, wherein the activity of the interferon producing cell is due to either the interferon producing activity or the survival of the interferon producing cell, or both of them.

Claims

1. A monoclonal antibody which binds to human ILT7, binds to none of human ILT1, human ILT2 and human ILT3, and suppresses interferon-α (IFNα) production from ILT7-expressing cells, or a fragment comprising its antigen binding region.

2. The monoclonal antibody according to claim 1, wherein the ILT7 expressing cell is an interferon producing cell (IPC).

3. The monoclonal antibody according to claim 1 or 2, wherein the cell is CD123 positive or BDCA-2 positive.

4. The monoclonal antibody according to any one of claims 1 to 3, wherein the cell is CD3 negative, CD14 negative, CD16 negative, CD19 negative, CD20 negative, and CD56 negative.

5. The monoclonal antibody according to any one of claims 1 to 4, wherein the monoclonal antibody is produced by a method comprising the following steps of:

   (1) administering to a non-human animal a cell retaining the following (a) and (b) in an expressible manner:

      (a) an exogenous polynucleotide encoding an amino acid sequence comprising an extracellular domain of human ILT7; and

      (b) an exogenous polynucleotide encoding Fc receptor γ-chain (FcRγ);

   (2) producing and selecting an antibody producing cell which produces an antibody which binds to human ILT7 from the antibody producing cell of the non-human animal; and

   (3) culturing the cell so selected and recovering a monoclonal antibody from the culture.

6. The monoclonal antibody according to claim 5, wherein the cell is an animal cell; and optionally wherein the cell is a human-derived cell; and further optionally wherein the human-derived cell is a 293T cell.

7. The monoclonal antibody according to any one of claims 1 to 4, wherein the fragment comprising its antigen binding region is Fab, F(ab')2, single chain Fv, or diabody.

8. A method for detecting an interferon producing cell, comprising the steps of:

   contacting the monoclonal antibody of any one of claims 1 to 7 with a test cell; and detecting the monoclonal antibody or the fragment comprising its antigen binding region which is bound to the cell.

9. An interferon a (IFNα)-suppressing agent comprising the monoclonal antibody according to any one of claims 1 to 7 as an active ingredient.