Claims

1. An anti-human Fn14 antibody or an antigen-binding fragment thereof comprising:

a heavy chain variable region comprising CDR1 consisting of the amino acid sequence of amino acid numbers 31 to 35 of SEQ ID NO: 2, CDR2 consisting of the amino acid sequence of amino acid numbers 50 to 65 of SEQ ID NO: 2, and CDR3 consisting of the amino acid sequence of amino acid numbers 98 to 114 of SEQ ID NO: 2; and

a light chain variable region comprising CDR1 consisting of the amino acid sequence of amino acid numbers 24 to 40 of SEQ ID NO: 4, CDR2 consisting of the amino acid sequence of amino acid numbers 56 to 62 of SEQ ID NO: 4, and CDR3 consisting of the amino acid sequence of amino acid numbers 95 to 103 of SEQ ID NO: 4.

2. The anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 1, selected from the following (1) and (2):

(1) an anti-human Fn14 antibody or an antigen-binding fragment thereof comprising a heavy chain variable region consisting of the amino acid sequence of amino acid numbers 1 to 125 of SEQ ID NO: 2 and a light chain variable region consisting of the amino acid sequence of amino acid numbers 1 to 114 of SEQ ID NO: 4; and

(2) an antibody or an antigen-binding fragment thereof formed by posttranslational modification of the anti-human Fn14 antibody or the antigen-binding fragment thereof of (1).

3. The anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 2, comprising:

a heavy chain variable region consisting of the amino acid sequence of amino acid numbers 1 to 125 of SEQ ID NO: 2; and

a light chain variable region consisting of the amino acid sequence of amino acid numbers 1 to 114 of SEQ ID NO: 4.

4. The anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 2, wherein the posttranslational modification is pyroglutamylation at the N terminal of the heavy chain variable region and/or deletion of lysine at the C terminal of the heavy chain.

5. The anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 2, comprising:

a heavy chain variable region consisting of the amino acid sequence of amino acid

numbers 1 to 125 of SEQ ID NO: 2, in which glutamine of amino acid number 1 of SEQ ID NO: 2 is modified to pyroglutamic acid; and

a light chain variable region consisting of the amino acid sequence of amino acid numbers 1 to 114 of SEQ ID NO: 4.

6. The anti-human Fn14 antibody according to claim 2, selected from the following (1) and (2):

(1) an anti-human Fn14 antibody comprising a heavy chain consisting of the amino acid sequence represented by SEQ ID NO: 2 and a light chain consisting of the amino acid sequence represented by SEQ ID NO: 4; and

(2) an anti-human Fn14 antibody formed by posttranslational modification of the antibody of (1).

7. The anti-human Fn14 antibody according to claim 6, comprising:

a heavy chain consisting of the amino acid sequence represented by SEQ ID NO: 2; and

a light chain consisting of the amino acid sequence represented by SEQ ID NO: 4

8. The anti-human Fn14 antibody according to claim 6, wherein the posttranslational modification is pyroglutamylation at the N terminal of the heavy chain and/or deletion of lysine at the C terminal of the heavy chain.

9. The anti-human Fn14 antibody according to claim 8, comprising:

a heavy chain consisting of the amino acid sequence of amino acid numbers 1 to 454 of SEQ ID NO: 2, in which glutamine of amino acid number 1 of SEQ ID NO: 2 is modified to pyroglutamic acid; and

a light chain consisting of the amino acid sequence represented by SEQ ID NO: 4.

10. The antigen-binding fragment according to any one of claims 1 to 5, which is a single chain variable region fragment, Fab, Fab’, or $F(ab')_2$.

11. A polynucleotide comprising:

a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3.

12. A polynucleotide comprising:

a base sequence encoding the light chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3.

13. An expression vector comprising:
the polynucleotide according to claim 11 and/or 12.

14. A host cell selected from the group consisting of the following (a) to (d):
(a) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3 and a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen-binding fragment thereof;
(b) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3, and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen-binding fragment thereof;
(c) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3; and
(d) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3.

15. A host cell selected from the group consisting of the following (a) to (d):
(a) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7 and a polynucleotide comprising a base sequence encoding the light chain of the antibody;
(b) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7, and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the antibody;
(c) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7; and
(d) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the anti-human Fn14 antibody according to claim 7.

16. A method for producing an anti-human Fn14 antibody or an antigen-

binding fragment thereof, the method comprising:

a step of culturing a host cell selected from the group consisting of the following (A) to (C) to express an anti-human Fn14 antibody or an antigen-binding fragment thereof:

(A) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3 and a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen-binding fragment thereof;

(B) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3, and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen-binding fragment thereof; and

(C) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain variable region of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3, and a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain variable region of the antibody or the antigen-binding fragment thereof.

17. A method for producing an anti-human Fn14 antibody comprising:

a step of culturing a host cell selected from the group consisting of the following (A) to (C) to express an anti-human Fn14 antibody:

(A) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7 and a polynucleotide comprising a base sequence encoding the light chain of the antibody;

(B) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7, and an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the antibody; and

(C) a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the heavy chain of the anti-human Fn14 antibody according to claim 7, and a host cell transformed with an expression vector comprising a polynucleotide comprising a base sequence encoding the light chain of the anti-human Fn14 antibody.

18. A pharmaceutical composition comprising:
the anti-human Fn14 antibody or the antigen-binding fragment thereof according to any one of claims 1 to 10; and
a pharmaceutically acceptable excipient.

19. A pharmaceutical composition comprising:
the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 3;
the anti-human Fn14 antibody or the antigen-binding fragment thereof according to claim 5; and
a pharmaceutically acceptable excipient.

20. A pharmaceutical composition comprising:
the anti-human Fn14 antibody according to claim 7;
the anti-human Fn14 antibody according to claim 9; and
a pharmaceutically acceptable excipient.

21. The pharmaceutical composition according to any one of claims 18 to 20, which is a pharmaceutical composition for preventing or treating cancer cachexia.

22. The anti-human Fn14 antibody or the antigen-binding fragment thereof according to any one of claims 1 to 10 for use in the prevention or treatment of cancer cachexia.

23. Use of the anti-human Fn14 antibody or the antigen-binding fragment thereof according to any one of claims 1 to 10 in the manufacture of a medicament for the prevention or treatment of
cancer cachexia.

24. The use according to claim 23, wherein the medicament is to be used in combination with an anticancer agent.

25. The use according to claim 24, wherein the anticancer agent is gemcitabine.

26. A pharmaceutical composition for preventing or treating cancer or cancer cachexia, comprising:

the anti-human Fn14 antibody or the antigen-binding fragment thereof according to any one of claims 1 to 10 as an active ingredient,

wherein the pharmaceutical composition is to be used in combination with an anticancer agent.