CLAIMS

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

a heavy chain variable region comprising CDR1 consisting of the amino acid sequence of SEQ ID NO: 1, CDR2 consisting of the amino acid sequence of SEQ ID NO: 2, and CDR3 consisting of the amino acid sequence of SEQ ID NO: 3, and

a light chain variable region comprising CDR1 consisting of the amino acid sequence of SEQ ID NO: 4, CDR2 consisting of the amino acid sequence of SEQ ID NO: 5, and CDR3 consisting of the amino acid sequence of SEQ ID NO: 6.

2. The anti-MerTK antibody or an antigen binding fragment thereof according to claim 1, comprising

(a) a heavy chain variable region and a light chain variable region selected from the group consisting of the following (1) to (6):

(1) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 10;

(2) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 12;

(3) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 14;

(4) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 16;

(5) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 18; and

(6) a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 20; and/or

(b) the antibody comprising a heavy chain comprising the heavy chain variable region and a light chain comprising the light chain variable region.

3. The anti-MerTK antibody according to claim 2(b), comprising

(a) L234A and L235A amino acid mutations (LALA mutations) in the heavy chain (wherein positions of the mutations are amino acid positions that are numbered according to the EU index in a human Igγ1 constant region);

(b) a P331G mutation in the heavy chain (wherein a position of the mutation is an amino acid position that is numbered according to the EU index in a human Igγ1 constant region); or

(c) L234A and L235A amino acid mutations (LALA mutations) and a P331G mutation in the heavy chain (wherein positions of the mutations are amino acid positions that are numbered according to the EU index in a human Igγ1 constant region).

4. The anti-MerTK antibody according to claim 3(c) selected from the group consisting of the following (1) to (6):

(1) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 10;

(2) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 12;

(3) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 14;

(4) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 16;

(5) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 18;

and

(6) an anti-MerTK antibody comprising a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8, and a light chain consisting of the amino acid sequence of SEQ ID NO: 20.

5. The anti-MerTK antibody according to any one of claims 1 to 4 which is an IgG antibody (anti-MerTK IgG antibody) or the anti-MerTK antibody or the antigen binding fragment thereof according to claim 1 or 2(a), wherein the antigen binding fragment is a single-chain variable fragment (scFv), a Fab fragment, a Fab' fragment, or a $F(ab')_2$ fragment.

6. The anti-MerTK antibody or the antigen binding fragment thereof according to any one of claims 1 to 5, wherein the anti-MerTK antibody or an antigen-binding fragment thereof is modified post-translationally.

7. A fusion product or a complex of the anti-MerTK antibody or the antigen binding fragment thereof according to any one of claims 1 to 6, or a cell allowed to express the anti-MerTK antibody or the antigen binding fragment thereof according to any one of claims 1 to 6 on the cell surface.

8. A polynucleotide comprising a nucleotide sequence encoding

(a) a heavy chain variable region or a light chain variable region of an anti-MerTK antibody or an antigen binding fragment thereof, the polynucleotide being selected from the group consisting of the following (1) to (7):

(1) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8;

(2) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 10;

(3) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 12;

(4) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 14;
(5) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 16;
(6) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 18; and
(7) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 20; or

(b) a heavy chain or a light chain of an anti-MerTK antibody, the polynucleotide being selected from the group consisting of the following (1) to (7):
(1) a polynucleotide comprising a nucleotide sequence encoding a heavy chain consisting of the amino acid sequence of SEQ ID NO: 8;
(2) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 10;
(3) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 12;
(4) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 14;
(5) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 16;
(6) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 18; and
(7) a polynucleotide comprising a nucleotide sequence encoding a light chain consisting of the amino acid sequence of SEQ ID NO: 20.

9. An expression vector comprising the polynucleotide according to claim 8.

10. A host cell

(a) transformed with the expression vector according to claim 9; or

(b) comprising a polynucleotide selected from the group consisting of the following (1) to (13):

(1) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8;

(2) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 10;

(3) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 12;

(4) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 14;

(5) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 16;

(6) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 18;

(7) a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 20;

(8) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 10;

(9) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 12;

(10) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 109 of SEQ ID NO: 14;
(11) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 16;
(12) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 18; and
(13) a polynucleotide comprising a nucleotide sequence encoding a heavy chain variable region consisting of an amino acid sequence from amino acid positions 1 to 119 of SEQ ID NO: 8, and a polynucleotide comprising a nucleotide sequence encoding a light chain variable region consisting of an amino acid sequence from amino acid positions 1 to 110 of SEQ ID NO: 20.

11. A method for producing an anti-MerTK antibody or an antigen binding fragment thereof, comprising the step of culturing the host cell according to claim 10 so that the anti-MerTK antibody or the antigen binding fragment thereof is expressed.

12. A pharmaceutical composition comprising the anti-MerTK antibody or the antigen binding fragment thereof according to any one of claims 1 to 6, and a pharmaceutically acceptable excipient.

13. The pharmaceutical composition according to claim 12 for use in the prevention and/or the treatment of an eye disease, optionally wherein the eye disease is a retinal disease, optionally wherein the retinal disease is a retinal degenerative disease, optionally wherein the retinal degenerative disease is retinitis pigmentosa or age-related macular degeneration.

14. The anti-MerTK antibody or the antigen binding fragment thereof according to any one of claims 1 to 6 for use in a method for preventing and/or treating an eye disease, optionally wherein the method comprises the step of administering a therapeutically effective amount of the anti-MerTK antibody or the antigen binding fragment thereof to a subject.

15. A bispecific antibody that binds to MerTK and a misfolded protein and/or amyloid, comprising a heavy chain variable region and a light chain variable region of an anti-MerTK antibody, and a heavy chain variable region and a light chain variable region of an antibody that binds to the misfolded protein and/or the amyloid, wherein

the heavy chain variable region of the anti-MerTK antibody comprises CDR1 consisting of the amino acid sequence of SEQ ID NO: 1, CDR2 consisting of the amino acid sequence of SEQ ID NO: 2, and CDR3 consisting of the amino acid sequence of SEQ ID NO: 3, and

the light chain variable region of the anti-MerTK antibody comprises CDR1 consisting of the amino acid sequence of SEQ ID NO: 4, CDR2 consisting of the amino acid sequence of SEQ ID NO: 5, and CDR3 consisting of the amino acid sequence of SEQ ID NO: 6.