## CLAIMS

[Claim 1]

A peptide having an affinity for a human transferrin receptor (a human transferrin receptor affinity peptide), , comprising a variable region of a heavy chain antibody having three complementary determining regions of CDR1, CDR2, and CDR3,

wherein the peptide is selected from the group consisting of the following (1) and (2),

(1) a peptide in which the amino acid sequence of CDR1 is the amino acid sequence set forth in SEQ ID NO: 7 or SEQ ID NO: 8, the amino acid sequence of CDR2 is the amino acid sequence set forth in SEQ ID NO: 9 or SEQ ID NO: 10, and the amino acid sequence of CDR3 is the amino acid sequence set forth in SEQ ID NO: 11 or SEQ ID NO: 12, and

(2) a peptide in which the amino acid sequence of CDR1 is the amino acid sequence set forth in SEQ ID NO: 13 or SEQ ID NO: 14, the amino acid sequence of CDR2 is the amino acid sequence set forth in SEQ ID NO: 15 or SEQ ID NO: 16, and the amino acid sequence of CDR3 is the amino acid sequence set forth in SEQ ID NO: 17 or SEQ ID NO: 18.

[Claim 2]

A human transferrin receptor affinity peptide, which is a peptide selected from the group consisting of the following (1) to (3),

(1) a peptide having 80% or more amino acid sequence identity to the amino acid sequence set forth in SEQ ID NO: 4, and having three complementary determining regions of CDR1, CDR2, and CDR3, which

have the amino acid sequences shown in (1) of Claim 1,

(2) a peptide having 80% or more amino acid sequence identity to the amino acid sequence set forth in SEQ ID NO: 5, and having three complementary determining regions of CDR1, CDR2, and CDR3, which have the amino acid sequences shown in (1) of Claim 1, and

(3) a peptide having 80% or more amino acid sequence identity to the amino acid sequence set forth in SEQ ID NO: 6, and having three complementary determining regions of CDR1, CDR2, and CDR3, which have the amino acid sequences shown in (2) of Claim 1.

[Claim 3]

The human transferrin receptor affinity peptide according to Claim 2, wherein the amino acid sequence identity is 85% or more.

[Claim 4]

The human transferrin receptor affinity peptide according to Claim 2, wherein the amino acid sequence identity is 90% or more.

[Claim 5]

The human transferrin receptor affinity peptide according to Claim 2, wherein the amino acid sequence identity is 95% or more.

[Claim 6]

The human transferrin receptor affinity peptide according to Claim 1, wherein the peptide includes an amino acid sequence selected from the group consisting of (1) to (3),

(1) the amino acid sequence in which 1 to 10 amino acids in the amino acid sequence set forth in SEQ ID NO: 4 are substituted, deleted, or added, and in which the amino acid sequence of CDR1 is the amino acid sequence set forth in SEQ ID NO: 7 or SEQ ID NO: 8, the amino

acid sequence of CDR2 is the amino acid sequence set forth in SEQ ID NO: 9 or SEQ ID NO: 10, and the amino acid sequence of CDR3 is the amino acid sequence set forth in SEQ ID NO: 11 or SEQ ID NO: 12,

(2) an amino acid sequence in which 1 to 10 amino acids in the amino acid sequence set forth in SEQ ID NO: 5 are substituted, deleted, or added, and in which the amino acid sequence of CDR1 is the amino acid sequence set forth in SEQ ID NO: 7 or SEQ ID NO: 8, the amino acid sequence of CDR2 is the amino acid sequence set forth in SEQ ID NO: 9 or SEQ ID NO: 10, and the amino acid sequence of CDR3 is the amino acid sequence set forth in SEQ ID NO: 11 or SEQ ID NO: 12, and

(3) an amino acid sequence in which 1 to 10 amino acids in the amino acid sequence set forth in SEQ ID NO: 6 are substituted, deleted, or added, and in which the amino acid sequence of CDR1 is the amino acid sequence set forth in SEQ ID NO: 13 or SEQ ID NO: 14, the amino acid sequence of CDR2 is the amino acid sequence set forth in SEQ ID NO: 15 or SEQ ID NO: 16, and the amino acid sequence of CDR3 is the amino acid sequence set forth in SEQ ID NO: 17 or SEQ ID NO: 18.

[Claim 7]

The human transferrin receptor affinity peptide according to Claim 6, wherein the number of substituted, deleted, or added amino acids is 1 to 5.

[Claim 8]

The human transferrin receptor affinity peptide according to Claim 6, wherein the number of substituted, deleted, or added amino acids is 1 to 3.

[Claim 9]

The human transferrin receptor affinity peptide according to any one of Claims 1 to 8, wherein the peptide has an affinity for both an extracellular region of a human transferrin receptor and an extracellular region of a monkey transferrin receptor.

[Claim 10]

The human transferrin receptor affinity peptide according to Claim 9, wherein both a dissociation constant with the extracellular region of the human transferrin receptor and a dissociation constant with the extracellular region of the monkey transferrin receptor are $5 \times 10^{-11}$ M to $1 \times 10^{-8}$ M.

[Claim 11]

The human transferrin receptor affinity peptide according to Claim 9, wherein both of dissociation constants with the extracellular region of the human transferrin receptor are $5 \times 10^{-11}$ M to $5 \times 10^{-7}$ M.

[Claim 12]

The human transferrin receptor affinity peptide according to Claim 9, wherein in a case where a value of a dissociation constant with the extracellular region of the human transferrin receptor is designated as 1, a value of a dissociation constant with the monkey transferrin receptor is 1 to 10.

[Claim 13]

The human transferrin receptor affinity peptide according to Claim 9, wherein in a case where a value of a dissociation constant with the extracellular region of the human transferrin receptor is designated as 1, a value of a dissociation constant with the monkey transferrin receptor is 3 to 10.

[Claim 14]

The human transferrin receptor affinity peptide according to Claim 1, wherein the peptide includes the amino acid sequence selected from the group consisting of the amino acid sequences set forth in SEQ ID NO: 4, SEQ ID NO: 5, and SEQ ID NO: 6.

[Claim 15]

A fusion protein of the human transferrin receptor affinity peptide according to any one of Claims 1 to 14 and a different protein (A).

[Claim 16]

The fusion protein according to Claim 15, wherein the human transferrin receptor affinity peptide is bound to the C-terminus or the N-terminus of the different protein (A) directly or via a linker, wherein the linker that links the human transferrin receptor affinity peptide to the different protein (A) is a peptide linker, and wherein the amino acid sequence of the peptide linker is selected from the group consisting of one amino acid, the amino acid sequence Gly-Ser, the amino acid sequence Ser-Ser, the amino acid sequence Gly-Gly-Ser, the amino acid sequence Gly-Gly-Gly, and one of the amino acid sequences set forth in SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21, SEQ ID NO: 22, SEQ ID NO: 23, SEQ ID NO: 24, and SEQ ID NO: 25.

[Claim 17]

The fusion protein according to Claim 15, wherein the human transferrin receptor affinity peptide is bound to the C-terminus or the N-terminus of the different protein (A) directly or via a linker, wherein the linker that links the human transferrin receptor affinity peptide to the

different protein (A) is a peptide linker, and wherein the amino acid sequence of the peptide linker consists of the amino acid sequence in which 2 to 10 amino acid sequences each selected from the group consisting of one amino acid, the amino acid sequence Gly-Ser, the amino acid sequence Ser-Ser, the amino acid sequence Gly-Gly-Ser, the amino acid sequence Gly-Gly-Gly, and the amino acid sequences set forth in SEQ ID NO: 19, SEQ ID NO: 20, and SEQ ID NO: 21 are arranged in series.

[Claim 18]

The fusion protein according to any one of Claims 15 to 17, wherein the different protein (A) is a cytokine, a growth factor, or an antibody drug.

[Claim 19]

The fusion protein according to any one of Claims 15 to 17, wherein the different protein (A) is selected from the group consisting of a brain-derived nerve growth factor (BDNF), a nerve growth factor (NGF), a lysosomal enzyme, a ciliary neurotrophic factor (CNTF), a glial cell line neurotrophic factor (GDNF), a neurotrophin 3, a neurotrophin 4/5, a neurotrophin 6, a neuregulin 1, an erythropoietin, a darbepoietin, an activin, a basic fibroblast growth factor (bFGF), a fibroblast growth factor 2 (FGF2), an epidermal growth factor (EGF), a vascular endothelial growth factor (VEGF), an interferon α, an interferon β, an interferon γ, an interleukin 6, a granulocyte-macrophage colony-stimulating factor (GM-CSF), a granulocyte colony-stimulating factor (G-CSF), a macrophage colony-stimulating factor (M-CSF), a tumor necrosis factor α receptor (TNF-α receptor), a PD-1 ligand, a PD-L1, a

PD-L2, an enzyme having an activity of degrading β-amyloid, an anti-β-amyloid antibody, an anti-BACE antibody, an anti-EGFR antibody, an anti-PD-1 antibody, an anti-PD-L1 antibody, an anti-PD-L2 antibody, an anti-HER2 antibody, an anti-TNF-α antibody, and an anti-CTLA-4 antibody.

[Claim 20]

The fusion protein according to any one of Claims 15 to 17, wherein the different protein (A) is a lysosomal enzyme, and

wherein the lysosomal enzyme is selected from the group consisting of α-L-iduronidase, iduronate-2-sulfatase, acidic α-glucosidase, glucocerebrosidase, β-galactosidase, GM2-activator protein, β-hexosaminidase A, β-hexosaminidase B, N-acetylglucosamine-1-phosphotransferase, α-mannosidase, β-mannosidase, galactosylceramidase, saposin C, arylsulfatase A, α-L-fucosidase, aspartylglucosaminidase, α-N-acetylgalactosaminidase, acidic sphingomyelinase, α-galactosidase A, β-glucuronidase, heparan N-sulfatase, α-N-acetylglucosaminidase, acetyl CoA α-glucosaminide N-acetyltransferase, N-acetylglucosamine-6-sulfatase, acidic ceramidase, amylo-1,6-glucosidase, sialidase, palmitoyl-protein thioesterase-1, tripeptidyl peptidase-1, hyaluronidase-1, CLN1, and CLN2.