Claims

[Claim 1] An isolated peptide binding to an HLA antigen and having cytotoxic T lymphocytes (CTL) inducibility, wherein the peptide is derived from a polypeptide consisting of the amino acid sequence of SEQ ID NO: 18 or an immunologically active fragment thereof.

[Claim 2] The isolated peptide of claim 1, wherein the HLA antigen is HLA-A24 or HLA-A2.

[Claim 3] The isolated peptide of claim 1 or 2, wherein said peptide comprises an amino acid sequence selected from the group consisting of:
(a) SEQ ID NOs: 4, 2, 3, 7 and 12; and
(b) SEQ ID NO: 4, 2, 3, 7 and 12, wherein 1, 2, or several amino acids are substituted, inserted, deleted and/or added.

[Claim 4] The isolated peptide of any one of claims 1 to 3, wherein said peptide has one or both of the following characteristics:
(a) the second amino acid from N-terminus is or is modified to be an amino acid selected from the group consisting of phenylalanine, tyrosine, methionine and tryptophan; and
(b) the C-terminal amino acid is or is modified to be an amino acid selected from the group consisting of phenylalanine, leucine, isoleucine, tryptophan and methionine.

[Claim 5] The isolated peptide of any one of claims 1 to 3, wherein said peptide has one or both of the following characteristics:
(a) the second amino acid from the N-terminus is or is modified to be an amino acid selected from the group consisting of leucine and methionine; and
(b) the C-terminal amino acid is or is modified to be an amino acid selected from the group consisting of valine and leucine.

[Claim 6] The isolated peptide of any one of claims 1 to 5, wherein said peptide is nonapeptide or decapeptide.

[Claim 7] An isolated polynucleotide encoding the peptide of any one of claims 1 to 6.

[Claim 8] A composition for inducing CTL, wherein the composition comprises one or more of the peptide(s) set forth in any one of claims 1 to 6, or one or more of the polynucleotide(s) set forth in claim 7.

[Claim 9] A pharmaceutical composition for the treatment and/or prophylaxis of cancers, and/or the prevention of the postoperative recurrence thereof, wherein the composition comprises one or more of the peptide(s) set

forth in any one of claims 1 to 6, or one or more of the polynucleotide(s) of claim 7.

[Claim 10] The pharmaceutical composition of claim 9 formulated for the administration to a subject whose HLA antigen is HLA-A24 or HLA-A2.

[Claim 11] The pharmaceutical composition of claim 9 or 10 formulated for the treatment of cancer.

[Claim 12] A method for inducing an antigen-presenting cell (APC) with CTL inducibility, wherein the method comprises a step selected from the group consisting of:
(a) contacting an APC with the peptide of any one of claims 1 to 6 in vitro, ex vivo or in vivo, and
(b) introducing a polynucleotide encoding the peptide of any one of claims 1 to 6 into an APC.

[Claim 13] A method for inducing CTL, wherein the method comprises a step selected from the group consisting of:
(a) co-culturing CD8 positive T cells with APCs, which presents on its surface a complex of an HLA antigen and the peptide of any one of claims 1 to 6;
(b) co-culturing CD8 positive T cells with exosomes, which presents on its surface a complex of an HLA antigen and a peptide of any one of claims 1 to 6; and
(c) introducing a gene that comprises a polynucleotide encoding a T cell receptor (TCR) subunit polypeptide capable of binding to the peptide of any one of claims 1 to 6 into a T cell.

[Claim 14] An isolated APC that presents on its surface a complex of an HLA antigen and the peptide of any one of claims 1 to 6.

[Claim 15] The APC of claim 14, which is induced by the method of claim 12.

[Claim 16] An isolated CTL that targets any of the peptides of claims 1 to 6.

[Claim 17] The CTL of claim 16, which is induced by the method of claim 13.

[Claim 18] A method of inducing an immune response against cancer in a subject wherein the method comprises administering to the subject a composition comprising one or more peptide(s) of any one of claims 1 to 6, one or more immunologically active fragment(s) thereof, or one or more polynucleotide(s) encoding the peptide or the fragment.

[Claim 19] An antibody or fragment thereof against any of the peptides of claims 1 to 6.

[Claim 20] A vector comprising a nucleotide sequence encoding any of the peptides of claims 1 to 6.

[Claim 21] A host cell transformed or transfected with an expression vector according to claim 20.

[Claim 22] A diagnostic kit comprising any of the peptides of claims 1 to 6, the polynucleotide of claim 7 or the antibody of claim 19.

Claims

[Claim 1] An isolated peptide of less than 15 amino acids that has cytotoxic T lymphocyte (CTL) inducibility, wherein said peptide comprises an amino acid sequence selected from the group consisting of:
(a) SEQ ID NOs: 4, 2, 3, 7 and 12; and
(b) SEQ ID NOs: 4, 2, 3, 7 and 12, in which 1 or 2 amino acids are substituted and/or added.

[Claim 2] The isolated peptide of claim 1, wherein said peptide has one or both of the following characteristics:
(a) the second amino acid from the N-terminus is or is modified to be an amino acid selected from the group consisting of phenylalanine, tyrosine, methionine and tryptophan; and
(b) the C-terminal amino acid is or is modified to be an amino acid selected from the group consisting of phenylalanine, leucine, isoleucine, tryptophan and methionine.

[Claim 3] The isolated peptide of claim 1, wherein said peptide has one or both of the following characteristics:
(a) the second amino acid from the N-terminus is or is modified to be an amino acid selected from the group consisting of leucine and methionine; and
(b) the C-terminal amino acid is or is modified to be an amino acid selected from the group consisting of valine and leucine.

[Claim 4] The isolated peptide of claim 1, wherein said peptide is a nonapeptide or decapeptide.

[Claim 5] A composition for inducing a CTL, wherein the composition comprises one or more peptide(s) set forth in claim 1.

[Claim 6] A pharmaceutical composition for the treatment of cancers in which CDC45L is overexpressed, wherein the composition comprises one or more peptide(s) set forth in claim 1.

[Claim 7] The pharmaceutical composition of claim 6 formulated for the administration to a subject whose HLA antigen is HLA-A24 or HLA-A2.

[Claim 8] A method for inducing an antigen-presenting cell (APC) with CTL inducibility, wherein the method comprises a step of contacting an APC with the peptide of claim 1 in vitro.

[Claim 9] An in vitro method for inducing a CTL, wherein the method comprises a step of co-culturing a CD8 positive T cell with an APC that presents on its surface a complex of an HLA antigen and the peptide of claim 1.

[Claim 10] A diagnostic kit comprising the peptide of claim 1.