

CLAIMS

1. A method for activating helper T cells, which comprises the step of activating helper T cells by adding a
5 WT1 peptide to antigen presenting cells from a subject positive in respect to any MHC class II molecule selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-
10 DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule, wherein the WT1 peptide has the ability to bind to any MHC class II molecule of an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803
15 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule, and wherein the WT1 peptide is:

- (a) a peptide consisting of the amino acid sequence of SEQ
20 ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or
(b) a peptide of (a) wherein the amino acid sequence of SEQ ID NO:2 has substitution, deletion or addition of one to five amino acids or a modification thereof.

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2. The method according to claim 1, wherein the WT1 peptide has the ability to bind to at least two MHC class II molecules selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-
30 DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-

DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule.

3. The method according to claim 1 or 2, wherein the
5 addition of a WT1 peptide to antigen presenting cells is carried out by adding the WT1 peptide, a polynucleotide encoding the WT1 peptide, an expression vector containing the polypeptide, or cells containing the expression vector.
- 10 4. A composition containing a WT1 peptide when used for activating helper T cells by adding the WT1 peptide to antigen presenting cells from a subject positive in respect to any MHC class II molecule selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406
15 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule, wherein the WT1 peptide has the ability to bind to any MHC class II
20 molecule selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule, and wherein the WT1 peptide is:
25 (a) a peptide consisting of the amino acid sequence of SEQ ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or
(b) a peptide of (a) wherein the amino acid sequence of
30 SEQ ID NO:2 has substitution, deletion or addition of one to five amino acids or a modification thereof.

5. The composition according to claim 4, wherein the WT1 peptide has the ability to bind to at least two MHC class II molecules selected from an HLA-DRB1*0101 molecule, an
5 HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule.

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6. The composition according to claim 4 or 5, wherein the addition of a WT1 peptide to antigen presenting cells is carried out by adding a WT1 peptide, a polynucleotide encoding the WT1 peptide, an expression vector containing
15 the polynucleotide, or cells containing the expression vector.

7. The composition according to any one of claims 4 to 6, wherein the WT1 peptide is a peptide consisting of the
20 amino acid sequence: Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His (SEQ ID NO:2).

8. Isolated antigen presenting cells from a subject positive in respect to any MHC class II molecule selected
25 from an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, and an HLA-DPB1*0301 molecule which present a complex of an antigen peptide containing a WT1 peptide with an MHC class
30 II molecule, wherein the MHC class II molecule is any MHC class II molecule selected from an HLA-DRB1*0403 molecule,

an HLA-DRB1*0406 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, and an HLA-DPB1*0301 molecule, and wherein the WT1 peptide is:

- 5 (a) a peptide consisting of the amino acid sequence of SEQ ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or
- (b) a peptide of (a) wherein the amino acid sequence of SEQ ID NO:2 has substitution, deletion or addition of
- 10 one to five amino acids or a modification thereof.

9. Isolated helper T cells which recognize a complex of an antigen peptide containing a WT1 peptide with an MHC class II molecule, wherein the MHC class II molecule is any

15 MHC class II molecule selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201

20 molecule and an HLA-DPB1*0301 molecule, and wherein the WT1 peptide is:

- (a) a peptide consisting of the amino acid sequence of SEQ ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or
- 25 (b) a peptide of (a) wherein the amino acid sequence of SEQ ID NO:2 has substitution, deletion or addition of one to five amino acids or a modification thereof.

10. Isolated cytotoxic T cells which have been activated

30 by the helper T cells according to claim 9.

11. A pharmaceutical composition when used for treating or preventing a cancer from a subject positive in respect to any MHC class II molecule selected from an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule, an HLA-DRB4*0101 molecule, an HLA-DPB1*0201 molecule and an HLA-DPB1*0301 molecule, comprising, as an active ingredient, (i) any of the compositions according to any one of claims 4 to 7, (ii) the antigen presenting cells according to claim 8, (iii) the helper T cells according to claim 9, or (iv) the cytotoxic T cells according to claim 10.

12. A pharmaceutical composition when used for activating cytotoxic T cells, comprising, as an active ingredient, any of a WT1 peptide, a polynucleotide encoding the WT1 peptide, an expression vector containing the polynucleotide, or cells containing the expression vector, and which is administered to a subject having any MHC class II molecule of an HLA-DPB1*0201 molecule, an HLA-DPB1*0301 molecule, an HLA-DRB1*1502 molecule, an HLA-DRB1*0405 molecule, an HLA-DRB1*0101 molecule, an HLA-DRB1*0403 molecule, an HLA-DRB1*0406 molecule, an HLA-DRB1*0803 molecule, an HLA-DRB1*0901 molecule, an HLA-DRB1*1101 molecule, an HLA-DRB3*0202 molecule or an HLA-DRB4*0101 molecule, and wherein the WT1 peptide is:

(a) a peptide consisting of the amino acid sequence of SEQ ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or

(b) a peptide of (a) wherein the amino acid sequence of SEQ ID NO:2 has substitution, deletion or addition of one to five amino acids or a modification thereof.

5 13. A method for determining the presence or amount of WT1 specific helper T cells in a subject positive in respect to any MHC class II molecule selected from an HLA-DRB1*0101, HLA-DRB1*0403, HLA-DRB1*0406, HLA-DRB1*0803, HLA-DRB1*0901, HLA-DRB1*1101, HLA-DRB3*0202, HLA-DRB4*0101, HLA-DPB1*0201
10 molecule and an HLA-DPB1*0301 molecule, the method comprising the steps of:

(a) stimulating a sample obtained from the subject using a WT1 peptide, and wherein the WT1 peptide is:

(i) a peptide consisting of the amino acid sequence
15 of SEQ ID NO:2 (Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met His Ser Arg Lys His); or

(ii) a peptide of (a) wherein the amino acid sequence of SEQ ID NO:2 has substitution, deletion or addition of one to five amino acids or a
20 modification thereof, and

(b) determining the presence or amount of cytokines or helper T cells, wherein the increase of the presence or amount of cytokines or helper T cells shows the presence or amount of the WT1-specific helper T cells.

25 14. A method according to claim 1 or claim 13, a composition according to claim 4, claim 11 or claim 12, an antigen presenting cell according to claim 8, a helper T cell according to claim 9, or a cytotoxic T cell according to claim 10, substantially as hereinbefore described with
30 reference to the Examples and the accompanying drawings.