

CLAIMS

1. A recombinant or synthetic peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: ~~3924~~, SEQ ID No: 1 to SEQ ID NO: ~~3823~~, and SEQ ID NO: ~~40-25~~ to SEQ ID NO: 228, wherein the peptide has an overall length of up to 14 amino acids, and wherein the peptide has the ability to bind to an MHC class-I or -II molecule.
2. A pharmaceutically acceptable salt of a peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: ~~3924~~, SEQ ID No: 1 to SEQ ID NO: ~~3823~~, and SEQ ID NO: ~~40-25~~ to SEQ ID NO: 228, wherein the peptide has an overall length of up to 14 amino acids, and wherein the peptide has the ability to bind to an MHC class-I or -II molecule.
3. The pharmaceutically acceptable salt of claim 2, wherein the salt is a chloride, a bromide, a iodide, a phosphate, a sulphate, a nitrate, a chlorate, a thiocyanate, an ammonium salt, a potassium salt, a sodium salt, a magnesium salt, a calcium salt, a lithium salt, a Zn^{2+} salt, a Cu^{2+} salt, a caesium salt, a manganese salt, a rubidium salt or a Ba^{2+} salt, an acetate, a trifluoroacetate, a propionate, a glycolate, a pyruvate, an oxalate, a malate, a maleate, a malonate, a succinate, a fumarate, a tartrate, a citrate, a benzoate, a cinnamate, a mandelate, a methane sulfonate, an ethane sulfonate, p-toluenesulfonate, a salicylate or a trimethylamine salt.
4. The recombinant or synthetic peptide of claim 1 or the pharmaceutically acceptable salt of claim 2 or 3, wherein the peptide consists of the amino acid sequence according to any of SEQ ID NO: ~~3924~~, SEQ ID No: 1 to SEQ ID NO: ~~3823~~, and SEQ ID NO: ~~40-25~~ to SEQ ID NO: 228.
5. A peptide comprising the amino acid sequence selected from the group consisting of SEQ ID NO: ~~3924~~, SEQ ID No: 1 to SEQ ID NO: ~~3823~~, and SEQ ID NO: ~~40-25~~ to SEQ ID NO: 228, or a pharmaceutically acceptable salt thereof, for use in therapy, wherein the peptide has an overall length of up to 14 amino acids, and wherein the peptide has the ability to bind to an MHC class-I or -II molecule.
6. The recombinant or synthetic peptide of claim 1 or 4, the pharmaceutically acceptable salt of any of claims 2 to 4 or the peptide for use of claim 5, wherein the peptide, when

bound to molecule(s) of the major histocompatibility complex (MHC), is capable of being recognized by CD4 and/or CD8 T cells.

7. The recombinant or synthetic peptide of any of claims 1, 4 or 6, or the peptide for use according to claim 5 or 6, wherein the peptide is modified and/or includes non-peptide bonds.
8. A fusion protein, comprising a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, having an overall length of up to 14 amino acids, and N-terminal amino acids of the HLA-DR antigen-associated invariant chain (Ii).
9. A binding molecule that specifically binds to a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, having an overall length of up to 14 amino acids, or to the peptide defined in any of claims 4 to 6 when bound to an MHC molecule.
10. The binding molecule of claim 9, being (i) an antibody, in particular a soluble or membrane-bound antibody, or (ii) a T-cell receptor that is reactive with an HLA ligand, wherein the ligand is a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228 and has an overall length of up to 14 amino acids.
11. The binding molecule of claim 10, wherein (i) the antibody is a monoclonal antibody, a chimeric antibody and/or a humanized antibody, or a fragment thereof, (ii) the antibody binds to said peptide when bound to an MHC molecule and is a bi-specific antibody or a fragment thereof and/or (iii) wherein the T-cell receptor is soluble or membrane-bound.
12. The binding molecule of claim 10 or 11, wherein the T-cell receptor is provided as a soluble molecule and carries a further effector function such as an immune stimulating domain or toxin.
13. A nucleic acid, encoding the peptide defined in any one of claims 1, 4 or 6 or the binding molecule of any of claims 10 to 12, optionally linked to a heterologous promoter sequence, or an expression vector comprising the nucleic acid.

14. A recombinant host cell comprising the peptide defined in any of claims 1, 4 or 6, or the nucleic acid or expression vector according to claim 13.
- 5 15. The recombinant host cell of claim 14, wherein (i) the host cell comprises the peptide defined in any of claims 1, 4 or 6 or a nucleic acid encoding the same, wherein the host cell is an antigen presenting cell such as a dendritic cell, or (ii) the host cell comprises a nucleic acid encoding the binding molecule of any of claims 10 to 12, wherein the host cell is a T cell or an NK cell.
- 10 16. An *in vitro* method for producing activated T lymphocytes, the method comprising contacting *in vitro* T cells with antigen loaded human class I or II MHC molecules expressed on the surface of a suitable antigen-presenting cell or an artificial construct mimicking an antigen-presenting cell for a period of time sufficient to activate the T cells in an antigen specific manner, wherein the antigen is a peptide defined in any one of
15 claims 1, 4 or 6.
17. An activated T lymphocyte, produced by the method according to claim 16, that selectively recognizes a cell which presents a polypeptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, and that has an overall length of up to 14 amino acids.
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18. Use of a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, wherein the peptide has an overall length of up to 14 amino acids, or a pharmaceutically acceptable salt thereof, of the nucleic acid or expression vector of claim 12, of the recombinant host cell of claim 13 or 14, of an activated T lymphocyte of claim 16 or of the binding molecule of any of claims 10 to 12 in the manufacture of a medicament for the treatment of cancer.
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- 30 19. A peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, wherein the peptide has an overall length of up to 14 amino acids or a pharmaceutically acceptable salt thereof, the nucleic acid or expression vector of claim ~~12~~13, the recombinant host cell of claim ~~13~~14 or ~~14~~15, the activated T lymphocyte of claim 17 or the binding molecule of
35 any of claims 9 to 12 for use in diagnosis and/or treatment of cancer.

20. The use of claim 18, or the peptide, nucleic acid, expression vector, host cell, activated T lymphocyte or binding molecule for use of claim 19, wherein the cancer is selected from the group of glioblastoma (GB), breast cancer (BRCA), colorectal cancer (CRC), renal cell carcinoma (RCC), chronic lymphocytic leukaemia (CLL), hepatocellular carcinoma (HCC), non-small cell and small cell lung cancer (NSCLC, SCLC), Non-Hodgkin lymphoma (NHL), acute myeloid leukaemia (AML), ovarian cancer (OC), pancreatic cancer (PC), prostate cancer (PCA), oesophageal cancer including cancer of the gastric-oesophageal junction (OSCAR), gallbladder cancer and cholangiocarcinoma (GBC, CCC), melanoma (MEL), gastric cancer (GC), urinary bladder cancer (UBC), and uterine cancer (UEC) and other tumours that show an over-presentation of a peptide comprising the sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, which peptide has an overall length of up to 14 amino acids.

21. The use, or the peptide, nucleic acid, expression vector, host cell, activated T lymphocyte or binding molecule for use of claim 19, wherein the treatment is a cellular therapy.

22. A pharmaceutical composition comprising at least one active ingredient selected from a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, wherein the peptide has an overall length of up to 14 amino acids or a pharmaceutically acceptable salt thereof, the binding molecule of any of claims 9 to 12, the nucleic acid or the expression vector according to claim 13, the recombinant host cell according to claim 14 or 15, or the activated T lymphocyte of claim 17, or a conjugated or labelled active ingredient, and a pharmaceutically acceptable carrier.

23. The pharmaceutical composition of claim 22, wherein (i) the pharmaceutical composition further comprises pharmaceutically acceptable excipients and/or stabilizers, and/or (ii) wherein the pharmaceutical composition is a vaccine.

24. A kit comprising:

- (a) a container comprising a pharmaceutical composition containing a peptide comprising the amino acid sequence of one of SEQ ID NO: ~~39~~24, SEQ ID No: 1 to SEQ ID NO: ~~38~~23, and SEQ ID NO: ~~40~~25 to SEQ ID NO: 228, wherein the peptide has

an overall length of up to 14 amino acids or a pharmaceutically acceptable salt thereof, the binding molecule of any of claims 9 to 12, the nucleic acid or expression vector of claim 13, the recombinant host cell of claim 14 or 15, the activated T lymphocyte of claim 17, in solution or in lyophilized form;

5 (b) optionally, a second container containing a diluent or reconstituting solution for the lyophilized formulation; and

(c) optionally, at least one further peptide of an overall length of up to 14 amino acids, the further peptide being selected from the group consisting of SEQ ID NO: ~~39~~24, SEQ ID NO: 1 to SEQ ID No: ~~38~~23, SEQ ID No: ~~40~~25 to SEQ ID NO: 302, SEQ ID NO: 305, and SEQ ID NO: 306.

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