

CLAIMS

1. A peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: 256, SEQ ID NO: 8, SEQ ID NO: 21, SEQ ID NO: 231, SEQ ID NO: 104, SEQ ID NO: 255, SEQ ID NO: 100, SEQ ID NO: 156, SEQ ID NO: 102, SEQ ID NO: 101, SEQ ID NO: 170, SEQ ID NO: 1 to SEQ ID NO: 7, SEQ ID NO: 9 to SEQ ID NO: 20, SEQ ID NO: 21 to SEQ ID NO: 99, SEQ ID NO: 103, SEQ ID NO: 105 to SEQ ID NO: 155, SEQ ID NO: 157 to SEQ ID NO: 169, SEQ ID NO: 171 to SEQ ID NO: 230, SEQ ID NO: 232 to SEQ ID NO: 254, and SEQ ID NO: 257 to SEQ ID NO: 268, or a pharmaceutically acceptable salt thereof, wherein the peptide has an overall length of up to 30 amino acids.
2. The peptide of claim 1, wherein the peptide has the ability to bind to an MHC class-I or -II molecule, and wherein the peptide, when bound to said MHC, is capable of being recognized by CD4 and/or CD8 T cells.
3. The peptide of any of claims 1 to 3, wherein the peptide has an overall length of 8 to 16 amino acids, or wherein the peptide consists or consists essentially of an amino acid sequence according to any of SEQ ID NO: 256, SEQ ID NO: 8, SEQ ID NO: 21, SEQ ID NO: 231, SEQ ID NO: 104, SEQ ID NO: 255, SEQ ID NO: 100, SEQ ID NO: 156, SEQ ID NO: 102, SEQ ID NO: 101, SEQ ID NO: 170, SEQ ID NO: 1 to SEQ ID NO: 7, SEQ ID NO: 9 to SEQ ID NO: 20, SEQ ID NO: 21 to SEQ ID NO: 99, SEQ ID NO: 103, SEQ ID NO: 105 to SEQ ID NO: 155, SEQ ID NO: 157 to SEQ ID NO: 169, SEQ ID NO: 171 to SEQ ID NO: 230, SEQ ID NO: 232 to SEQ ID NO: 254, and SEQ ID NO: 257 to SEQ ID NO: 268.
4. The peptide of any of Claims 1 to 3, wherein said peptide is modified and/or includes non-peptide bonds.
5. The peptide of any of Claims 1 to 4, wherein said peptide is comprised in a fusion protein, in particular comprising N-terminal amino acids of the HLA-DR antigen-associated invariant chain (Ii).
6. A binding molecule that specifically recognizes the peptide of any of claims 1 to 4, or the peptide of any of claims 1 to 4 when bound to an MHC molecule.
7. The binding molecule of claim 6, 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 the peptide of any of claims 1 to 4, or the peptide of any of claims 1 to 4 when bound to an MHC molecule.

8. The binding molecule of claim 7, wherein the antibody is a monoclonal antibody or a fragment thereof and/or wherein the T-cell receptor is soluble or membrane-bound.

9. The binding molecule of claim 8, 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.

10. A nucleic acid, encoding for the peptide of any of claims 1 to 4, a binding molecule of any of claims 6 to 9, optionally linked to a heterologous promoter sequence, or an expression vector expressing said nucleic acid.

11. A recombinant host cell comprising the peptide according to any one of claims 1 to 5, the binding molecule according to any of claims 6 to 9, or the nucleic acid or the expression vector according to claim 10, wherein said host cell optionally is selected from an antigen presenting cell, such as a dendritic cell, a T cell or an NK cell.

12. 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 according to any of claims 1 to 3.

13. An activated T lymphocyte, produced by the method according to claim 12, that selectively recognizes a cell which presents a polypeptide comprising an amino acid sequence given in any one of claims 1 to 3.

14. A pharmaceutical composition comprising at least one active ingredient selected from the group consisting of the peptide of any of claims 1 to 5, the binding molecule of any of claims 6 to 9, the nucleic acid or the expression vector according to claim 10, the recombinant host cell according to claim 11, or the activated T lymphocyte according to claim 13, or a conjugated or labelled active ingredient, and a pharmaceutically acceptable carrier.

15. The pharmaceutical composition of claim 14, wherein (i) the pharmaceutical composition further comprises pharmaceutically acceptable excipients and/or stabilizers, and/or (ii) wherein the pharmaceutical composition is a vaccine.

5 16. A method for producing the peptide of any of claims 1 to 5, or the binding molecule of any of claims 6 to 9, the method comprising culturing the recombinant host cell according to claim 11, and isolating the peptide, or the binding molecule from said host cell and/or its culture medium.

10 17. The peptide according to any of claims 1 to 5, the binding molecule according to any of claims 6 to 9, the nucleic acid or the expression vector according to claim 10, the recombinant host cell according to claim 11, or the activated T lymphocyte according to claim 13 for use in diagnosis and/or treatment of cancer.

15 18. Use of the peptide according to any of claims 1 to 5, the binding molecule according to any of claims 6 to 9, the nucleic acid or the expression vector according to claim 10, the recombinant host cell according to claim 11, or the activated T lymphocyte according to claim 13 in the manufacture of a medicament for treatment of cancer.

20 19. The use of claim 18, wherein the treatment is a cellular therapy.

20. The use of claim 18, wherein said cancer is selected from the group of colorectal cancer, glioblastoma, gastric cancer, hepatocellular carcinoma, renal cell carcinoma, chronic lymphocytic leukaemia, chronic myeloid leukaemia and acute myeloid leukaemia, and
25 other lymphoid neoplasms, for example, Non-Hodgkin lymphoma, post-transplant lymphoproliferative disorders (PTLD) as well as other myeloid neoplasms, such as primary myelofibrosis, essential thrombocytopenia, polycythaemia vera, as well as other neoplasms such as oesophageal cancer, non-small cell lung cancer, small cell lung cancer, pancreatic cancer, prostate cancer, melanoma, breast cancer, gallbladder cancer and
30 cholangiocarcinoma, urinary bladder cancer, uterine cancer, head and neck squamous cell carcinoma, mesothelioma and other tumours that show an over-expression of a protein from which a peptide comprising an amino acid sequence selected from SEQ ID NO: 256, SEQ ID NO: 8, SEQ ID NO: 21, SEQ ID NO: 231, SEQ ID NO: 104, SEQ ID NO: 255, SEQ ID NO: 100, SEQ ID NO: 156, SEQ ID NO: 102, SEQ ID NO: 101, SEQ ID NO:
35 170, one of SEQ ID NO: 1 to SEQ ID NO: 7, one of SEQ ID NO: 9 to SEQ ID NO: 20, one of SEQ ID NO: 21 to SEQ ID NO: 99, SEQ ID NO: 103, one of SEQ ID NO: 105 to SEQ ID NO: 155, one of SEQ ID NO: 157 to SEQ ID NO: 169, one of SEQ ID NO: 171 to SEQ ID NO: 230, one of SEQ ID NO: 232 to SEQ ID NO: 254, or one of SEQ ID NO: 257 to SEQ ID NO: 268 is derived.

21. A kit comprising:

(a) a container comprising a pharmaceutical composition containing the peptide of any of claims 1 to 5, the binding molecule of any of claims 6 to 9, the nucleic acid or the expression vector according to claim 10, the host cell according to claim 11, or the activated T lymphocyte according to claim 13, in solution or in lyophilized form;

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

(c) optionally, at least one more peptide selected from the group consisting of SEQ ID NO: 1 to SEQ ID NO: 268, and

(d) optionally, instructions for (i) use of the solution or (ii) reconstitution and/or use of the lyophilized formulation,

wherein the kit optionally further comprising one or more of (iii) a buffer, (iv) a diluent, (v) a filter, (vi) a needle, or (v) a syringe.