

CLAIMS

1. A peptide comprising an amino acid sequence selected from the group consisting of SEQ ID No: 1 to SEQ ID No. 228, or a pharmaceutically acceptable salt thereof, wherein the peptide has an overall length of up to 14 amino acids, and
5 wherein the peptide has the ability to bind to an MHC class-I or -II molecule.
2. The peptide of claim 1, wherein the peptide comprises the amino acid sequence of SEQ ID NO: 32, of SEQ ID NO: 24, of SEQ ID NO: 39, of SEQ ID NO: 72, of SEQ ID NO: 106, of SEQ ID NO: 149, of SEQ ID NO: 154 or of SEQ ID NO: 220.
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3. The peptide of claim 1 or 2, 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.
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4. The peptide of any of claims 1 to 3, wherein the peptide consists or consists essentially of an amino acid sequence according to any of SEQ ID No. 1 to SEQ ID No. 228.
5. The peptide according to any of Claims 1 to 3, wherein the peptide is modified and/or includes non-peptide bonds.
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6. The peptide according to 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).
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7. A binding molecule that specifically binds to the peptide of any of claims 1 to 4, or to the peptide of any of claims 1 to 5 when bound to an MHC molecule.
8. The binding molecule of claim 7, 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 has an amino acid sequence selected from the group consisting of SEQ ID No: 1 to SEQ ID No. 228.
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9. The binding molecule of claim 8, wherein (i) the antibody binds to said peptide when bound to an MHC molecule and is a monoclonal antibody, a bi-specific antibody and/or a
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chimeric antibody or a fragment thereof and/or (ii) wherein the T-cell receptor is soluble or membrane-bound.

10. The binding molecule of claim 8 or 9, 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.

11. A nucleic acid, encoding a peptide of any one of claims 1 to 4 or the binding molecule of claim 8 or 9, optionally linked to a heterologous promoter sequence, or an expression vector capable of expressing the nucleic acid.

12. A recombinant host cell comprising the peptide according to any of claims 1 to 6, or the nucleic acid or expression vector according to claim 11.

13. The recombinant host cell of claim 9, wherein (i) the host cell comprises the peptide according to any of claims 1 to 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 claim 8 or 9, wherein the host cell is a T cell or an NK cell.

14. 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 one of claims 1 to 4.

15. Use of a peptide according to any one of claims 1 to 6, the nucleic acid or expression vector according to claim 11, the host cell according to claim 12 or 13, an activated T lymphocyte obtained by the method of claim 14 or the binding molecule according to claim 8 or 9 in the manufacture of a medicament against cancer.

16. The peptide of any of claims 1 to 6, the nucleic acid or expression vector of claim 11, the host cell of claim 12 or 13, an activated T lymphocyte obtained by the method of claim 14 or the binding molecule of claim 8 or 9 for use in diagnosis and/or treatment of cancer.

17. The use according to claim 15, or the peptide, nucleic acid, expression vector, host cell, activated T lymphocyte or binding molecule for use according to claim 16, wherein the cancer is selected from the group of glioblastoma (GB), breast cancer (BRCA), colorectal cancer (CRC), renal cell carcinoma (RCC), chronic lymphocytic leukemia (CLL), hepatocellular carcinoma (HCC), non-small cell and small cell lung cancer (NSCLC, SCLC), Non-Hodgkin lymphoma (NHL), acute myeloid leukemia (AML), ovarian cancer (OC), pancreatic cancer (PC), prostate cancer (PCA), esophageal cancer including cancer of the gastric-esophageal junction (OSCAR), gallbladder cancer and cholangiocarcinoma (GBC, CCC), melanoma (MEL), gastric cancer (GC), urinary bladder cancer (UBC), and uterine cancer (UEC) and other tumors that show an overexpression of a protein from which a peptide SEQ ID No. 1 to SEQ ID No. 289, SEQ ID No. 305, or SEQ ID No. 306 is derived.
18. The use, or the peptide, nucleic acid, expression vector, host cell, activated T lymphocyte or binding molecule for use of claim 17, wherein the treatment is a cellular therapy.
19. A kit comprising:
- (a) a container comprising a pharmaceutical composition containing the peptide according to any one of claims 1 to 6, the binding molecule of any of claims 8 or 9, the nucleic acid or expression vector according to claim 11, the host cell according to claim 12 or 13, an activated T lymphocyte obtained by the method of claim 14, in solution or in lyophilized form;
- (b) optionally, a second container containing a diluent or reconstituting solution for the lyophilized formulation; and
- (c) optionally, at least one further peptide, the further peptide being selected from the group consisting of SEQ ID No. 1 to SEQ ID No. 302, SEQ ID No. 305, and SEQ ID No. 306.
20. A pharmaceutical composition comprising at least one active ingredient selected from the group consisting of
- a) the peptide of claim 1;
- b) a T-cell receptor reactive with a peptide and/or the peptide-MHC complex according to a);

- c) a fusion protein comprising a peptide according to a), and the N-terminal amino acids 1 to 80 of the HLA-DR antigen-associated invariant chain (Ii);
- d) a nucleic acid encoding for any of a) to c) or an expression vector comprising said nucleic acid,
- 5 e) a host cell comprising the expression vector of d);
- f) an activated T-lymphocyte, obtained by a method comprising contacting in vitro T cells with a peptide according to a) expressed on the surface of a suitable antigen presenting cell for a period of time sufficient to activate said T cell in an antigen specific manner, as well as a method to transfer these activated T cells into the autologous or
- 10 other patients;
- g) an antibody, or soluble T-cell receptor, reactive to a peptide and/or the peptide – MHC complex according to a) and/or a cell presenting a peptide according to a), and potentially modified by fusion with for example immune-activating domains or toxins,
- i) a conjugated or labelled peptide or scaffold according to any of a) to g),
- 15 and a pharmaceutically acceptable carrier, and optionally, pharmaceutically acceptable excipients and/or stabilizers.