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— *with sequence listing part of description (Rule 5.2(a))*

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22 November 2018 (22.11.2018)

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(54) Title: PEPTIDES AND COMBINATION OF PEPTIDES FOR USE IN IMMUNOTHERAPY AGAINST LEUKEMIAS AND OTHER CANCERS

(57) Abstract: The present invention relates to peptides, proteins, nucleic acids and cells for use in immunotherapeutic methods. In particular, the present invention relates to the immunotherapy of cancer. The present invention furthermore relates to tumor- associated T-cell peptide epitopes, alone or in combination with other tumor-associated peptides that can for example serve as active pharmaceutical ingredients of vaccine compositions that stimulate anti-tumor immune responses, or to stimulate T cells ex vivo and transfer into patients. Peptides bound to molecules of the major histocompatibility complex (MHC), or peptides as such, can also be targets of antibodies, soluble T-cell receptors, and other binding molecules.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K39/00 C07K14/47 G01N33/50 A61P35/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61K C07K G01N A61P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, Sequence Search, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE UniParc [Online] 7 May 2011 (2011-05-07), XP002783030, Database accession no. UPI00020AB3F1 the whole document ----- DATABASE UniParc [Online] 15 January 2013 (2013-01-15), XP002783031, Database accession no. UPI0002ADAAFF the whole document ----- -/--	1
A		1

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2018	11/10/2018

Name and mailing address of the ISA/	Authorized officer
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2

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/059114

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/077836 A2 (CORIXA CORP [US]; GAIGER ALEXANDER [US]; ALGATE PAUL A [US]; MANNION J) 25 September 2003 (2003-09-25)	1
Y	example 7; sequences 10460,10461 sequence 11119 sequences 11084,11102 example 6	2-23

Y	WO 2016/207164 A2 (IMMATICS BIOTECHNOLOGIES GMBH [DE]) 29 December 2016 (2016-12-29) the whole document	2-23

Y	WO 2015/193359 A2 (IMMATICS BIOTECHNOLOGIES GMBH [DE]) 23 December 2015 (2015-12-23) the whole document	2-23

2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2018/059114

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23(partially)

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23(partially)

A peptide comprising SEQ ID NO:1, SEQ ID 86, or SEQ ID No:238 and a variant sequence thereof which is at least 88% homologous to SEQ ID NO:1, SEQ ID 86, or SEQ ID No:238 and wherein said variant binds to molecule(s) of the major histocompatibility complex (MHC) and/or induces T cells cross-reacting with said variant peptide; wherein said peptide is not a full length polypeptide. The invention also concerns the following in relation to SEQ ID NO:1, SEQ ID 86, or SEQ ID No:238: a nucleic acid encoding a peptide according to claim 1, an expression vector, a recombinant host cell, a method for producing a peptide, an in-vitro method for producing activated T lymphocytes, T lymphocytes, a method for killing target cells, an antibody, the use of the above in cancer treatment, a kit, an aptamer, a T-cell receptor and a pharmaceutical composition.

2-277. claims: 1-23(partially)

A peptide comprising SEQ ID NO:2-85,87-237,239-279 and a variant sequence thereof which is at least 88% homologous to SEQ ID NO:2-85,87-237,239-279, and wherein said variant binds to molecule(s) of the major histocompatibility complex (MHC) and/or induces T cells cross-reacting with said variant peptide; wherein said peptide is not a full length polypeptide. The invention also concerns the following in relation to SEQ ID NO:2-85,87-237,239-279 : a nucleic acid encoding a peptide according to claim 1, an expression vector, a recombinant host cell, a method for producing a peptide, an in-vitro method for producing activated T lymphocytes, T lymphocytes, a method for killing target cells, an antibody, the use of the above in cancer treatment, a kit, an aptamer, a T-cell receptor and a pharmaceutical composition.

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278. claims: 24-32

A method for producing a personalized anti-cancer vaccine comprising identifying TUMAPs presented by a tumor sample and comparing the peptides identified with a warehouse of peptides that have been prescreened for immunogenicity and/or over presentation in tumors as compared to normal tissues.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/059114

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