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Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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

(88) **Date of publication of the international search report**:
16 February 2017

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(54) **Title**: NOVEL PEPTIDES AND COMBINATION OF PEPTIDES FOR USE IN IMMUNOTHERAPY AGAINST ESOPHAGEAL CANCER 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
PCT/EP2016/065812

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07K14/47 C07K14/635 A61K39/00
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)
C07K A61K

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, BIOSIS, CHEM ABS Data, EMBASE, 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	WO 2008/013934 A2 (CELL SIGNALING TECHNOLOGY INC [US]; POLAKIEWICZ ROBERTO [US]; LEE KIMB) 31 January 2008 (2008-01-31)	1-6,10, 15-20, 36,38,39
Y	claims 1-4, 11, 12, 22,23; sequences 49, 52	7-9, 11-14, 30-35,37

Y	WO 2007/028573 A1 (IMMATICS BIOTECHNOLOGIES GMBH [DE]; SINGH HARPREET [DE]; EMMERICH NIEL) 15 March 2007 (2007-03-15) claims 1-36	7-9, 11-14, 30-35,37

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[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

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"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
21 December 2016	10/01/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schwachtgen, J

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

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FABIO RIZZOLO ET AL: "Conventional and microwave-assisted SPPS approach: a comparative synthesis of PTHrP(1-34)NH2", JOURNAL OF PEPTIDE SCIENCE., vol. 17, no. 10, 1 October 2011 (2011-10-01), pages 708-714, XP055330373, GB ISSN: 1075-2617, DOI: 10.1002/psc.1395 table 1	1-6
X	US 2005/033023 A1 (CORREALE PIERPAOLO [IT] ET AL) 10 February 2005 (2005-02-10) paragraph [0059]; claims 1-28; table 3; sequence 3	1-20, 30-39
A	ANDREA KIESSLING ET AL: "Tumor-Associated Antigens for Specific Immunotherapy of Prostate Cancer", CANCERS, vol. 4, no. 4, 22 February 2012 (2012-02-22), pages 193-217, XP055330776, DOI: 10.3390/cancers4010193 page 194, paragraph 2 - page 195, paragraph 3 page 200, paragraph 2 - paragraph 4	1-20, 30-39

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2016/065812

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.:

1-20, 30-39(all partially)

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.:

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: 1-20, 30-39(all partially)

A peptide comprising an amino acid sequence consisting of SEQ ID No. 1 and variant sequences thereof which are at least 88% homologous to SEQ ID No. 1, 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; and a pharmaceutical acceptable salt thereof, wherein said peptide is not a full-length polypeptide. Subject-matter related thereto.

2-93. claims: 1-20, 30-39(all partially)

Idem to invention 1 but relating to each of SEQ ID NO: 2-640

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94. claims: 21-29

A method for producing a personalized anti-cancer vaccine for a compound-based and/or cellular therapy for an individual patient, said method comprising:a) identifying tumor-associated peptides (TUMAPs) presented by a tumor sample from said individual patient;b) comparing the peptides as identified in a) with a warehouse of peptides that have been pre-screened for immunogenicity and/or over-presentation in tumors as compared to normal tissuesc) selecting at least one peptide from the warehouse that matches a TUMAP identified in the patient; andd) manufacturing and/or formulating sid personalized vaccine based on step c).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2016/065812

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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