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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:

14 March 2013

(54) Title: MATERIALS AND METHODS FOR MODULATING IMMUNE RESPONSES

(57) Abstract: The present invention provides materials and methods for modulating an immune response. In one embodiment, the present invention provides an initial artificial lymph-node homing environment, and a simultaneous, or subsequent, artificial spleen environment leading to the resolution of the activated immune responses. In one specific embodiment, the present invention can be used to prevent and/or treat pathogenic infection, cancer, allergenic reactions, and/or unwanted immune or auto-immune responses.



A. CLASSIFICATION OF SUBJECT MATTER

A61K 39/39(2006.01)i, A61K 38/19(2006.01)i, A61K 38/17(2006.01)i, A61K 39/35(2006.01)i, A61P 37/00(2006.01)i, A61P 29/00(2006.01)i

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 39/39

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)

eKOMPASS(KIPO internal) & Keywords: pro-inflammatory agent, anti-inflammatory agent, antigen, biocompatible, scaffold matrix, hydrogel, immuno-modulating, GM-CSF, microparticle, PLGA, vaccine

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2007-063421 A2 (THE PROVOST, FELLOWS AND SCHOLARS OF THE COLLEGE OF THE HOLY AND UNDIVIDED TRINITY OF QUEEN ELIZABETH, NEAR DUBLIN) 07 June 2007 See claims 1, 2, 5, 6, 13, 14, 18-23, 51, and 52; examples 12 and 13.	10-20
Y	HO-YUAN CHOU et al. 'Hydrogel-delivered GM-CSF overcomes nonresponsiveness to hepatitis B vaccine through the recruitment and activation of dendritic cells' The Journal of Immunology, 2010, Vol. 185, No. 9, pp. 5468-5475, ISSN 0022-1767(p), 1550-6606(e). See abstract; p. 5469, left-column; results.	10-20
A	BENJAMIN G. KESELOWSKY et al. 'Multifunctional dendritic cell-targeting polymeric microparticles: Engineering new vaccines for type 1 diabetes' Human Vaccines, January 2011, Vol. 7, No. 1, pp. 37-44, ISSN 1554-8600. See the whole document.	10-20
PX	YOUNG MEE YOON et al. 'Development of a tolerogenic matrix containing autoantigens for the prevention of type 1 diabetes' Diabetes, July 2011, Vol. 60, No. Suppl. 1, 2537-PO, pp. A668 and A669, ISSN 0012-1797(p), 1939-327X(e). See abstract.	10-20



Further documents are listed in the continuation of Box C.



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 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

28 DECEMBER 2012 (28.12.2012)

Date of mailing of the international search report

02 JANUARY 2013 (02.01.2013)

Name and mailing address of the ISA/KR



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/043993

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of :

a. a sequence listing filed or furnished

☐

on paper

☒

in electronic form

b. time of filing or furnishing

☐

contained in the international application as filed

☒

filed together with the international application in electronic form

☐

furnished subsequently to this Authority for the purposes of search

2. ☒ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/043993**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.: 1-9
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 1-9 pertain to methods for treatment of the human body by therapy, and thus relate to a subject matter which this International Searching Authority is not required, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT, to search.
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:

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 fee, this Authority did not invite payment of any additional fee.
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.:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/043993Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

WO 2007-063421 A2

07.06.2007

AU 2006-321287 A1

07.06.2007

CA 2632797 A1

07.06.2007

CN 101394865 A

25.03.2009

EP 1962901 A2

03.09.2008

EP 2316483 A1

04.05.2011

GB 0811801 D0

30.07.2008

GB 2448255 A

08.10.2008

JP 2009-519234 A

14.05.2009

NZ 569086 A

29.07.2011

US 2010-0003287 A1

07.01.2010