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(54) Title: TREATING INFLAMMATORY ARTHRITIS

(57) Abstract: A method for treating inflammatory arthritis comprises applying peripheral blood from a patient or subject to an apheresis column loaded with a solid support comprising one or more binding reagents capable of specifically binding to a chemokine receptor, optionally the chemokine receptor CCR2, CCR1, CCR3 or CCR5 immobilized directly or indirectly on the support thus removing one or more chemokine receptor, optionally CCR2, CCR1, CCR3 and CCR5 expressing cells from the peripheral blood of the patient or subject. Various companion diagnostic methods and useful binding reagents are also described.



WO 2012/172339 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051348

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07K14/52 A61M1/36 B01J20/32 C07K17/02 G01N33/68
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 A61M B01J G01N

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 10 2005 036505 A1 (ADEXTER GMBH [DE]) 1 June 2006 (2006-06-01) paragraph [0023]	4,13, 43-50
Y	----- WO 2007/133147 A1 (IBD COLUMN THERAPIES INTERNAT [SE]; THOERN MAGNUS [SE]; WINQVIST OLA [] 22 November 2007 (2007-11-22) claims	4,13, 43-50
Y	----- WO 2010/029317 A2 (IBD COLUMN THERAPIES INTERNAT [SE]; WINQVIST OLA [SE]; COTTON GRAHAM [] 18 March 2010 (2010-03-18) cited in the application the whole document	1-18, 43-50
	----- -/-	



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 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

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INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2012/051348

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/017979 A1 (MACK MATTHIAS [DE] ET AL) 23 January 2003 (2003-01-23) especially example 12; claims 4,5,19 -----	4,13, 43-50
Y	US 2003/215421 A1 (MCDONALD JOHN R [CA] ET AL) 20 November 2003 (2003-11-20) paragraphs [0032], [0457], [0462] -----	1-18
Y	M. N. SARAFI ET AL: "Murine Monocyte Chemoattractant Protein (MCP)-5: A Novel CC Chemokine That Is a Structural and Functional Homologue of Human MCP-1", JOURNAL OF EXPERIMENTAL MEDICINE, vol. 185, no. 1, 1 January 1997 (1997-01-01), pages 99-110, XP055035882, ISSN: 0022-1007, DOI: 10.1084/jem.185.1.99 abstract -----	5,6,14, 15
Y	WO 2010/021697 A2 (PFIZER [US]; GLADUE RONALD P [US]; KELLER BRADLEY T [US]; OGAWA SHINJI) 25 February 2010 (2010-02-25) cited in the application the whole document especially, page 1, last sentence and page 2, lines 30-33 -----	1-18
Y	TAKUJI IWAMOTO ET AL: "Molecular aspects of rheumatoid arthritis: chemokines in the joints of patients", FEBS JOURNAL, vol. 275, no. 18, 1 September 2008 (2008-09-01), pages 4448-4455, XP055036303, ISSN: 1742-464X, DOI: 10.1111/j.1742-4658.2008.06580.x cited in the application the whole document -----	1-18
Y	L TYLASKA: "CCR2 REGULATES THE LEVEL OF MCP-1/CCL2 IN VITRO AND AT INFLAMMATORY SITES AND CONTROLS T CELL ACTIVATION IN RESPONSE TO ALLOANTIGEN", CYTOKINE, vol. 18, no. 4, 1 May 2002 (2002-05-01), pages 184-190, XP055035952, ISSN: 1043-4666, DOI: 10.1006/cyto.2002.1031 the whole document ----- -/--	1-18

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051348

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	VERGUNST CLARISSA E ET AL: "Modulation of CCR2 in rheumatoid arthritis - A double-blind, randomized, placebo-controlled clinical trial", ARTHRITIS & RHEUMATISM, JOHN WILEY & SONS, INC, US, vol. 58, no. 7, 1 July 2008 (2008-07-01), pages 1931-1939, XP002676223, ISSN: 0004-3591, DOI: 10.1002/ART.23591 page 1932, left-hand column, paragraph 2 -----	1-18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2012/051348

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.:

6, 15(completely); 1-5, 7-14, 16-18, 43-50(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: 6, 15(completely); 1-5, 7-14, 16-18, 43-50(partially)

A binding reagent capable of specifically binding the CCR2 chemokine receptor, immobilized on a solid support within an apheresis column, and its use for treating inflammatory arthritis

2. claims: 1-5, 7-14, 16-18, 43-50(all partially)

A binding reagent capable of specifically binding the CCR1 chemokine receptor, immobilized on a solid support within an apheresis column, and its use for treating inflammatory arthritis

3. claims: 1-5, 7-14, 16-18, 43-50(all partially)

A binding reagent capable of specifically binding the CCR3 chemokine receptor, immobilized on a solid support within an apheresis column, and its use for treating inflammatory arthritis

4. claims: 1-5, 7-14, 16-18, 43-50(all partially)

A binding reagent capable of specifically binding the CCR5 chemokine receptor, immobilized on a solid support within an apheresis column, and its use for treating inflammatory arthritis

5. claims: 19-29

Methods of diagnosing inflammatory arthritis or selecting a suitable treatment for the disease comprising determining the levels of CCR2, CCR1, CCR3 and/or CCR5

6. claims: 30-34, 60-64

Modified CCL2/MCP-1 chemokine

7. claims: 35-42

Modified MCP-5 chemokine

8. claims: 51-55

Modified CCL8 chemokine

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

9. claims: 56-59

Modified CCL5 chemokine

10. claims: 65-69

Modified CCL11 chemokine

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2012/051348

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