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(54) Title: MULTIPOTENT ADULT STEM CELL POPULATION

(57) Abstract: The present invention relates to the identification, isolation, expansion and characterization of a specific type of adult stem cell. These adult stem cells are characterised in that they naturally express many of the markers of totipotency, which have hitherto generally been limited to embryonic cell populations. The cells of the invention display an unprecedented capacity for multipotency; they are able to differentiate into cell types of mesodermal, endodermal and ectodermal origin. These adult stem cells may be used as therapeutic agents including, without limitation, for the regeneration of tissue, particularly for regeneration of damaged cardiac tissue, such as myocardium.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/005636

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12N5/06

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)
C12N

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 practical, search terms used)

EPO-Internal, BIOSIS, WPI Data, EMBASE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>BELTRAMI ANTONIO R ET AL: "Multipotent cells can be generated in vitro from several adult human organs (heart, liver, and bone marrow)" BLOOD, vol. 110, no. 9, November 2007 (2007-11), pages 3438-3446, XP002536079 ISSN: 0006-4971 abstract page 3439 page 3440 page 3441 - page 3442 page 3438 figures 1,4;S3 Document 1, Supplementary Material and Methods</p> <p align="center">----- -/--</p>	1-54,61

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 document 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.
- *Z* 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/IB2009/005636

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>D'IPPOLITO G ET AL: "Marrow-isolated adult multilineage inducible (MIAMI) cells, a unique population of postnatal young and old human cells with extensive expansion and differentiation potential" JOURNAL OF CELL SCIENCE, CAMBRIDGE UNIVERSITY PRESS, LONDON, GB, vol. 117, no. part 14, 15 June 2004 (2004-06-15), pages 2971-2981, XP002339338 ISSN: 0021-9533 abstract page 2971</p>	1-54,61
X	<p>-----</p> <p>JIANG Y ET AL: "PLURIPOTENCY OF MESENCHYMAL STEM CELLS DERIVED FROM ADULT MARROW" NATURE, NATURE PUBLISHING GROUP, LONDON, UK, vol. 418, no. 6893, 4 July 2002 (2002-07-04), pages 41-49, XP001204372 ISSN: 0028-0836 abstract page 41 page 44 page 45 page 48 figures 1d,4c</p>	1-54,61
X	<p>-----</p> <p>KUCIA M ET AL: "A population of very small embryonic-like (VSEL) CXCR4+SSEA-1+Oct4+ stem cells identified in adult bone marrow" LEUKEMIA, MACMILLAN PRESS LTD, US, vol. 20, 1 January 2006 (2006-01-01), pages 857-869, XP003013478 ISSN: 0887-6924 abstract page 868</p>	1-54,61
X	<p>-----</p> <p>WO 2007/067280 A (UNIV LOUISVILLE RES FOUND [US]; RATAJCZAK MARIUSZ [US]; KUCIA MAGDALEN) 14 June 2007 (2007-06-14) claims 12,13,43,44 paragraphs [0017], [0270]</p>	1-54,61
X	<p>-----</p> <p>WO 2006/029084 A (CORNELL RES FOUNDATION INC [US]; EDELBERG JAY M [US]; PALLANTE BENEDET) 16 March 2006 (2006-03-16) claims 1,3,12,13,34,38 paragraphs [0028], [0124], [0200]</p> <p>-----</p> <p style="text-align: center;">-/--</p>	1-54,61

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2009/005636

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RATAJCZAK ET AL: "Hunt for pluripotent stem cell - Regenerative medicine search for almighty cell" JOURNAL OF AUTOIMMUNITY, LONDON, GB, vol. 30, no. 3, 4 February 2008 (2008-02-04), pages 151-162, XP022479845 ISSN: 0896-8411 the whole document -----	1-54,61

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2009/005636

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.:

see additional sheet(s)

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: 1-54 and 61.

An isolated adult stem cell population characterised in that the cells are capable of differentiating into mesoderm-, endoderm- and ectoderm-derived cells without recombinant manipulation, the use of said cells in the regeneration and repair of tissue and subject-matter relating thereto.

2. claims: 55-60.

A method of isolation of adult stem cells.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2009/005636

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
WO 2007067280	A	14-06-2007	EP	1974018 A2		01-10-2008
			US	2009220466 A1		03-09-2009
WO 2006029084	A	16-03-2006	US	2008254002 A1		16-10-2008