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14 December 2017 (14.12.2017)

WO 2017/163132 A3

(54) Title: USE OF UMBILICAL CORD BLOOD DERIVED EXOSOMES FOR TISSUE REPAIR

(57) Abstract: The subject invention provides a method for promoting wound healing in a patient in need thereof comprising contacting a wound of the patient with exosomes secreted by umbilical cord blood mononuclear cells (UCBMNCs) so as to thereby promote wound healing in the patient. The subject application also provides a method for promoting wound healing in a patient in need thereof comprising contacting a wound of the patient with a composition comprising one or more miRNA and a pharmaceutically acceptable carrier so as to thereby promote wound healing in the patient.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/000412

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K35/51 A61K31/7105 C12N15/113
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 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 practicable, search terms used)
EPO-Internal, Sequence Search, CHEM ABS Data, WPI Data, EMBASE, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/093885 A1 (SAHOO SUSMITA [US] ET AL) 19 April 2012 (2012-04-19)	1-36, 40-43, 51-55
Y	example 3.3 the whole document	37-39
X	Yefta Moenadjat ET AL: "The application of human umbilical cord blood mononuclear cells in the management of deep partial thickness burn", Med J Indones, 1 January 2013 (2013-01-01), pages 92-99, XP055389174, Retrieved from the Internet: URL:http://mji.ui.ac.id/journal/index.php/mji/article/download/534/521 [retrieved on 2017-07-10] the whole document	33,51, 53,54

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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

"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
10 July 2017	30/10/2017

Name and mailing address of the ISA/	Authorized officer
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1

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

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/000412

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HALA O. EL-MESALLAMY ET AL: "Cell-Based Regenerative Strategies for Treatment of Diabetic Skin Wounds, a Comparative Study between Human Umbilical Cord Blood-Mononuclear Cells and Calves' Blood Haemodialysate", PLOS ONE, vol. 9, no. 3, 18 March 2014 (2014-03-18), page e89853, XP055389176, DOI: 10.1371/journal.pone.0089853	33,51, 53,54
A	the whole document	28-31

Y	ZHENG LIU ET AL: "MicroRNA-150 Protects the Heart From Injury by Inhibiting Monocyte Accumulation in a Mouse Model of Acute Myocardial Infarction", CIRCULATION: CARDIOVASCULAR GENETICS, vol. 8, no. 1, 1 February 2015 (2015-02-01), pages 11-20, XP055389305, US ISSN: 1942-325X, DOI: 10.1161/CIRCGENETICS.114.000598 the whole document	37-39

A	WO 2014/028493 A2 (CEDARS SINAI MEDICAL CENTER [US]) 20 February 2014 (2014-02-20) abstract paragraph [0020] - paragraph [0021]; figure 18A; examples	1-43, 51-55

A	J.-M. WANG ET AL: "MicroRNA miR-27b Rescues Bone Marrow-Derived Angiogenic Cell Function and Accelerates Wound Healing in Type 2 Diabetes Mellitus", ARTERIOSCLEROSIS, THROMBOSIS, AND VASCULAR BIOLOGY., vol. 34, no. 1, 1 January 2014 (2014-01-01), pages 99-109, XP055389297, US ISSN: 1079-5642, DOI: 10.1161/ATVBAHA.113.302104 abstract page 103, right-hand column, last paragraph; figure 6	1

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/000412

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.:

1-43, 55(completely); 51-54(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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2017/000412

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012093885 A1	19-04-2012	NONE	
WO 2014028493 A2	20-02-2014	AU 2013302799 A1	26-02-2015
		CA 2881394 A1	20-02-2014
		EP 2882445 A2	17-06-2015
		JP 2015524844 A	27-08-2015
		US 2015203844 A1	23-07-2015
		WO 2014028493 A2	20-02-2014

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-43, 55(completely); 51-54(partially)

A method for promoting wound healing in a patient in need thereof comprising contacting a wound of the patient with exosomes secreted by umbilical cord blood mononuclear cells (UCBMNCs) so as to thereby promote wound healing in the patient.
A composition comprising exosomes secreted by UCBMNCs for promoting wound healing in a patient in need thereof.
A process of making a composition comprising exosomes secreted by UCBMNCs comprising step a) separating the exosomes from the UCBMNCs and b) suspending the exosomes in a pharmaceutically acceptable carrier.
A composition comprising exosome secreted by UCBMNCs prepared by said process.
A method for promoting tissue repair in a patient in need thereof comprising contacting a tissue of the patient with exosomes secreted by UCBMNCs so as to thereby promote tissue repair in the patient.

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2. claims: 45, 47, 49(completely); 44, 46, 48, 50-54, 56(partially)

A method for promoting wound healing in a patient in need thereof comprising contacting a wound of the patient with a composition comprising one or more miRNA and a pharmaceutically acceptable carrier so as to thereby promote wound healing in the patient, wherein the miRNA is hsa-miR-150-5p.
A composition comprising one or more miRNA and a pharmaceutically acceptable carrier for promoting wound healing in a patient in need thereof, wherein the miRNA is hsa-miR-150-5p
A process of making a composition comprising one or more miRNA and a pharmaceutically acceptable carrier comprising step a) mixing the miRNA with a transfection agent and b) suspending the mixture in the pharmaceutically acceptable carrier, wherein the miRNA is hsa-miR-150-5p.
A composition comprising one or more miRNA and a pharmaceutically acceptable carrier prepared by said process.
A method for promoting tissue repair in a patient in need thereof comprising contacting a tissue of the patient with a composition comprising one or more miRNA so as to thereby promote tissue repair in the patient, wherein the miRNA is hsa-miR-150-5p.

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3. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-181a-5p.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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4. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-451a.

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5. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-103a-3p.

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6. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-15a-5p.

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7. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-19a-3p.

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8. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-15b-5p.

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9. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-26b-5p.

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10. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-30d-5p.

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11. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-146b-5p.

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12. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-106b-5p.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

13. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-29a-3p.

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14. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-17-5p.

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15. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-29b-3p.

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16. claims: 44, 46, 48, 50-54, 56(all partially)

Same as invention 2, but wherein the miRNA is hsa-miR-101-3p.
