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- 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))

[Continued on next page]

(54) Title: MOLECULAR ENHANCEMENT OF EXTRACELLULAR MATRIX AND METHODS OF USE

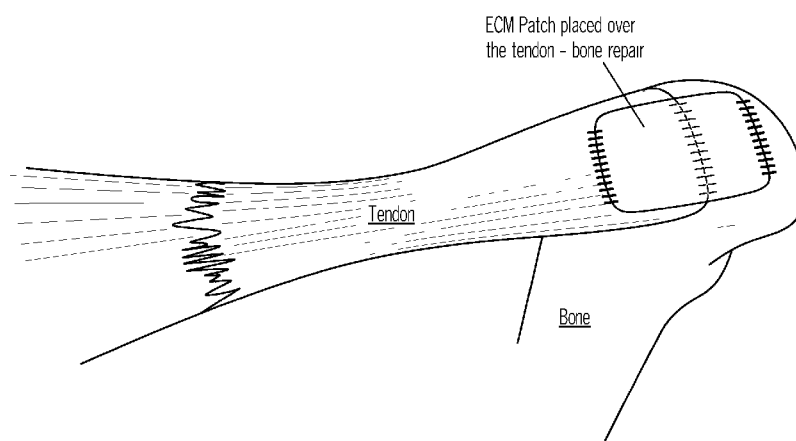


FIG. 1

(57) Abstract: A composition comprising a human- or animal-derived extracellular matrix and a macromolecular network which is prepared ex vivo is provided that is useful in the repair of a tissue injury, particularly in repair of tears or gaps between a tendon and a bone, such as in a rotator cuff tear. In an embodiment, the composition comprises a human- or animal-derived extracellular matrix having impregnated therein a macromolecular network of hyaluronan macromolecules that have been cross-linked via dihydroxyphenyl linkages, so that the cross-linked network is interlocked within the extracellular matrix. The resulting HA-incorporated extracellular matrix can be supplied in the form of a patch to reinforce a tissue repair or cover a tissue defect.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/034071**A. CLASSIFICATION OF SUBJECT MATTER***A61L 27/54(2006.01)1, C08G 85/00(2006.01)1, C08G 8/28(2006.01)1, C08G 63/91(2006.01)1, C08G 73/02(2006.01)1, C08J 3/24(2006.01)i, C08J 3/22(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)

IPC A61L 27/54, A61K 47/48, C08F 32/00, C08B 37/00, C08G 85/00, C08G 8/28, C08G 63/91, C08G 73/02, C08J 3/24, C08J 3/22, C12N 5/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords extracellular matrix, macromolecule, cross link, network, dihydroxyphenyl, polycarboxylate, polyamine, polyhydroxyphenyl, hyaluronan, tyramine

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 2006/0084759 A1 (CALABRO, ANTHONY et al) 20 April 2006 See abstract, figures 1-3, claims 1-10, 16-19	1-21, 28
A	US 2001/0027237 A1 (MAYES, ANNE M et al) 4 October 2001 See abstract, claims 1 and 12	1-21, 28
A	US 2004/0127698 A1 (TSAI, SHIAO-WEN et al) 1 July 2004 See abstract, page 3, claim 1	1-21, 28
A	US 2004/0063206 A1 (ROWLEY, JON A and HEIDARAN, MOHAMMAD A) 1 April 2004 See abstract, page 3, claim 1, 16 and 17	1-21, 28



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

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/034071

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 22-27
because they relate to subject matter not required to be searched by this Authority, namely
Claims 22-27 pertain to methods for treatment of the human or animal body by surgery, 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(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/US2009/034071

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0084759 A 1	20.04.2006	US 07368502 B2 US 07465766 B2 US 2004-0147673 A 1 US 2005-0265959 A 1 US 06982298 B2	06.05.2008 16.12.2008 29.07.2004 01.12.2005 03.01.2006
US 2001-0027237 A 1	04.10.2001	US 06150459 A US 06207749 B 1 US 06399700 B2	21.11.2000 27.03.2001 04.06.2002
US 2004-0 127698 A 1	0 1.07 .2004	US 2007-0066816 A 1	22.03.2007
US 2004-0063206 A 1	0 1.04 .2004	AU 2003-277040 A 1 AU 2003-277040 A 1 CA 2500410 A 1 EP 1565551 A2 JP 2006-500953 A KR 10-2005-0071520 A US 2004-0147016 A 1 WO 2005-035735 A2 WO 2004-031371 A2	23.04.2004 30.09.2003 15.04.2004 24.08.2005 12.01.2006 07.07.2005 29.07.2004 21.04.2005 15.04.2004