

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
5 February 2009 (05.02.2009)

PCT

(10) International Publication Number
WO 2009/017753 A3

(51) **International Patent Classification:**

A61L 24/08 (2006.01) A61L 27/20 (2006.01)
A61L 27/52 (2006.01)

(21) **International Application Number:**

PCT/US2008/009198

(22) **International Filing Date:** 30 July 2008 (30.07.2008)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**

11/830,125 30 July 2007 (30.07.2007) US

(71) **Applicant** (for all designated States except US): **EN-DOMEDIX, INC.** [US/US]; 12 Sulgrave Road, Scarsdale, New York 10583 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants** (for US only): **ABRAHAMS, John, M.** [US/US]; 12 Sulgrave Road, Scarsdale, New York 10583 (US). **CHEN, Weiliam** [US/US]; 3 Panfield Place, Mount Sinai, New York 11766 (US). **ZAHOS, Peter** [US/US]; 3865 Windmill Lakes Road, Weston, Florida 33332 (US).

(74) **Agents:** **STEFFEY, Charles, E.** et al.; Schwegman, Lundberg & Woessner, PA, P.O. Box 2938, Minneapolis, Minnesota 55402 (US).

(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, **BR**, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, **HR**, HU, **ID**, IL, IN, IS, **JP**, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) **Date of publication of the international search report:**
4 June 2009

(54) **Title:** CHITOSAN-BASED BIOPOLYMER SYSTEM FOR TREATING DEGENERATIVE DISC DISEASE

(57) **Abstract:** The invention provides a method of treating degenerative disc disease and discogenic pain by disposing a hydrogel tissue sealant within the intervertebral disc, where the hydrogel fills voids and tears in the annulus fibrosus and replaces leaked material from the nucleus pulposus. The hydrogel is formed in situ from a substantially liquid premix, which can be emplaced with a syringe needle or a catheter into the intervertebral disc, where it forms the hydrogel by gelation. The hydrogel can also include a therapeutic or a protective material, or a radiopaque or MRI-active agent to aid in visualization.



WO 2009/017753 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/009198

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61L24/08 A61L27/52 A61L27/20

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 A61L

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, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication where appropriate of the relevant passages	Relevant to claim No
Y	US 2004/091540 A1 (DESROSIERS ERIC ANDRE [CA] ET AL) 13 May 2004 (2004-05-13) claims 1,12,41-43,52 examples H-V	1-15
Y	----- MWALE FACKSON ET AL: "Biological evaluation of chitosan salts cross-linked to genipin as a cell scaffold for disk tissue engineering." TISSUE ENGINEERING 2005 JAN-FEB, vol. 11, no. 1-2, January 2005 (2005-01), pages 130-140, XP002518499 ISSN: 1076-3279 cited in the application abstract page 138, column 1, paragraph 3 - page 139, column 1, paragraph 1 ----- -/-	1-15

Further documents are listed in the continuation of Box C

See patent family annex

Special categories of cited documents

¹A' document defining the general state of the art which is not considered to be of particular relevance

¹E' earlier document but published on or after the International filing date

¹L¹ 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

¹T' 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

¹X* 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

¹Y* 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

10 March 2009

Date of mailing of the international search report

09/04/2009

Name and mailing address of the ISA/
European Patent Office P B 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040,
Fax. (+31-70) 340-3016

Authorized officer

Peris Antol i , Berta

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/009198

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2004/006961 A (BIOSYNTECH CANADA INC [CA]; CHENITE ABDELLATIF [CA]; HOEMANN CAROLINE) 22 January 2004 (2004-01-22) paragraphs [0008] - [0011], [0050], [0051] -----	1-15
Y	DI MARTINO A ET AL: "Chitosan: A versatile biopolymer for orthopaedic tissue-engineering" BIOMATERIALS, ELSEVIER SCIENCE PUBLISHERS BV., BARKING, GB, vol. 26, no. 30, 1 October 2005 (2005-10-01), pages 5983-5990, XP025280153 ISSN: 0142-9612 [retrieved on 2005-10-01] abstract page 5986, column 2, paragraph 2 - page 5987, column 1, paragraph 1 figure 3 -----	1-15
Y	US 2007/031467 A1 (ABRAHAMS JOHN M [US] ET AL) 8 February 2007 (2007-02-08) claims 1,4-8 paragraph [0013] example 7 -----	1-15
Y	US 2005/002893 A1 (GOLDMANN HELMUT [DE]) 6 January 2005 (2005-01-06) claims 1,5,10,11,22-26 -----	1-15
A	US 2007/003525 A1 (MOEHLLENBRUCK JEFFREY W [US] ET AL) 4 January 2007 (2007-01-04) claims 1,44-50 paragraph [0003] -----	1-15
P,X	WO 2007/124198 A (ENDOMEDIX INC [US]; CHEN WILLIAM [US]; ABRAHAMS JOHN M [US]) 1 November 2007 (2007-11-01) claims 1,33-40,43-49,64,69 -----	1-15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/009198

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:

Although claims 1-8 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

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 allsearchable 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.-

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/US2008/009198

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004091540	A1 13-05-2004	AU 2137002 A UO 0240070 A2 CA 2429168 A1 EP 1335687 A2 US 2009030525 A1	27-05-2002 23-05-2002 23-05-2002 20-08-2003 29-01-2009
WO 2004006961	A 22-01-2004	AU 2003249805 A1 CA 2493083 A1 EP 1536837 A1 JP 2005536496 T	02-02-2004 22-01-2004 08-06-2005 02-12-2005
US 2007031467	A1 08-02-2007	WO 2007149130 A1	27-12-2007
US 2005002893	A1 06-01-2005	DE 10152407 A1 WO 03035122 A1 EP 1438079 A1 ES 2242080 T3	08-05-2003 01-05-2003 21-07-2004 01-11-2005
US 2007003525	A1 04-01-2007	NONE	
WO 2007124198	A 01-11-2007	NONE	