

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
29 November 2007 (29.11.2007)

PCT

(10) International Publication Number  
**WO 2007/136738 A3**

(51) International Patent Classification:  
A61F 2/00 (2006.01) A61K 38/00 (2006.01)  
A61N 1/00 (2006.01)

(21) International Application Number:  
PCT/US2007/011888

(22) International Filing Date: 18 May 2007 (18.05.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/801,751 19 May 2006 (19.05.2006) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, 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, 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, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, 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:  
13 March 2008

(54) Title: NOVEL HYDROPHILIC POLYMERS AS MEDICAL LUBRICANTS AND GELS

(57) Abstract: The present invention provides new biopolymers which mimic the properties of natural polysaccharides found in vivo. The inventive polysaccharides can be used as viscosupplements, viscoelastics, tissue space fillers, and/or anti-adhesive agents. Also provided are pharmaceutical compositions comprising the inventive polymers and methods of using them including, for example, in the treatment of arthritic and sport- injured knee joints; in reconstruction or cosmetic procedures, intervertebral disc repair, treatment of vocal cord problems, treatment of urinary incontinence, and prevention of adhesion formation following abdominal or gynecological surgery.

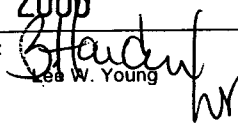


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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/11888

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(8) - A61F 2/00; A61N 1/00; A61K 38/00 (2007.10) USPC - 424/423; 604/500 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) USPC: 424/423; 604/500 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC: 424/423; 604/500(text delimited) and Google Scholar (text search) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST(USPT,PGPB,EPAB,JPAB); DialogPRO(Engineering); Google Scholar; WIPO documents Search Terms Used: polymer, polysaccharide, mimic, substitute, viscosupplement, tissue space fillers, osteoarthritic, synovial joint, intervertebral disc, urinary incontinence		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,511,559 A (SZENDREI et al.) 16 April 1985 (16.04.1985), col 1, ln 7-20; col 2, ln 54-55; col 4, ln 34-51; col 8, ln 55-60; col 9, ln 53-59; col 10, ln 25-39; claim 8	1-6, 25, 26, 29-49
Y	BARROW et al., "The structure of a novel polysaccharide isolated from Zymomonas mobilis determined by nuclear magnetic resonance spectroscopy", European Journal of Biochemistry, 1984, vol 145, pg 173-179, (1984), pg 173, col 1, para 1-2; table 1	1-3, 7-15, 25, 27, 29-49
Y	WO 2005/035588 A1 (BLASZCZAK et al.) 21 April 2005 (21.04.2005), pg 4, ln 25 to pg 9, ln 4	4-6, 16-24, 26, 28
Y	US 5,676,964 A (DELLA VALLE et al.) 14 October 1997 (14.10.1997), col 1, ln 38-45 and ln 67; col 2, ln 36-64; col 7, ln 7-14 and ln 44-61; col 8, ln 31-37; col 9, ln 1-31; col 13, ln 8-10 and ln 45-47; col 13, ln 62 to col 14, ln 28; col 14, ln 62-67; col 15, ln 5-12 and ln 35-40; col 16, ln 5-48	7-24, 27-28, 43-46
Y	US 5,827,937 A (AGERUP) 27 October 1998 (27.10.1998), abstract; col 4, ln 50-65; col 5, ln 20-28; col 7, ln 10-18; claim 17	31, 38-39, 49
Y	WO 2003/000191 A2 (THOMPSON et al.) 03 January 2003 (03.01.2003), abstract; pg 3, para 3; pg 11; pg 12, para 2	40-42
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 12 December 2007 (12.12.2007)		Date of mailing of the international search report <b>24 JAN 2008</b>
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer:  Lisa W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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**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 extra box

- 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 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.

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Continuation of Box No. III -- Observations where unity of invention is lacking

Group I: claims 1-6, 25, 26, and 29-49

Group II: claims 7-24, and 27-49

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

Group I: claims 1-6, 25, 26, and 29-49 are directed to a polymer having one of the chemical structures as disclosed in claims 1 and 4.

Group II: claims 7-24, and 27-49 are directed to a polymer having one of the chemical structures as disclosed in claims 7 and 16.

Claims that are considered generic: 29-49

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2 they lack the same or corresponding technical features for the following reasons:

Group II does not include the polymers having one of the chemical structures as disclosed in claims 1 and 4 of Group I.

Group I does not include the polymers having one of the chemical structures as disclosed in claims 7 and 16 of Group II.

None of these technical features are common to the other groups, nor do they correspond to a special technical feature in the other groups. Therefore, unity of invention is lacking.