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12 September 2008



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(54) **Title:** METHODS OF PROMOTING CARDIAC REPAIR USING GROWTH FACTORS FUSED TO HEPARIN BINDING SEQUENCES

(57) **Abstract:** The present invention is directed to proteins in which a heparin binding peptide is fused to a growth factor that promotes cell growth and survival. The compound thus formed is bound to the surface of cells which are then administered to damaged tissue. The growth factor is thereby maintained at the site of administration where it promotes repair.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US 07/23527

A CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61 K 38/00, C07K 17/00 (2008.04) USPC - 514/12, 530/350 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(8) - A61K 38/00, C07K 17/00 (2008 04) USPC - 514/12, 530/350 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 424/551, 424/9 1, 435/325, 435/69 1, 530/399, 536/23 5 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST(USPT,PGPB,EPAB,JPAB), Google Scholar heparin binding, peptide or protein, IGF-1, PDGF, fusion protein, cardiomyocyte, chondrocyte, neuron, targeting, localized, delivery, implanting, repairing or treating		
C DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	US 2006/0172931 A1 (SAN ANTONIO et al) 3 Aug 2006 (03 08 2006), para [0141] and [0145]-[0148]	1, 2, 4, 7-8, 10-15, 17-20 and 22-26
Y	US 2006/0088510 A1 (LEE et al) 27 Apr 2006 (27 04 2006), para [001 1]-[0013], [0032], [0034] and [0036]	1, 2, 4, 7-8, 10-15, 17-20 and 22-26
A	US 6,037,329 A (BAIRD et al) 14 Mar 2000 (14 03 2000), SEQ ID NO 8	3, 9, 16 and 21
<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	Date of mailing of the international search report	
2 June 2008 (02 06 2008)	19 JUN 2008	
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 Lee W Young PCT Helpdesk 571-272 4300 PCT OSP 571 272 7774	

INTERNATIONAL SEARCH REPORT

International application No

PCT/US 07/23527

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 **I** Claims Nos
because they relate to subject matter not required to be searched by this Authority, namely

- 2 **D** 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 **X** Claims Nos 5 and 6
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

Group 1, claims 1-4 and 7-26, wherein claims 3, 9, 16, 21 are limited to SEQ ID NO 3

Groups 2-19, claims 1-4 and 7-26, wherein claims 3, 9, 16, 21 are limited to SEQ ID NO 4-21, respectively

The inventions listed as Groups 1-19 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 special technical features for the following reasons

Compounds of the claimed formula would be regarded as having the same or corresponding technical feature if they had a common property or activity, and shared a significant structural element that is essential to the common property or activity. While said compounds do share the common property of promoting cell growth and tissue repair, there is no teaching as to a shared significant structural element that is an improvement over the prior art, and hence, there is no disclosure of the same or corresponding technical feature. In addition, US 2005/0222394 A1 to Zamora, et al teaches synthetic heparin-binding growth factor analogs (abstract, claims 1 and 7) comprising IGF-1 (claim 17). Therefore, unity of invention is lacking.

- 1 **I** As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
- 2 **I** As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees
- 3 **I** 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 **X** 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 1-4 and 7-26, wherein claims 3, 9, 16, 21 are limited to SEQ ID NO 3

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee
- D** 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