

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 February 2010 (04.02.2010)

PCT

(10) International Publication Number
WO 2010/014830 A3

(51) International Patent Classification:
C07K 14/00 (2006.01)

(21) International Application Number:
PCT/US2009/052282

(22) International Filing Date:
30 July 2009 (30.07.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/084,901 30 July 2008 (30.07.2008) US

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(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, CL, 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, PE, 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, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- 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))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:
27 May 2010

(54) Title: PEPTIDE THERAPEUTICS THAT BIND VEGF AND METHODS OF USE THEREOF

(57) Abstract: The present invention provides peptides and mimetics thereof that bind to VEGF. In preferred embodiments, the peptides of the invention are D type optical isomers which can bind VEGF and which can inhibit or reduce VEGF biological activity.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 09/52282

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - C07K 14/00 (2010.01)
 USPC - 530/300
 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)
 USPC -- 530/300

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)
 WEST -- PGPB,USPT,USOC,EPAB,JPAB; Dialog Classic Files - 654, 652, 351, 349, 6,35, 65, 155; Google Scholar; USPTO Web Page; NCBI BLAST; Search terms -- isolated specific peptide, peptidomimetic, VEGF binding peptide, D-amino acids, PEG-spacers, PEGamine, terminal modification, biotinyl lysine, (sequence searches)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- A	US 2005/0250700 A1 (SATO et al.) 10 November 2005 (10.11.2005) para [0008]-[0010], [0078], [0094], [0395], [0404], [0418], [1208], [1210], SEQ ID NO: 1	1 ----- 2-5, 10-13, 16, 17, 20-25, 28-36, 39-43
A	US 2005/0196754 A1 (DRMANAC et al.) 08 September 2005 (08.09.2005) SEQ ID NO: 47742	2-5, 10-13, 16, 17, 20, 21, 20-25, 28-36, 39-43
A	US 2007/0044171 A1 (KOVALIC et al.) 22 February 2007 (22.02.2007) SEQ ID NO: 149156	22, 39, 40, 42 and 43

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 25 March 2010 (25.03.2010)	Date of mailing of the international search report 05 APR 2010
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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
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 09/52282

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.: 44-51
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:

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. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-5, 10-13, 28-36, and 39-43, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRSPWAGRLWGLVRL (SEQ ID NO: 11), optionally further comprising n-terminal or c-terminal modifications thereto.

Group II: claims 1, 2, 6, 7, and 28-35, 39, 40, 42 and 43, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNTLHWVCASDICWRTPWAGQLWGLVRL. (Note: this sequence corresponds to the fully defined portion of SEQ ID NO: 35).

- Please see extra sheet for continuation -

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.:
1-5, 10-13, 16, 17, 20-25, 28-36, 39-43, comprising sequences limited as in Groups I, V, VIII and X.
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

International application No.

PCT/US 09/52282

Continuation of Box III: Lack of Unity of Invention

Group III: claims 1, 2, 8, 9, 28-35 and 37-43 directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRTPWAGQLWRLVRL (Note: this sequence corresponds to the fully defined portion of SEQ ID NO: 36).

Group IV: claims 1, 2, 10, 11, 14, 15, and 28-35, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRTPWAGRLWGLVRL (SEQ ID NO: 39)

Group V: claims 1, 2, 10, 11, 16, 17, and 28-35, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRTPWAGQLWGLVRL (SEQ ID NO: 40).

Group VI: claims 1, 2, 10, 18, 19, and 28-35, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRTPWAGRLWRLVRL (SEQ ID NO: 41).

Group VII: claims 1, 2, 10, 20, 21, and 28-35, directed to a VEGF-binding peptide comprising D-amino acid isomers, and comprising the sequence: GNALHWVCASNICWRTPWAGRLWELVRL (SEQ ID NO: 42).

Group VIII: claims 22 and 39, 40, 42 and 43, directed to a peptide or mimetic comprising D-type amino acid isomers, and comprising the sequence: GGFEGLSQARKDQLWFLMQHIRSYRTIT (seq id no; 29), with optional n-terminal and c-terminal extensions thereof.

Group IX: claims 23 and 28-35, directed to a peptide or mimetic which binds to VEGF comprising D type amino acid isomers, and comprising the sequence: SATLASWVL, optionally further comprising n-terminal or c-terminal extensions or modifications.

Group X: claims 22-25, 28-35, 39, 40, 42 and 43, directed to a peptide or mimetic which binds to VEGF comprising D type amino acid isomers, and limited to a sequence: SSTLGSWVL, optionally further comprising n-terminal or c-terminal extensions or modifications, wherein said extensions comprise the following n-terminal sequence: GVQEDV, and the following c-terminal sequence: LPFHRGTRLSVWVT.

Group XI: claims 23 and 26-35, directed to a peptide or mimetic which binds to VEGF comprising D type amino acid isomers, and comprising the sequence: SPTLSSFVI, optionally further comprising n-terminal or c-terminal extensions or modifications, wherein said extensions comprise the following n-terminal sequence: GAGLWWGFCTDQHCIFK and the following c-terminal sequence: T.

Group XII: claims 52-56, directed to a method for detecting VEGF in a sample, comprising: incubating a sample with a peptide or mimetic that binds to VEGF, wherein the peptide comprises D type amino acid isomers, to form a complex, and detecting the VEGF bound to an immobilized capture reagent.

The inventions listed as Groups I - XII 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:

The special technical feature of the claims of Groups I-XI are peptides or mimetics which bind to VEGF, and which comprise D type amino acid isomers, wherein each Group is directed to a peptide comprising a particular sequence. The special technical feature of the Group XII claims is a method for detecting VEGF in a sample, comprising: incubating a sample with a peptide or mimetic that binds to VEGF, wherein the peptide comprises D type amino acid isomers, to form a complex, and detecting the VEGF bound to an immobilized capture reagent.

The only common technical element shared by the above groups is that they are related to peptides which bind to VEGF and comprise D type amino acid isomers. This common technical element does not represent an improvement over the prior art of US 20030064410 A1 to Hubbell, et al. (see para [0037], [0041], [0047], and [0085] - [0089]). Therefore, the inventions of Groups I - XII lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature.

(Note: Applicants' may request further sequences to be searched by fully specifying the sequence, and by paying an additional invention search fee for each additional sequence).