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C07K 7/08 (2006.01)	A61K 38/10 (2006.01)
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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,

[Continued on next page]

(54) Title: LLP2A-BISPHOSPHONATE CONJUGATES FOR OSTEOPOROSIS TREATMENT

(57) Abstract: The present invention provides compounds and pharmaceutical compositions of a peptidomimetic ligand, e.g. LLP2A, conjugated with a bisphosphonate drug, e.g. Alendronate. The compounds and pharmaceutical compositions of the present invention are useful in the treatment of osteoporosis and for the promotion of bone growth due to their specificity for the $\alpha_v\beta_1$ integrin on mesenchymal stem cells and for the surface of bone.

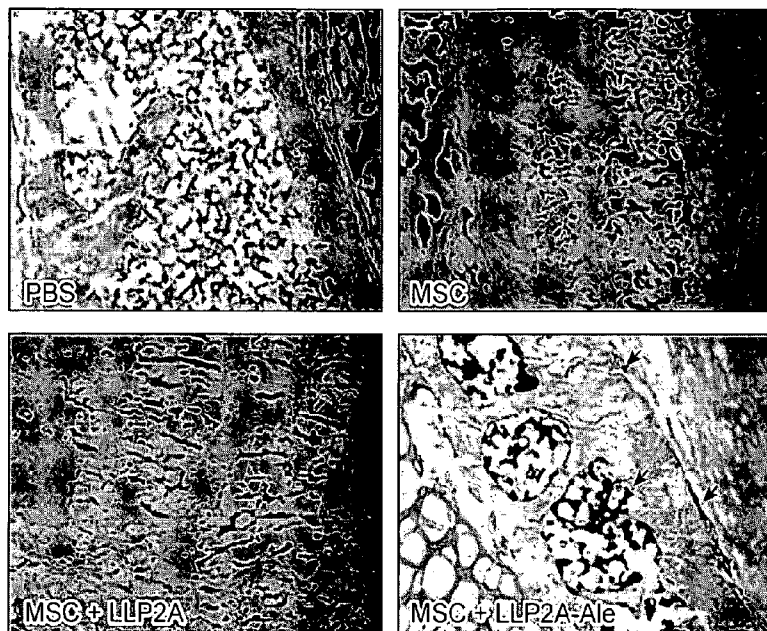


FIG. 1

WO 2012/031228 A3



OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Published:

- with international search report (Art. 21(3))
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/050381**A. CLASSIFICATION OF SUBJECT MATTER***C07K 7/08(2006.01)i, C07K 7/06(2006.01)i, A61K 38/10(2006.01)i, A61P 19/08(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)

C07K 7/08; A61K 38/08; A61K 31/66

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
Japanese utility models and applications for utility models

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

PubMed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/0019900 A1 (LAM, K. S. et al.) 26 January 2006 See claims 1 and 46; paragraphs [0003]-[0010].	1-17
A	DENARDO, S. J. et al. 111In-LLP2A-DOTA Polyethylene Glycol-Targeting $\alpha_4\beta_1$ Integrin: Comparative Pharmacokinetics for Imaging and Therapy of Lymphoid Malignancies. Journal of Nuclear Medicine. April 2009, Vol. 50, No. 4, pages 625-34. See figure 1 and discussion.	1-17
A	KENYON, N. J. et al. An $\alpha_4\beta_1$ integrin antagonist decreases airway inflammation in ovalbumin-exposed mice. Eur J European Journal of Pharmacology. 28 January 2009, Vol. 603, No. 1-3, pages 138-46. See figure 1.	1-17
A	US 6,008,207 A (BRENNER, G. S. et al.) 28 December 1999 See columns 1-3.	1-17

 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

Date of the actual completion of the international search

25 APRIL 2012 (25.04.2012)

Date of mailing of the international search report

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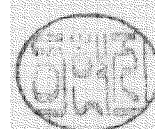
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/050381**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.: 18-20
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 18-20 pertain to methods for treatment of the human body by therapy, as well as diagnostic methods, 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 39.1(iv) of the Regulations under 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

International application No.

PCT/US2011/050381

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>PENG, L. et al. In vivo optical imaging of human lymphoma xenograft using a library-derived peptidomimetic against alpha4beta1 integrin. Molecular Cancer Therapeutics. February 2008, Vol. 7, No. 2, pages 432-7. See figure 1 and introduction.</p>	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/050381

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0019900 A1	26.01.2006	US 2005-0263866 A1	01.12.2005
		US 7576175 B2	18.08.2009
		US 7952189 B2	31.05.2011
		WO 2005-122379 A2	22.12.2005
		WO 2005-122379 A3	08.02.2007
		WO 2005-122379 A3	22.12.2005
		WO 2005-122379 A9	09.03.2006
US 06008207A A	28.12.1999	None	