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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, BN, 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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:
2 October 2014

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(54) Title: PEPTIDES AS GIP, GLP-1 AND GLUCAGON RECEPTORS TRIPLE-AGONIST

(57) Abstract: The present invention provides novel peptides, having the structural formula (I) showed GIP, GLP-1 & Glucagon-receptors triple-agonistic activity. These peptides exhibit increased stability to proteolytic cleavage, especially against DPP-IV (Dipeptidyl peptidase-IV) enzyme. These peptides can be delivered by parenteral routes of administration, for the treatment or prevention of diabetes, obesity and related metabolic disorders. The present invention thus discloses novel peptides as GIP, GLP-1 & Glucagon-receptors triple-agonist having the following structure (I) A-Z_1-Z_2-Z_3-Z_4-Z_5-Z_6-Z_7-Z_8-Z_9-Z_{10}-Z_{11}-Z_{12}-Z_{13}-Z_{14}-Z_{15}-Z_{16}-Z_{17}-Z_{18}-Z_{19}-Z_{20}-Z_{21}-Z_{22}-Z_{23}- Z_{24}-Z_{25}-Z_{26}-Z_{27}-Z_{28}-Z_{29}-B

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A. CLASSIFICATION OF SUBJECT MATTER
INV. C07K14/605
ADD.

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

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)

EPO-Internal, BIOSIS, Sequence Search, EMBASE, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/148089 A1 (UNIV INDIANA RES & TECH CORP [US]; DIMARCHI RICHARD D [US]; SMILEY DAV) 23 December 2010 (2010-12-23) page 135 table 12 example 24 page 160 pages 1-58 table 24	1-14

X	WO 2009/155258 A2 (UNIV INDIANA RES & TECH CORP [US]; DIMARCHI RICHARD D [US]; SMILEY DAV) 23 December 2009 (2009-12-23)	1-14
Y	sequence 251 claims 1-114	1-14

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[X] Further documents are listed in the continuation of Box C.

[X] 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 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
6 June 2014	13/06/2014

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

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Form PCT/ISA/210 (second sheet) (April 2005)

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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 2009/125424 A2 (CADILA HEALTHCARE LTD [IN]; BAHEKAR RAJESH H [IN]; JAIN MUKUL R [IN];) 15 October 2009 (2009-10-15) abstract claims 1-18	1-14
A	WO 2011/048614 A2 (CADILA HEALTHCARE LTD [IN]; BAHEKAR RAJESH [IN]; JAIN MUKUL R [IN]; PA) 28 April 2011 (2011-04-28) the whole document	1-14
A	RUNGE S ET AL: "Different domains of the glucagon and glucagon-like peptide-1 receptors provide the critical determinants of ligand selectivity", BRITISH JOURNAL OF PHARMACOLOGY, NATURE PUBLISHING GROUP, BASINGSTOKE, HANTS; GB, vol. 138, no. 5, 1 March 2003 (2003-03-01) , pages 787-794, XP002427759, ISSN: 0007-1188, DOI: 10.1038/SJ.BJP.0705120 the whole document	1-14
A	DAN DONNELLY: "The structure and function of the glucagon-like peptide-1 receptor and its ligands", BRITISH JOURNAL OF PHARMACOLOGY, vol. 166, no. 1, 1 May 2012 (2012-05-01), pages 27-41, XP55060540, ISSN: 0007-1188, DOI: 10.1111/j.1476-5381.2011.01687.x the whole document	1-14
Y	WO 2011/088837 A1 (ZEALAND PHARMA AS [DK]; PETERSEN JOERGEN SOEBERG [CH]; KJOELBYE ANNE L) 28 July 2011 (2011-07-28) abstract page 4 - page 5 page 22 - page 35 claims 1-154	1-14

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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 additional sheet

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 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.:

1-14(partially)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 1-5, 130-136, as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

2-128. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 6-129, 137-140 (each SEQ ID No represents a single invention) as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

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129. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 141-145, 187-191, 192, 194 as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

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130. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 146-186, 193, 195 as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

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131. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 196-199, 242-249, as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

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132. claims: 1-14(partially)

A glucagon analog of SEQ ID NO 200-241, 250, as well as pharmaceutical composition comprising the same and use of said compounds in medicine.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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Information on patent family members

International application No
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