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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, 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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Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

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

(88) Date of publication of the international search report:

8 November 2012

(54) Title: PERTUSSIS VACCINE

(57) **Abstract:** An immunogenic composition, comprising: (a) an immunogenic conjugate comprising the structure of: Pr - Sr - O - N = Kdo - OS (I) in which Pr represents carrier protein, Sr is an optional spacer moiety, Kdo is 3-deoxy-D- manno-octulosonic acid or a derivative thereof, and OS is an oligosaccharide or polysaccharide obtained from Bordetella bronchiseptica LPS, Bordetella pertussis LPS, or Bordetella parapertussis LPS; (b) diphtheria toxoid; and (c) tetanus toxoid.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/023152**A. CLASSIFICATION OF SUBJECT MATTER***A61K 39/02(2006.01)i, A61K 39/10(2006.01)i, A61P 31/00(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)

A61K 39/02; A61K 39/10; A61K 39/385; A61P 31/04; A61K 39/38; A61K 39/00; A61K 39/09

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)

eKOMPASS(KIPO internal) & Keywords: immunogenic conjugate, carrier protein, Kdo, Bordetella bronchiseptica, Bordetella pertussis, diphtheria toxoid, tetanus toxoid, pertussis toxoid, LPS, oligosaccharide, bactericidal, RBwbm△LPS, O-SP expression

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010-0158937 A1 (JOANNA KUBLER-KIELB et al.) 24 June 2010 See paragraphs [0074], [0100], [0102], [0103], and [0122]; example 1; claims 1, 2, 4, 9, 13, 17, 18, 22-25, 27, and 28.	1-4, 11-14, 19-22
A	US 2004-0202668 A1 (DOMINIQUE BOUTRIAU et al.) 14 October 2004 See claim 1.	1-4, 11-14, 19-22
A	EP 0471954 A2 (AMERICAN CYANAMID COMPANY) 26 February 1992 See abstract; claim 1.	1-4, 11-14, 19-22
A	US 5445817 A (RACHEL SCHNEERSON et al.) 29 August 1995 See column 10; claims 1, 3-5, and 8-10.	1-4, 11-14, 19-22

☐ 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

21 AUGUST 2012 (21.08.2012)

Date of mailing of the international search report

22 AUGUST 2012 (22.08.2012)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/023152**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.: 15-18, 23
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 15-18 and 23 pertain to methods for treatment of the human body by therapy, 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 the PCT, to search.
2. ☒ Claims Nos.: 7, 8
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:

Claims 7 and 8 refer to claim 6 which is not drafted in accordance with PCT Rule 6.4(a).
3. ☒ Claims Nos.: 5, 6, 9, 10, 18
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

Information on patent family members

International application No.

PCT/US2012/023152

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