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[Continued on next page]

(54) Title: ANTI-DENGUE VIRUS GENETIC VACCINE BASED ON THE ENVELOPE PROTEIN ECTODOMAINS

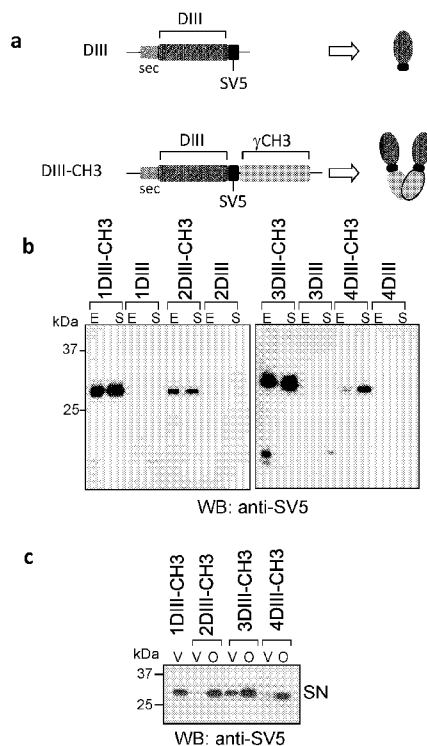


Figure 1

(57) Abstract: The present invention refers to a genetic vaccine for dengue virus of all serotypes or for any virus belonging to the Flavivirus genus. Said vaccine is based on the envelope protein E ectodomains, more in particular on the DIII domain of envelope protein E is fused to a carboxyterminal domain from the constant region of an immunoglobulin is disclosed in the present invention. The use of said construct allows for an efficient secretion of the fusion protein from the cells and thus for a high antibody response.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

— *with sequence listing part of description (Rule 5.2(a))*

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K39/12 C07K14/18 C12N7/00 C12N15/62
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)

A61K C07K C12N

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)

EP0-Internal, BIOSIS, Sequence Search, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	STAROPOLI I ET AL: "Dengue virus envelope glycoprotein can be secreted from insect cells as a fusion with the maltose-binding protein", JOURNAL OF VIROLOGICAL METHODS, vol. 56, no. 2, 1996, pages 179-189, XP002716233, ISSN: 0166-0934 abstract page 180 ----- -/-	1-3, 5-12,17, 18,22



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 another citation or other special reason (as specified)

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"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

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/063588

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PURDY D E ET AL: "Secretion of noninfectious dengue virus-like particles and identification of amino acids in the stem region involved in intracellular retention of envelope protein", VIROLOGY, ELSEVIER, AMSTERDAM, NL, vol. 333, no. 2, 15 March 2005 (2005-03-15), pages 239-250, XP004757140, ISSN: 0042-6822, DOI: 10.1016/J.VIROL.2004.12.036 abstract page 246; figure 1	1-3, 5-12,17, 18,20-22
Y	----- WO 2011/115583 A1 (UNIV SINGAPORE [SG]; CENTRE NAT RECH SCIENT [FR]; UNIV CLAUDE BERNARD) 22 September 2011 (2011-09-22) abstract; figure 1B paragraph [00137]; figure 1B	1-3, 5-12,17, 18,20-22
Y	----- SARAH MURRELL ET AL: "Review of dengue virus and the development of a vaccine", BIOTECHNOLOGY ADVANCES, ELSEVIER PUBLISHING, BARKING, GB, vol. 29, no. 2, 29 November 2010 (2010-11-29), pages 239-247, XP028136136, ISSN: 0734-9750, DOI: 10.1016/J.BIOTECHADV.2010.11.008 [retrieved on 2010-12-10] page 244	1-3, 5-12,17, 18,20-22
Y	----- US 2004/234951 A1 (HERMIDA CRUZ LISSET [CU] ET AL) 25 November 2004 (2004-11-25) claims 1-35; sequence 32	1-3, 5-12,17, 18,20-22
X	----- CHEN YAPING ET AL: "Demonstration of binding of dengue virus envelope protein to target cells", JOURNAL OF VIROLOGY, vol. 70, no. 12, 1996, pages 8765-8772, XP002734187, ISSN: 0022-538X	1,2,5-8, 11,12, 17,18, 20,21
Y	page 8769 - page 8771; figure 1 ----- -/--	3,9,10, 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/063588

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LI G ET AL: "Comparison of immune responses against foot-and-mouth disease virus induced by fusion proteins using the swine IgG heavy chain constant region or beta-galactosidase as a carrier of immunogenic epitopes", VIROLOGY, ELSEVIER, AMSTERDAM, NL, vol. 3281-3, 5-12, 17, 18, 20-22, no. 2, 25 October 2004 (2004-10-25), pages 274-281, XP004581380, ISSN: 0042-6822, DOI: 10.1016/J.VIROL.2004.07.025 page 275 - page 277 -----	1-3, 5-12,17, 18,20-22
Y	WO 2009/099716 A1 (VGX PHARMACEUTICALS INC [US]; RAMANATHAN MATHURA P [US]; SARDESAL NIRAJ) 13 August 2009 (2009-08-13) claims 1-34 -----	1-3, 5-12,17, 18,20-22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2014/063588

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.:
1-3, 5-12, 17, 18, 20-22
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: 1-3(completely); 5-12, 17, 18, 20-22(partially)

A genetic construct comprising a nucleotide sequence encoding a secretion leader peptide, a nucleotide sequence a domain of envelope protein E DI-III of the dengue virus according to SEQ ID Nos. 11,12,13 and 14 and a nucleotide sequence encoding one or more carboxyterminal domains from the constant region of an immunoglobulin, a protein encoded by said construct, antibodies and a vaccine

2. claims: 4(completely); 5-12, 17-19, 24, 25(partially)

A genetic construct comprising a nucleotide sequence encoding a secretion leader peptide, a nucleotide sequence any domain of envelope protein E DIII of a virus of the Flavivirus genus and a nucleotide sequence encoding one or more carboxyterminal domains from the constant region of an immunoglobulin, a protein encoded by said construct, antibodies and a vaccine

3. claims: 13-16(completely); 17-22, 24, 25(partially)

Protein codified by the genetic construct, antibodies and uses as medicament, vaccines

4. claim: 23

Vaccine

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/063588

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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