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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.

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Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

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))*

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

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(54) **Title**: POLYVALENT VACCINE

(57) **Abstract**: The present invention relates, in general, to an immunogenic composition (e.g., a vaccine) and, in particular, to a polyvalent immunogenic composition, such as a polyvalent HIV vaccine, and to methods of using same. The invention further relates to methods that use a genetic algorithm to create sets of polyvalent antigens suitable for use, for example, in vaccination strategies.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/004664

A. CLASSIFICATION OF SUBJECT MATTER

C07K 14/155(2006.01)i, C12N 15/49(2006.01)i, A61K 39/21(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)
IPC 8: A61K 48/00, A61K 39/21, C12Q 1/68, A61K 39/29, A61K 31/70

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)
eKOMPASS (KIPO internal) & keywords: HIV, polyvalent, vaccine, T lymphocyte response, polypeptide, protein, nucleic acid, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2007-024941 A2 (THE REGENTS OF THE UNIVERSITY OF CALIFORNIA et al., US) 01 March 2007 See the whole document	1-7
A	WO 2007-047916 A2 (NOVARTIS AG., CH) 26 April 2007 See the whole document	1-7
A	US 2006-0216305 A1 (RENU B. LAL and SHERRY M. OWEN, US) 28 September 2006 See the whole document	1-7
A	US 2006-0275897 A1 (GARY J. NABEL et al., US) 07 December 2006 See the whole document	1-7
A	US 2003-0194411 A1 (ARYE RUBINSTEIN et al., US) 16 October 2003 See the whole document	1-7
A	US 2003-0180314 A1 (ANNE DEGROOT, US) 25 September 2003 See the whole document	1-7

☒ 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	Date of mailing of the international search report
05 APRIL 2010 (05.04.2010)	**06 APRIL 2010 (06.04.2010)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
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Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/004664

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002-0198162 A1 (JUHA PUNNONEN et al., US) 26 December 2002 See the whole document	1-7
A	KAORI SHINODA et al. 'Polygene DNA vaccine induces a high level of protective effect against HIV-vaccinia virus challenge in mice.' In: Vaccine. September 2004, Vol.22(27-28), pp.3523-3815. See the whole document	1-7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/004664

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.: 8, 9
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 8 and 9 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.:
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 Extra Sheet.

1. ☐ As all required addtional 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.

This ISA found multiple inventions as follows:

-Group I, claim(s) 1-7(in part), drawn to peptides/nucleic acids comprising HIV-1 gag-encoded antigenic epitopes.
-Group II, claim(s) 1-7(in part), drawn to peptides/nucleic acids comprising HIV-1 nef-encoded antigenic epitopes.
-Group III, claim(s) "1, 2, 4, 6, and 7"(in part), drawn to peptides/nucleic acids comprising HIV-1 env-encoded antigenic epitopes.

The inventions listed as Group I, II, and III 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 claims are drawn to "Markush" type groups peptides/nucleic acids. Under PCT Rule 13.2, the "Markush" grouping possess unity if:

(A) All alternatives have a common property or activity; and
(B1) A common structure is present, i.e., a significant structural element is shared by all of the alternatives; or
(B2) In the cases where the common structure cannot be the unifying criteria, all alternatives belong to a recognized class of chemical compounds in the art to which the invention pertains.

In the instant case, neither criteria A or B1 or B2 is met between the groups. Only within each groups do the alternatives have a common property: gag-, nef-, or env-encoded epitopes each and independently have the capacity to induce an immune response to respective class of epitopes because to the significantly different structure of the epitope.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/004664

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