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AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,  
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,  
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TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM,  
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KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG,  
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TD, TG)
- as to the applicant's entitlement to claim the priority of the  
earlier application (Rule 4.17(iii)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

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For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: HIV-PEPTIDE-CARRIER-CONJUGATES

(57) Abstract: The present invention is related to the fields of molecular biology, virology, immunology and medicine. The invention provides a modified virus-like particle (VLP) comprising a VLP which can be loaded with immunostimulatory substances, in particular with DNA oligonucleotides containing non-methylated C and G (CpGs), and particular HIV peptides linked thereto. Such CpG-VLPs are dramatically more immunogenic than their CpG-free counterparts and induce enhanced B and T cell responses. The immune response against HIV peptides optionally coupled, fused or attached otherwise to the VLPs is similarly enhanced as the immune response against HIV peptides are especially directed to the Th1 type. Antigens attached to CpG-loaded VLPs may therefore be ideal vaccines for prophylactic or therapeutic vaccination against allergies, tumors and other self-molecules and chronic viral diseases.

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# INTERNATIONAL SEARCH REPORT

International Application No  
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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61K39/39 A61K39/12 C07K14/16		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61K 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 practical, search terms used) EPO-Internal, BIOSIS, EMBASE, WPI Data, Sequence Search		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, Y	WO 03/024481 A (BACHMANN MARTIN F ; LIPOWSKY GERAD (CH); MAURER PATRICK (CH); MEIJERIN) 27 March 2003 (2003-03-27) the whole document	1-103
P, Y	WO 2004/000351 A (RENNER WOLFGANG A ; BACHMAN MARTIN F (CH); CYTOS BIOTECHNOLOGY AG (CH)) 31 December 2003 (2003-12-31) the whole document	1-103
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		
<input checked="" type="checkbox"/> Patent family members are listed in 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 document 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  9 November 2004	Date of mailing of the international search report  06 DEC 2004	
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Giebeler, K	

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP2004/003163

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>NOTKA FRANK ET AL: "Accelerated clearance of SHIV in rhesus monkeys by virus-like particle vaccines is dependent on induction of neutralizing antibodies" VACCINE, vol. 18, no. 3-4, 23 September 1999 (1999-09-23), pages 291-301, XP002291383 ISSN: 0264-410X see especially abstract and Figure 1; the whole document</p> <p style="text-align: center;">-----</p>	1-103
Y	<p>MARTIN SEAMUS J ET AL: "Immunization of human HIV-seronegative volunteers with recombinant p17/p24:Ty virus-like particles elicits HIV-1 p24-specific cellular and humoral immune responses" AIDS (PHILADELPHIA), vol. 7, no. 10, 1993, pages 1315-1323, XP009034714 ISSN: 0269-9370 see especially abstract and page 1316, column 1, paragraph 4 and column 2; the whole document</p> <p style="text-align: center;">-----</p>	1-103
Y	<p>LUO LIZHONG ET AL: "Induction of V3-specific cytotoxic T lymphocytes responses by HIV gag particles carrying multiple immunodominant V3 epitopes of gp120" VIROLOGY, vol. 240, no. 2, 20 January 1998 (1998-01-20), pages 316-325, XP002291384 ISSN: 0042-6822 see especially abstract, Figure 1, and page 323, column 2, paragraph 2; the whole document</p> <p style="text-align: center;">-----</p>	1-103
Y	<p>GERBER S ET AL: "Human papillomavirus virus-like particles are efficient oral immunogens when coadministered with Escherichia coli heat-labile enterotoxin mutant R192G or CpG DNA" JOURNAL OF VIROLOGY, THE AMERICAN SOCIETY FOR MICROBIOLOGY, US, vol. 75, no. 10, May 2001 (2001-05), pages 4752-4760, XP002246338 ISSN: 0022-538X the whole document</p> <p style="text-align: center;">-----</p>	21, 26-47, 68,72-92
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2004/003163

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>STORNI TAZIO ET AL: "Critical role for activation of antigen-presenting cells in priming of cytotoxic T cell responses after vaccination with virus-like particles"            JOURNAL OF IMMUNOLOGY,            vol. 168, no. 6,            15 March 2002 (2002-03-15), pages            2880-2886, XP002291385            ISSN: 0022-1767            the whole document</p>	21-23, 26-47, 68,69, 72-92
Y	<p>-----            WO 00/39304 A (CHIRON CORP)            6 July 2000 (2000-07-06)            see especially pages 32-38            the whole document</p>	1-103
Y	<p>-----            ADDO M M ET AL: "Comprehensive epitope analysis of human immunodeficiency virus type 1 (HIV-1)-specific T-cell responses directed against the entire expressed HIV-1 genome demonstrate broadly directed responses, but no correlation to viral load."            JOURNAL OF VIROLOGY,            vol. 77, no. 3, February 2003 (2003-02),            pages 2081-2092, XP002291386            ISSN: 0022-538X            see especially Tables 4 and 5;            the whole document</p>	1-103
Y	<p>-----            BUONAGURO L ET AL: "High efficient production of Pr55gag virus-like particles expressing multiple HIV-1 epitopes, including a gp120 protein derived from an Ugandan HIV-1 isolate of subtype A"            ANTIVIRAL RESEARCH,            vol. 49, no. 1, January 2001 (2001-01),            pages 35-47, XP002304514            ISSN: 0166-3542            the whole document</p>	1-103
Y	<p>-----            JEGERLEHNER ANDREA ET AL: "A molecular assembly system that renders antigens of choice highly repetitive for induction of protective B cell responses"            VACCINE,            vol. 20, no. 25-26,            19 August 2002 (2002-08-19), pages            3104-3112, XP002291387            ISSN: 0264-410X            see especially abstract            the whole document</p>	12-17, 60-65

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2004/003163

## Box 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 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

As a result of the prior review under R. 40.2(e) PCT,  
no additional fees are to be refunded.

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.:  
  
1-103 (all 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.  
 No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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