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- (71) **Applicants (for all designated States except US):** **DUKE UNIVERSITY** [US/US]; P.O. Box 90083, Durham, NC 27708-0083 (US). **UNIVERSITY OF KANSAS** [US/US]; 2385 Irving Hill Rd, Lawrence, KS 66045 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **HAYNES, Barton, F.** [US/US]; C/o Duke University, P.O. Box 90083, Durham, NC 27708-0083 (US). **DESAIRE, Heather** [US/US]; C/o University Of Kansas, 2385 Irving Hill Road, Lawrence, KS 66045 (US). **GO, Eden, P.** [PH/US]; C/o University Of Kansas, 2385 Irving Hill Road, Lawrence, KS 66045 (US).
- (74) **Agent:** **WILSON, Mary, J.;** Nixon & Vanderhye PC, 901 North Glebe Road, 11th Floor, Arlington, VA 22203-1808 (US).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW
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- Declaration under Rule 4.17:**  
— *of inventorship (Rule 4.17(iv))*
- Published:**  
— *with international search report*
- (88) **Date of publication of the international search report:**  
14 August 2008

(54) **Title:** CARBOHYDRATE-BASED VACCINES FOR HLV

(57) **Abstract:** The present invention relates, in-general, to Human immunodeficiency virus (HTV), and in particular to a carbohydrate-based vaccine for HIV and to methods of making and using same.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/ 19996

**A CLASSIFICATION OF SUBJECT MATTER**  
 IPC: **A61K** 39/00( 2006.01)

USPC. 424/184. 1,193 1  
 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)  
 U.S . 424/1 84 1,193 1

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)  
 Please See Continuation Sheet

**C DOCUMENTS CONSIDERED TO BE RELEVANT**

Category •	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	WO 2004/033663 A2 (WANG) 22 April 2004 (22.04 2004), entire document	1,5,9,10, 15 -----
Y		2-4,6-8,13,14,16-18
Y	WO 2004/075850 A2 (LIAO) 10 September 2004 (10 09.2004), entire document.	6
Y	SAIFUDDIN et al Interaction of mannose-binding lectin with primary isolates of human immunodeficiency virus type 1. Journal of General Virology, 2000, VoI 81, pages 949-955, entire document	13,14,17
Y	HAYNES et al Analysis of HIV-I subtype B third variable region peptide motifs for induction of neutralizing antibodies against HIV-I primary isolates Virology, 2006, VoI 345, pages 44 - 55, entire document.	3,4

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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"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	"&"	document member of the same patent family

Date of the actual completion of the international search 04 April 2008 (04 04.2008)	Date of completion of the international search report on <b>"MAY 2008"</b>
Name and mailing address of the ISA/US Mail Stop PCT, Attn ISA/US Commissioner for Patents P O Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer <i>Nicole Kinsey White</i> NICOLE KINSEY WHITE /Stacy B. Chen Primary Examiner Art Unit 1648 Telephone No. (571) 272- 1600

# INTERNATIONAL SEARCH REPORT

International application No. .  
PCT/US07/19996

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
<b>X</b>	NI et al. Toward a Carbohydrate-Based HIV-I Vaccine: Synthesis and Immunological Studies of Oligomannose-Containing Glycoconjugates. Bioconjugate Chem., 2006, Vol. 17, pages 493-500, entire document.	1,5,15

**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  
Please See Continuation 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 additional fees, this Authority did not invite payment of any 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

- 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 1-10 and 13-18

- 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

**BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I (claims 1-10 and 13-18), drawn to a composition comprising carbohydrates rendered immunogenic by derivatization to a carrier.

Group II (claims 11-12 and 19), drawn to methods for inducing neutralizing antibodies.

Group III (claim 20), drawn to a method for rendering the V3 loop of HIV Env available for binding to anti-V3 antibodies.

The inventions listed as Groups I-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 technical feature shared among the inventions listed as Groups I-III is a composition comprising carbohydrates of HIV Env rendered immunogenic by derivatization to a carrier. The noted shared technical feature does not provide a contribution over the prior art, as evidenced by the teachings of Wang (WO 2004/033663). Wang teaches a novel high-mannose oligosaccharide cluster comprising at least one high-mannose oligosaccharide assembled on a monosaccharide scaffold to provide a carbohydrate-based HIV-I vaccine. The general design of such a vaccine is where Man<sub>9</sub> represents the major high-mannose type oligosaccharide structure found on HIV-I gp120, and the immunogenic protein can be any potent immune-stimulating carrier protein such as KLH (keyhole limpet hemocyanin). Hence, in the absence of a contribution over the prior art, the noted shared technical feature is not a shared special technical feature. Without a shared special technical feature, the inventions listed as Groups I-III lack unity with one another.

Continuation of B. FIELDS SEARCHED Item 3:

Dialog (medhne, embase, scisearch, biosis) HIV, CARRIER, CARBOHYDRATE, VACCINE

In house patent database HIV, CARRIER, CARBOHYDRATE, VACCINE