

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
20 January 2005 (20.01.2005)

PCT

(10) International Publication Number
WO 2005/005603 A3

- (51) International Patent Classification⁷: **A61K 48/00**, C12N 15/00
- (21) International Application Number:
PCT/US2004/018441
- (22) International Filing Date: 10 June 2004 (10.06.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/477,056 10 June 2003 (10.06.2003) US
- (71) Applicant (for all designated States except US): **IOMAI CORPORATION** [US/US]; 20 Firstfield Road, Suite 250, Gaithersburg, MD 20878 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **EPPERSON, Diane, E.** [US/US]; 20 Firstfield Road, Suite 250, Gaithersburg, MD 20878 (US). **GLENN, Gregory, M.** [US/US]; 20 Firstfield Road, Suite 250, Gaithersburg, MD 20878 (US). **HAMMOND, Scott, A.** [US/US]; 20 Firstfield Road, Suite 250, Gaithersburg, MD 20878 (US).
- (74) Agents: **ZISKA, Suzanne, E.** et al.; Morgan, Lewis & Bockius LLP, 1111 Pennsylvania Avenue, NW, Washington, DC 20004 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, 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, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report:
20 October 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR INDUCING AN IMMUNE RESPONSE TO CANCER ANTIGEN

(57) Abstract: An immune response is induced in a host by expressing at least one nonself (*i.e.*, foreign) major histocompatibility complex (MHC) Class II molecule on host antigen presenting cells (APC) to stimulate host CD4⁺ T cells and presenting at least one oligopeptide of a cancer antigen to naive host CD8⁺ T cells. From these priming events, the development of a cancer antigen-specific cytotoxic reaction in the host may be dependent on or enhanced by help provided by the CD4⁺ T cells. A method for immunization is comprised of (1) at least one foreign MHC Class II molecule and (2) at least one tumor antigen having an amino acid sequence with at least one self MHC Class I-restricted oligopeptide therein. Adjuvant is an optional component of the system.

WO 2005/005603 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/18441

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : A61K 48/00; C12N 15/00 US CL : 514/44; 435/320.1 According to International Patent Classification (IPC) or to both national classification and IPC</p>																	
<p>B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 514/44; 435/320.1</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet</p>																	
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>US 6,472,375 B1 (HOON et al) 29 October 2002 (29.10.2002), abstract, column 3, lines 5-32, column 4, lines 21-67, column 5, lines 1-8, 19-32, column 6, lines 1-27.</td> <td>1-27</td> </tr> <tr> <td>A</td> <td>US 2002/0085991 A1 (SCHMIDT et al) 4 July 2002 (04.07.2002), abstract, page 2.</td> <td>1-27</td> </tr> <tr> <td>A</td> <td>US 6,465,251 B1 (SCHULTZE et al) 15 October 2002 (15.10.2002) abstract, column 8, lines 4-15, 29-67, column 10, lines 18-60, column 13, lines 19-31.</td> <td>1-27</td> </tr> <tr> <td>A, P</td> <td>US 2003/0235594 A1 (HUMPHREYS et al) 25 december 2003 (25.12.2003) abstract, pages 6, 8, 9 and 32.</td> <td>1-27</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	US 6,472,375 B1 (HOON et al) 29 October 2002 (29.10.2002), abstract, column 3, lines 5-32, column 4, lines 21-67, column 5, lines 1-8, 19-32, column 6, lines 1-27.	1-27	A	US 2002/0085991 A1 (SCHMIDT et al) 4 July 2002 (04.07.2002), abstract, page 2.	1-27	A	US 6,465,251 B1 (SCHULTZE et al) 15 October 2002 (15.10.2002) abstract, column 8, lines 4-15, 29-67, column 10, lines 18-60, column 13, lines 19-31.	1-27	A, P	US 2003/0235594 A1 (HUMPHREYS et al) 25 december 2003 (25.12.2003) abstract, pages 6, 8, 9 and 32.	1-27
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.															
A	US 6,472,375 B1 (HOON et al) 29 October 2002 (29.10.2002), abstract, column 3, lines 5-32, column 4, lines 21-67, column 5, lines 1-8, 19-32, column 6, lines 1-27.	1-27															
A	US 2002/0085991 A1 (SCHMIDT et al) 4 July 2002 (04.07.2002), abstract, page 2.	1-27															
A	US 6,465,251 B1 (SCHULTZE et al) 15 October 2002 (15.10.2002) abstract, column 8, lines 4-15, 29-67, column 10, lines 18-60, column 13, lines 19-31.	1-27															
A, P	US 2003/0235594 A1 (HUMPHREYS et al) 25 december 2003 (25.12.2003) abstract, pages 6, 8, 9 and 32.	1-27															
<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p>																	
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"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	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed						
"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	"&" document member of the same patent family																
"P" document published prior to the international filing date but later than the priority date claimed																	
<p>Date of the actual completion of the international search 21 July 2005 (21.07.2005)</p>		<p>Date of mailing of the international search report 03 AUG 2005</p>															
<p>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. (703) 305-3230</p>		<p>Authorized officer Tara L. Garvey <i>Tara L. Garvey</i> Telephone No. (571) 272-0507</p>															

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/18441

Continuation of B. FIELDS SEARCHED Item 3:
EAST, MEDLINE, CAPLUS, BIOSIS, EMBASE

Search Terms: major histocompatibility complex class II, MHC class II, tumor, cancer, antigen, DNA, vector, antigen presenting cell, APC, foreign, non-self, immune, response, reaction