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61/472,411 6 April 2011 (06.04.2011) US
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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, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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:**

7 March 2013

(54) **Title:** ANTIBODY BIOMARKERS FOR DIABETES

(57) **Abstract:** Methods are provided for determining whether a subject has a diabetes phenotype. In practicing the subject methods, a sample, e.g., a blood sample, from a subject is analyzed for the presence of one or more autoantibodies to obtain an antibody signature. The obtained antibody signature is then employed to determine whether the subject has a diabetes phenotype. The subject methods may be used in diagnostic or prognostic applications, e.g., determining whether the subject has diabetes (e.g., T1D or T2D), or monitoring a subject with diabetes to determine whether the subject has or will develop ESRD. Also provided are compositions, systems and kits that find use in practicing the subject methods. The subject methods and compositions find use in a variety of applications, including the diagnosis and monitoring of diabetes in a subject.



A. CLASSIFICATION OF SUBJECT MATTER**G01N 33/564(2006.01)i, G01N 33/68(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)

G01N 33/564; C12Q 1/02; C40B 30/10; G01N 33/53

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: diabetes, phenotype, autoantibody, biomarker, diagnosis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010-0120629 A1 (ELLIS TAMIR M. et al.) 13 May 2010 See the abstract, example 4 and claims 5-6	21-25
A	US 2009-0197286 A1 (KARIN NATHAN et al.) 06 August 2009 See the abstract, example 1 and claims	21-25
A	Metz, T. O. et al., "Application of proteomics in the discovery of candidate protein biomarkers in a diabetes autoantibody standardization program sample subset," J. Proteome Research, 2008, Vol. 7, No. 2, pp. 698-707 See the abstract, Fig. 6 and tables 3-4	21-25
A	Butte, A. J. et al., "Protein microarrays discover angiotensinogen and PRKRIP1 as novel targets for autoantibodies in chronic renal disease," Molecular & Cellular Proteomics, 23 December 2010, Vol. 10: 10.1074/mcp.M110.000497 pp. 1-8 See the abstract, Fig. 1 and table 1	21-25



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

28 DECEMBER 2012 (28.12.2012)

Date of mailing of the international search report

03 JANUARY 2013 (03.01.2013)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/032610**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.: 1-20
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 1-20 pertain to methods for diagnosis of diabetes, and thus relate to a subject matter which this International Searching Authority is not required to search, under Article 17(2)(a)(i) of the PCT and Rule 39.1(iv) of the Regulations under the PCT.
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:

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.:
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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/032610

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010-0120629 A1	13.05.2010	CA 2529759 A1 EP 1718327 A2 EP 1718327 A4 JP 04-717810 B2 JP 2007-526449 A JP 4717810 B2 US 2005-0054005 A1 US 7648825 B2 WO 2005-094200 A2 WO 2005-094200 A3	13.10.2005 08.11.2006 05.11.2008 08.04.2011 13.09.2007 06.07.2011 10.03.2005 19.01.2010 13.10.2005 13.10.2005
US 2009-0197286 A1	06.08.2009	BR P10706967A2 CA 2641079 A1 CN 101416063 A EP 1989554 A1 JP 2009-526219 A JP 2009-526219 T WO 2007-091254 A1	12.04.2011 16.08.2007 22.04.2009 12.11.2008 16.07.2009 16.07.2009 16.08.2007