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Published:

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(88) **Date of publication of the international search report:**
15 April 2010



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(54) **Title:** METHODS AND MATERIALS FOR MONITORING MYELOMA USING QUANTITATIVE MASS SPECTROMETRY

(57) **Abstract:** The subject invention concerns methods and materials for diagnosing, monitoring the progress, and/or providing a prognosis for multiple myeloma and other conditions associated with antibody production in a person or animal. The methods of the invention utilize mass spectrometry for quantitative monitoring and detection of antibody produced by the plasma cells. The methods of the invention can be utilized for diagnosis, monitoring, and/or prognosis of multiple myeloma, monoclonal gammopathy, and other immunological or hematological conditions and disorders. In addition to detecting and quantifying antibody in a sample, other biological markers, such as serum albumin and/or beta-2-microglobulin, can also be detected and quantified using the present invention, and in combination with detection and quantification of antibody. Thus, in one embodiment, both antibody and serum albumin and/or beta-2-microglobulin are detected and quantified using mass spectrometry and a diagnosis or prognosis made based on the results and levels detected.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/049286**A. CLASSIFICATION OF SUBJECT MATTER***C07K 16/00(2006.01)i, A61P 35/00(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)

C07K 16/00

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
(Chinese Patents and application for patent)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal), Delphion, Pubmed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	KOOMEN, J. M. et al. 'Proteomic contributions to personalized cancer care.' Molecular and Cellular Proteomics. Vol. 7(10), pp. 1780-1794 (29 July 2008) See p. 1788, right column lines 32~p.1790.	1-3
X	GREIPP, P. R. et al. 'International staging system for multiple myeloma.' Journal of Clinical Oncology. Vol. 23(15), pp. 3412-3420 (4 April 2005)	1
A	See p. 3413, left column, lines 1-21.	2-3
A	LANGE, V. et al. 'Targeted quantitative analysis of Streptococcus pyogenes virulence factors by multiple reaction monitoring.' Molecular and Cellular Proteomics. Vol. 7(8), pp. 1489-1500 (13 April 2008) See abstract; p. 1490, left column, lines 27-31.	1-3
A	KUHN, E. et al. 'Quantification of C-reactive protein in the serum of patients with rheumatoid arthritis using multiple reaction monitoring mass spectrometry and ¹³ C-labeled peptide standards.' Proteomics. Vol. 4(4), pp. 1175-1186 (April 2004) See the abstract.	1-3

 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

22 FEBRUARY 2010 (22.02.2010)

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INTERNATIONAL SEARCH REPORT

International application No. PCT/US2009/049286

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MALLICK, P. et al. 'Computational prediction of proteotypic peptides for quantitative proteomics.' Nature Biotechnology. Vol. 25(1), pp. 125-131 (31 December 2006) See the abstract.	1-3
A	KIRKPATRICK, D. S. et al. 'The absolute quantification strategy: a general procedure for the quantification of proteins and post-translational modifications.' Methods. Vol. 35(3), pp. 265-273 (12 January 2005) See the abstract.	1-3
A	DEUTSCH, E. W. et al. 'PeptideAtlas: a resource for target selection for emerging targeted proteomics workflows.' EMBO Reports. Vol. 9(5), pp. 429-434 (May 2008) See the abstract.	1-3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/049286**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.: 4-27
because they relate to subject matter not required to be searched by this Authority, namely:
Said claims pertain to methods for diagnosis of diseases on the human body, thus relate to a subject-matter which International Searching Authority is not required to search under PCT Art. 17(2)(a)(i) and Rule 39.1(iv).
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/US2009/049286

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
None			