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Published:
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13 November 2003

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.

WO 02/076282 A3

(54) Title: METHOD FOR QUANTITATIVE ANALYSIS OF BLOOD VESSEL STRUCTURE

(57) Abstract: We disclose quantitative geometrical analysis enabling the measurement of several features of images of tissues including perimeter, area, and other metrics. Automation of features extraction creates a high throughput capability that enables analysis of serial sections for more accurate measurement of tissue dimensions. Measurement results are input into a relational database where they can be statistically analyzed and compared across studies. As part of the integrated process, results are also imprinted on the images themselves to facilitate auditing of the results. The analysis is fast, repeatable and accurate while allowing the pathologist to control the measurement process.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/00529

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : GO6K 9/00, 9/20, 9/36; G06T 1/40; G02B 21/00; G06N 3/00
US CL : 706/13; 382/280, 282, 286, 305; 702/19, 21; 359/368

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. : 706/13; 382/280, 282, 286, 305; 702/19, 21; 359/368

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)
WEST, STN (BIOSIS, MEDLINE)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,E	US 6,463,438 B1 (VELTRI ET AL.) 08 October 2002 (08/10/02), see entire document.	1-4
Y,E	US 6,415,046 B1 (KERUT SR.) 02 July 2002 (02/07/02), see entire document.	1-4
X,P	US 6,181,811 B1 (KUAN ET AL.) 30 January 2001 (30/01/01), see entire document.	1-4
X,E	US 6,404,906 B2 (BACUS ET AL.) 11 June 2002 (11/06/02), see entire document.	1
X,P	US 6,246,785 B1 (MOLNAR ET AL.) 12 June 2001 (07/06/01), see entire document.	1-3
X	US 6,137,899 A (LEE ET AL.) 24 October 2000 (24/10/00), see entire document.	1-3
X	US 6,101,265 A (BACUS ET AL.) 08 August 2000 (08/08/00), see entire document, especially column 1, lines 12-16.	1-4
X	US 5,784,162 A (CABIB ET AL.) 21 July 1998 (21/07/98), see entire document, especially abstract, column 1, lines 1-25; column 5, lines 45-60; columns 7-8; cloumn 10, lines 39-49; column 11, line 39-column 13, line 14.	1-4

☐ 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

"E" earlier application or patent 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	Date of mailing of the international search report
03 December 2002 (03.12.2002)	10 JUN 2003
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Lori A. Clow Telephone No. 703-308-0916

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Int al application No.
PCT/US02/00529

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim 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. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 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 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.: 1-4

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I, claims 1-4, drawn to a method to facilitate visualization of a feature in a tissue.
Group II, claims 5-9, drawn to a method for quantitative determination of geometry of a given blood vessel.
Group III, claims 10-14, drawn to a method for rapidly localizing a fractured boundry segment in a blood vessel image and generating a contour connecting the fractured ends.
Group IV, claims 15-20, drawn to a method for determining the extent of retenosis in a given blood vessel with a fractured boundry segment.

The inventions listed as Groups I-IV do not relate to a 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 special technical feature of the first group is considered to be the recited steps leading to the stated goal. Each of the groups recites different method steps and is directed to a different goal and as such, the groups do not share a special technical feature.