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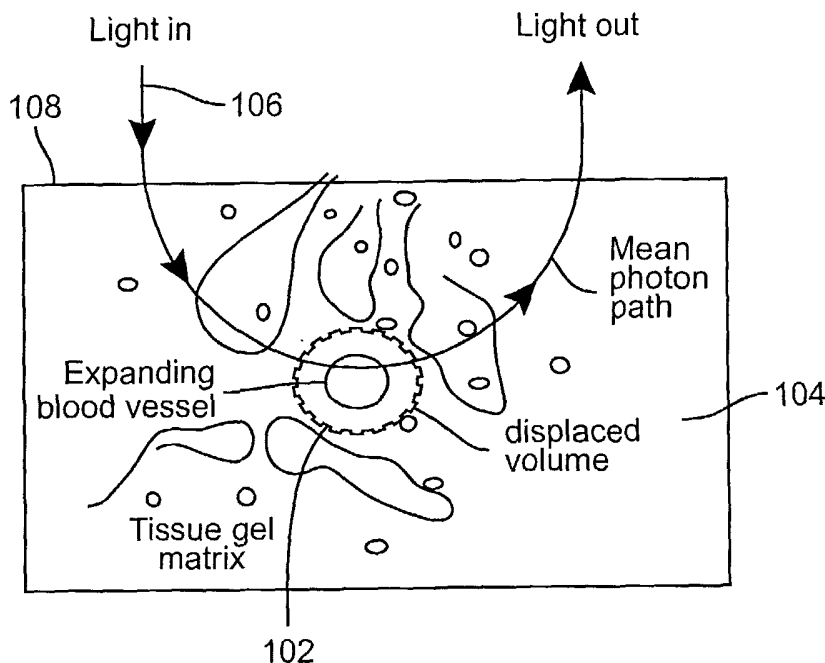
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR IMPROVING THE ACCURACY OF NONINVASIVE HEMATOCRIT MEASUREMENTS



(57) Abstract: A device and a method to provide a more reliable and accurate measurement of hematocrit (Hct) by noninvasive means. The changes in the intensities of light of multiple wavelengths transmitted through or reflected light from the tissue location are recorded immediately before and after occluding the flow of venous blood from the tissue location with an occlusion device positioned near the tissue location. As the venous return stops and the incoming arterial blood expands the blood vessels, the light intensities measured within a particular band of near-infrared wavelengths decrease in proportion to the volume of hemoglobin in the tissue location; those intensities measured within a separate band of wavelengths in which water absorbs respond to the difference between the water fractions within

the blood and the displaced tissue volume. A mathematical algorithm applied to the time-varying intensities yields a quantitative estimate of the absolute concentration of hemoglobin in the blood. To compensate for the effect of the unknown fraction of water in the extravascular tissue on the Hct measurement, the tissue water fraction is determined before the occlusion cycle begins by measuring the diffuse transmittance or reflectance spectra of the tissue at selected wavelengths.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/07760

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N21/35 A61B5/00 G01N33/72

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)

IPC 7 G01N A61B

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, BIOSIS, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 499 627 A (HARRIS DAVID H ET AL) 19 March 1996 (1996-03-19) cited in the application * column 9, line 66 - column 10, line 4; column 10, lines 26-31; column 11, lines 5-12; column 13, lines 11-12; figures 1a, 1b, 6 and 6a *	1-3, 5-10, 12, 13
X	US 5 833 602 A (OSEMWOTA OMOIGUI) 10 November 1998 (1998-11-10) * column 4, lines 38-46; figure 6; claim 1 *	1, 3
X	US 6 178 342 B1 (THOMPSON RICHARD JOHN ET AL) 23 January 2001 (2001-01-23) * column 2, line 19 - column 3, line 54; figures 1 and 2 *	1, 2, 4, 11
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 Further documents are listed in the continuation of box C. Patent family members are listed in 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 document 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 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

13 September 2002

Date of mailing of the international search report

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/07760

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 93 13706 A (US HEALTH) 22 July 1993 (1993-07-22) * page 1, lines 2-3; page 18, lines 7-27; figure 4 * -----	1
Y	US 4 883 055 A (MERRICK EDWIN B) 28 November 1989 (1989-11-28) * column 2, lines 24-40; figures 1 and 2 * -----	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/07760

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.: 19-22, 27
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Diagnostic method practised on the human or animal body
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 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:

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.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

national Application No

PCT/US 02/07760

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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