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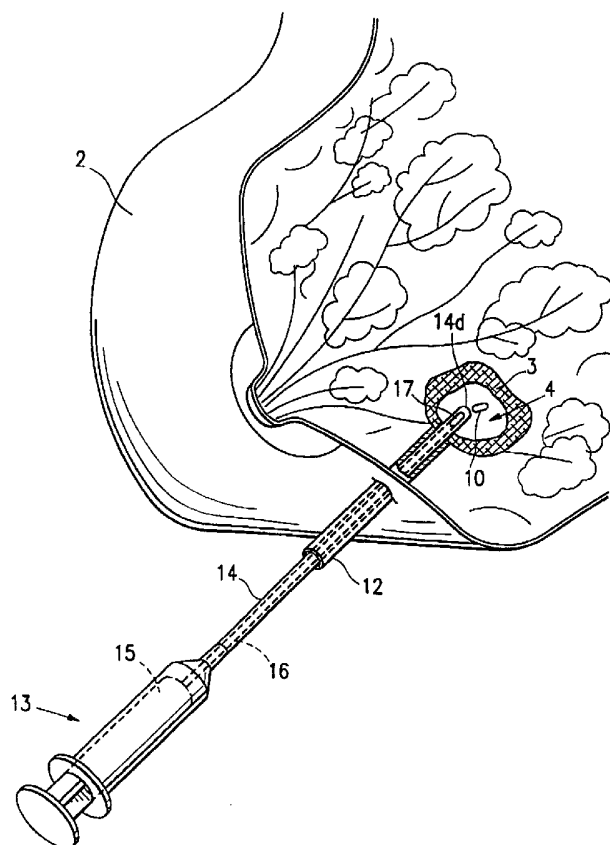
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[Continued on next page]

(54) Title: TISSUE SITE MARKERS FOR IN VIVO IMAGING



(57) Abstract: The invention is directed biopsy site markers and methods of marking a biopsy site, so that the location of the biopsy cavity is readily visible by conventional imaging methods, particularly by ultrasonic imaging. The biopsy site markers of the invention have high ultrasound reflectivity, presenting a substantial acoustic signature from a small marker, so as to avoid obscuring diagnostic tissue features in subsequent imaging studies, and can be readily distinguished from biological features. The several disclosed embodiments of the biopsy site marker of the invention have a high contrast of acoustic impedance as placed in a tissue site, so as to efficiently reflect and scatter ultrasonic energy, and preferably include gas-filled internal pores. The markers may have a non-uniform surface contour, such as a porous, irregular, frosted, faceted, multi-planar or lobulate surface, to enhance the acoustic signature. The markers have a characteristic form which is recognizably artificial during medical imaging.



European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/43403A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B19/00

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 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 00 24332 A (CORTESE ARMAND F) 4 May 2000 (2000-05-04)</p> <p>page 14, line 21 -page 15, line 12 page 15, line 20 -page 16, line 9 page 16, line 25 - line 32 page 17, line 7 - line 17 page 21, line 3 -page 22, line 1 page 22, line 10 - line 15 page 22, line 24 - line 34 --- --/--</p>	<p>1-10,12, 19,22, 26,27, 29,30</p>

☒ 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 December 2002

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/43403

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 386 936 A (VANCE PRODUCTS INC) 12 September 1990 (1990-09-12) abstract column 4, line 25 - line 27 column 7, line 37 - line 49 column 8, line 11 - line 14 column 8, line 36 - line 41	1-3,6-9, 29,30
A	column 9, line 11 - line 12 figures 1-4,9-11 ---	14,15
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X	US 5 394 875 A (LEWIS JUDITH T ET AL) 7 March 1995 (1995-03-07) column 1, line 8 - line 25 column 3, line 62 - column 4, line 3 column 11, line 54 - column 12, line 14 figure 15 ---	1-3,8,9
X	WO 00 38579 A (BUSH MARY ELIZABETH ;CONSTON STANLEY R (US); FAWZI NATALIE V (US);) 6 July 2000 (2000-07-06) page 18, paragraph 2 page 21, paragraph 2 figures 1L,1M ---	32
A	US 5 469 847 A (ZINREICH SIMION J ET AL) 28 November 1995 (1995-11-28) column 3, line 6 - line 12 column 6, line 6 - line 16 -----	1
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INTERNATIONAL SEARCH REPORT

Int'l application No.
PCT/US 01/43403

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

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:

see additional 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.:

Remark on Protest

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

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-31

Claims 1-31 refer to an intracorporeal site marker with a body shape which is recognisably artificial when the marker is subject to ultrasound or X-ray imaging, whereby the said marker comprises an ultrasound detectable body including boundaries having high contrast in acoustical impedance.

2. Claim : 32

Claim 32 refers to an intracorporeal site marker with a body shape which is recognisably artificial when the marker is subject to ultrasound or X-ray imaging, whereby the said marker comprises an elongated body of gel having a metallic band disposed at least partially surrounding the body of gel.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/43403

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