**Abstract:** A method and apparatus are disclosed for treating tissue, including an intra-operative mapping of a probe ablation zone. The method uses a system that maps the proximal and distal margins of the probe ablation zone using tools that are used to access the ablation target. In some embodiments, the tools comprise an introducer assembly, including a cannula and a stylet, and a bone drill. The tools have features or markings that cooperate to indicate which probe to use to achieve the desired ablation. The method further facilitates planning probe placement for delivering energy to treat (ablate) a desired ablation volume of a target tissue by using a system that maps both the target tissue and possible probe ablation zones.

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INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8): A61B 5/042, 18/12, 24/18, 28/12     (2014.01)

CPC: A61B 18/02, 2018/00005, 2018/00041, 2018/00293

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(8): A61B 5/042, 18/12, 24/18, 28/12   (2014.01)


Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practical, search terms used)


C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2006/0079867 A1 (BERZAK, N et al.) April 13, 2006; abstract; figure 21; paragraphs [0025], [0220]-[0223]; claims 10, 12-13</td>
<td>1, 134</td>
</tr>
<tr>
<td>Y</td>
<td>US 6471700 B1 (BURBANK, F et al.) October 29, 2002; figures 12-13; column 2, lines 18-20; column 4, lines 53-54; column 5, lines 16-18; column 6, lines 19-20; column 10, lines 50-53; column 11, lines 7-12; 24-25, 39-44; column 12, lines 12-13, 46-48</td>
<td>2-7, 11/1-7, 12/1-7, 83/1, 84/1, 85/84/1, 135</td>
</tr>
<tr>
<td>Y</td>
<td>US 2012/0065495 A1 (RICHARDS-KORTUM, R et al.) March 15, 2012; paragraph [0070]</td>
<td>83/1</td>
</tr>
<tr>
<td>Y</td>
<td>US 6511418 B2 (SHAHID, R et al.) January 28, 2003; column 3, lines 13-25</td>
<td>84/1, 85/84/1</td>
</tr>
<tr>
<td>Y</td>
<td>US 2005/038422 A1 (MAURICE, GT) February 17, 2005; figures 6A-C; paragraphs [0060], [0065], [0071]</td>
<td>135</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* 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 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

&T* document member of the same patent family

Date of the actual completion of the international search

23 November 2014 (23.11.2014)

Date of mailing of the international search report

21 JAN 2015

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer: Shane Thomas
PCT Helpdesk: 571-272-4300
PCT/US/ 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)
### 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.: 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).

### 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:

Group I: Claims 1-14, 83/1, 84/1, 85/84/1 and 134-135 are directed toward a method for intra-operative mapping of a probe ablation zone.

Group II: Claims 15-31, 86-98, 117, 123-133 and 146-149 are directed toward a system for treating tissue.

Group III: Claims 32-82, 83/32, 84/32, 85/84/32, 118-122 and 136-145 are directed toward a method for intra-operative probe selection for ablation of tissue at a treatment site, the method comprising using tools having features that cooperate to determine probe selection.

Group IV: Claims 99-16 are directed toward a method of ablating a target tissue.

"---Continued Within the Next Supplemental Box."---

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 additional fees, this Authority did not invite payment of additional fees.

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.: 1-14, 83/1, 84/1, 85/84/1, 134-135

**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.
The inventions listed as Groups I-IV do not relate to a single 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 features of Group I include the probe ablation zone being substantially equivalent to a target tissue being targeted for ablation, which are not present in Groups II-IV; the special technical features of Group II include a medical instrument defining one or more indicia, each indicia for defining a probe ablation zone; and one or more probes, each probe corresponding to a single indicia of the medical instrument, which are not present in Groups I and III-IV; the special technical features of Group III include mapping a proximal margin and a distal margin of a probe ablation zone at the treatment site using tools having features that cooperate to determine probe selection, which are not present in Groups I and IV; the special technical features of Group IV include removing the stylet from the cannula; inserting a bone drill into the cannula; and advancing the bone drill until a distal tip of the bone drill is at a distal edge of a desired ablation volume, the distal tip thereby defining a distal margin of a probe ablation zone, which are not present in Groups III-IV.

The common technical features of Groups I-IV are treating tissue comprising a probe ablation zone.

These common technical features are disclosed by US 6,471,700 B1 to Burbank, et al. (hereinafter ‘Burbank’). Burbank discloses treating tissue comprising a probe ablation zone (tissue adjacent the primary electrode 28 is ablated to create an incision as the electrode 28 passes through the tissue; column 5, lines 51-53).

Since the common technical features are previously disclosed by the Burbank reference, the common features are not special and so Groups I-IV lack unity.

The additional common technical features of Groups I and III are mapping a proximal margin and a distal margin of a probe ablation zone at the treatment site using tools.

These common technical features are disclosed by the Burbank reference. Burbank discloses mapping a proximal margin and a distal margin of a probe ablation zone at the treatment site using tools (electrosurgical ablation process is continued until the system 10 is appropriately positioned with regard to the target site 180; column 11, lines 8-12).

Since the common technical features are previously disclosed by the Burbank reference, the common features are not special and so Groups I and III lack unity.

The additional common technical features of Groups II and IV are an introducer assembly, including a cannula and a stylet.

These common technical features are disclosed by the Burbank reference. Burbank discloses an introducer assembly, including a cannula and a stylet (system for accessing a desired site within a patient’s body includes a cannula defining an inner; an electrosurgical stylet slidably fits inside the inner lumen; abstract).

Since the common technical features are previously disclosed by the Burbank reference, the common features are not special and so Groups II and IV lack unity.