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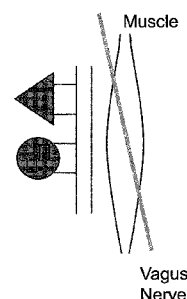
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16 September 2010

(54) Title: DEVICES AND METHODS FOR OPTIMIZING ELECTRODE PLACEMENT FOR ANTI-INFLAMMATORY STIM-
ULATION

FIG. 1: Artifact-guided placement and programming of
percutaneous electrode leads

- Problem
 - Efficacious stimulation without side-effects (may not be a problem if stimulation thresholds are extremely low).
- Observations
 - Artifact (i.e., muscle twitching) was the most significant problem while stimulating rats. Problems were resolved by repositioning electrode.
 - Anecdotal evidence claims that artifact is a significant problem with percutaneous insertions and requires significant "tweaking" to get efficacious stimulation of vagus (VNS).
- Proposed System
 - EMG artifact can be used to indicate stimulation artifact while surgeon inserts electrode allowing placement optimization.
 - Quadrapolar contacts allow 6 contacts to be evaluated for minimal artifact during programming.
 - Could be used for placement of electrode for any minimally invasive surgical technique for stimulators including VNS.



(57) Abstract: Described herein are methods, devices and system for selecting an optimum position of a stimulation electrode, and particularly methods, devices and systems for optimizing the position of a stimulation electrode for stimulating the inflammatory reflex and thereby inhibiting inflammation. The methods, devices and systems described herein may generally include the analysis of one or more artifact modalities arising after the application of a stimulation pulse. One or more of these artifact modalities (e.g., EMG, ECG, etc.) may be detected and used to generate a comparable indicator of the fitness of the position of the electrode relative to a target, such as a portion of the inflammatory reflex like the vagus nerve.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/064775**A. CLASSIFICATION OF SUBJECT MATTER*****A61N 1/36(2006.01)i, A61B 5/04(2006.01)i, A61B 5/0488(2006.01)i, A61B 5/0452(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)

A61N 1/36; A61B 5/04; A61N 1/18; A61N 1/362

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

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

eKOMPASS(KIPO internal) & Keywords: "electrode, inflammatory, reflex, stimulation, artifact, indicator, amplifier, position"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006-0287678 A1 (LISA LYNN SHAFER) 21 December 2006 See paragraphs [0066] - [[0073] and [0102], abstract, figures 2, 8 and 9	10-14
A	US 2006-0178706 A1 (DANIEL M. LISOGURSKI et al.) 10 August 2006 See claim 33, abstract, figures 1 and 7	10-14
A	US 2006-0206155 A1 (TAMIR BEN-DAVID et al.) 14 September 2006 See claims 1, 2, abstract, figure 1	10-14
A	US 2004-0049121 A1 (URI YARON) 11 March 2004 See claim 1, abstract, figure 1	10-14

☐ 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

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"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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/064775**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.: 1-9
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 1-9 pertain to methods for treatment of human body by surgery and thus relate to a subject matter which this International Searching Authority is not required to search under Article 17(2)(a)(i) and Rule 39.1(iv) PCT.
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.

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