Title: HEAT EXCHANGER CATHETER FOR CONTROLLING BODY TEMPERATURE

Abstract: Methods and apparatuses for temperature modification of a patient, or selected regions thereof, including an induced state of hypothermia of the brain region for neuroprotection. The temperature modification is accomplished using an in-dwelling heat exchange catheter (52) within which a fluid heat exchange medium circulates. Various disposable heat exchange cassettes are attached to the circulatory flow lines of the catheter, the heat exchange cassettes sized to engage cavities within various control units (50). The control units (50) include a heater/cooler device (66), a user input device (72), and a processor (70) connected to receive input from various sensors (36, 80). The heater/cooler (66) device may be thermoelectric to enable both heating and cooling based on polarity. A temperature control scheme for ramping the body temperature up and down without overshoot is provided. The disposable heat exchange cassettes may include an integral pump head (98) that engages a pump drive mechanism (68) in the control unit (50).
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.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**
- IPC(7) : A61F 07/00;
- US CL : 607/105;
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. : 607/105, 106, 118;
- 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 practicable, search terms used)
  - none

**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>
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<tbody>
<tr>
<td>Y</td>
<td>US 5,837,003 A (Ginsburg) 17 November 1998, see entire document.</td>
<td>13-16, 19-20</td>
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<td>1-12, 17, 18</td>
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<td>US 5,645,531 A (Thompson et al.) 08 July 1997, see entire document.</td>
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<td>A</td>
<td>US 5,716,386 A (Ward et al.) 10 February 1998, see entire document.</td>
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**Further documents are listed in the continuation of Box C.**

- Special categories of cited documents:
  - "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;
  - "Z" document member of the same patent family.

**Date of the actual completion of the international search**
- 07 FEBRUARY 2002

**Date of mailing of the international search report**
- 16 APR 2002

Name and mailing address of the ISA/US
- Commissioner of Patents and Trademarks
- Washington, D.C. 20231
- Facsimile No. (703) 305-3930

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Form PCT/ISA/210 (second sheet) (July 1998)
## INTERNATIONAL SEARCH REPORT

### (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
<td>A</td>
<td>US 5,211,631 A (Sheaff) 18 May 1993, see entire document.</td>
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<td>US 5,624, 392 A (Saab) 29 April 1997, see entire document.</td>
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