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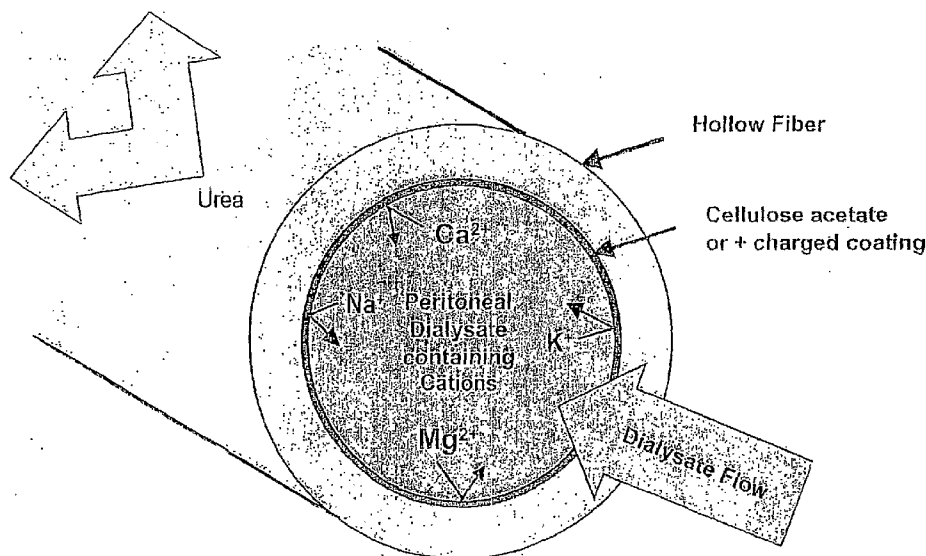
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[Continued on next page]

(54) Title: WEARABLE KIDNEY

## Hollow Fiber Cartridge: Ion Rejecting Skin



(57) Abstract: The present invention relates to a wearable peritoneal dialysis system (10) and a replaceable cartridge (32) in the wearable peritoneal dialysis system (10) that regenerates the peritoneal dialysis solution without removing positively charged, essential ions from the solution and, consequently, the patient. The invention also relates to methods of removing uremic waste metabolites from a patient using the wearable peritoneal dialysis system (10). The wearable peritoneal dialysis system (10) is meant to operate continuously or semi-continuously and be comfortably worn by a patient without significant burden.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*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.*

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/005779

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. A61M1/16 A61M1/28

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)  
A61M

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, EMBASE, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 944 684 A (ROBERTS MARTIN [US] ET AL) 31 August 1999 (1999-08-31) figures 1,2 column 4, line 66 - column 5, line 7 column 5, line 62 - column 6, line 23 column 7, line 32 - column 8, line 11 -----	1-25
Y	WO 2004/009158 A (BAXTER INT [US]; BAXTER HEALTHCARE SA [CH]) 29 January 2004 (2004-01-29) figures 1,3-6,8 page 14, line 24 - page 15, line 18 page 16, line 1 - page 17, line 4 page 18, lines 8-12 page 26, line 9 - page 27, line 4 page 30, line 8 - line 12 page 33, line 11 - line 18 page 35, line 1 - page 36, line 14 ----- -/--	1-25

☒ 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 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.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

5 September 2007

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11/09/2007

Name and mailing address of the ISA/

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# INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 094 775 A (MUELLER WILLIAM A) 13 June 1978 (1978-06-13) figures 1-4 column 3, line 27 - column 4, line 26 column 5, line 19 - column 6, line 4 column 6, lines 29-63 -----	1-25
Y	DE 31 10 128 A1 (FRAUNHOFER GES FORSCHUNG [DE]) 23 September 1982 (1982-09-23) figures 1,2 page 14, lines 29-33 page 18, line 13 - page 19, line 2 page 20, line 35 - page 23, line 12 -----	1-25
Y	BLUMENKRANTZ M J ET AL: "Applications of the Redy Sorbent System to Hemodialysis and Peritoneal Dialysis" ARTIFICIAL ORGANS, BLACKWELL SCIENTIFIC PUBLICATIONS, INC., BOSTON, US, vol. 3, no. 3, August 1978 (1978-08), pages 230-236, XP009088722 ISSN: 0160-564X cited in the application page 230, right-hand column, line 26 - page 231, right-hand column, line 15 figures 1,2 page 233, right-hand column, line 20 - page 235, left-hand column, line 44 -----	1-25
A	US 3 707 967 A (KITRILAKIS S ET AL) 2 January 1973 (1973-01-02) figure 1 column 4, line 14 - column 5, line 5 -----	1-25
A	US 2003/114787 A1 (GURA VICTOR [US]) 19 June 2003 (2003-06-19) figures 1-7 paragraphs [0038] - [0047] -----	1-25
A	EP 0 064 393 A (PURDUE RESEARCH FOUNDATION [US]) 10 November 1982 (1982-11-10) page 3, line 16 - page 6, line 8 -----	4,13
A	DE 25 58 363 A1 (AFFONSO ALVARO PROF DR) 7 July 1977 (1977-07-07) figures 1-3 page 2, line 9 - page 3, line 32 -----	

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2007/005779

### Box 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.: 26, 27  
because they relate to subject matter not required to be searched by this Authority, namely:  
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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 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.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No  
PCT/US2007/005779

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5944684	A	31-08-1999	NONE	
WO 2004009158	A	29-01-2004	AU 2003249296 A1 EP 1523350 A2 JP 2005533573 T MX PA05000816 A	09-02-2004 20-04-2005 10-11-2005 28-04-2005
US 4094775	A	13-06-1978	NONE	
DE 3110128	A1	23-09-1982	NONE	
US 3707967	A	02-01-1973	DE 2149040 A1 GB 1307056 A JP 52008635 B NL 7113434 A	06-04-1972 14-02-1973 10-03-1977 05-04-1972
US 2003114787	A1	19-06-2003	AU 2002351283 A1 BR 0214906 A EP 1480690 A2 JP 2005511250 T MX PA04005751 A SE 0401504 A WO 03051422 A2	30-06-2003 07-12-2004 01-12-2004 28-04-2005 05-07-2005 06-08-2004 26-06-2003
EP 0064393	A	10-11-1982	AU 8320782 A ES 8307102 A1 GB 2097696 A JP 58116362 A	11-11-1982 16-10-1983 10-11-1982 11-07-1983
DE 2558363	A1	07-07-1977	NONE	