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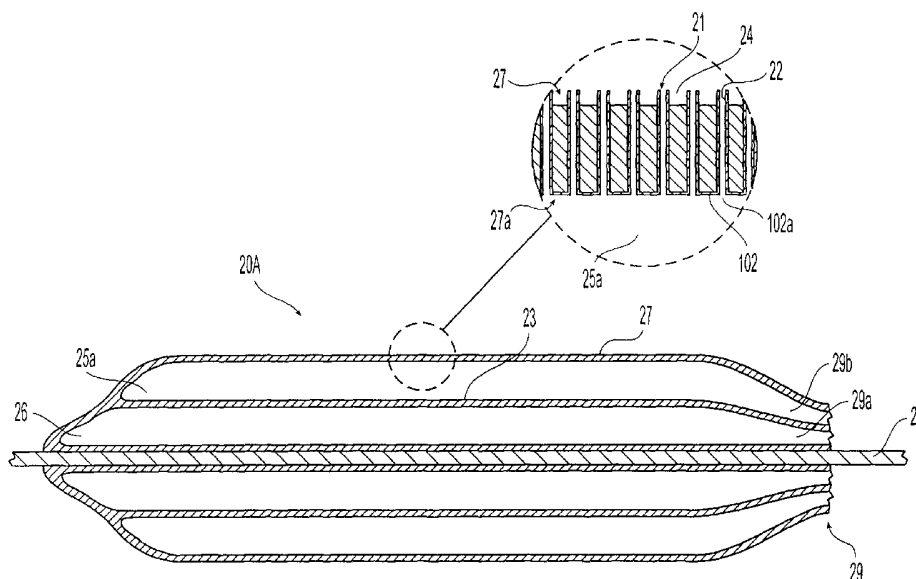
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(54) Title: BALLOON CATHETER HAVING MICRO-NEEDLES ON THE BALLOON SURFACE FOR DELIVERY OF A BIOLOGICALLY ACTIVE MATERIAL TO A BODY LUMEN



(57) Abstract: An apparatus for delivery of biologically active materials comprises a catheter and balloon having micro-needles or pores. In the apparatus, the balloon can have a polymer coating containing the biologically active material, and the apparatus can include a sheath surrounding the balloon. In one embodiment the biologically active material is delivered through lumens in the micro-needles. Another embodiment of the invention is an apparatus for delivery of biologically active materials comprising a catheter with a balloon disposed thereon and a shockwave generator for producing a shockwave for delivering the biologically active material to a body lumen. Methods for delivery of biologically active materials are also disclosed.



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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

Int. Application No

PCT/US 01/44272

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61M25/10

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 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, 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.
A	US 5 693 029 A (LEONHARDT HOWARD J) 2 December 1997 (1997-12-02) abstract column 3, line 55 -column 5, line 47; figures 1-4 ---	1,9,10, 17,34
A	US 5 941 868 A (KAPLAN AARON V ET AL) 24 August 1999 (1999-08-24) abstract column 3, line 7-41 ---	1,9,10, 17,34
A	US 5 320 634 A (BARATH PETER ET AL) 14 June 1994 (1994-06-14) abstract column 5, line 49 -column 6, line 3; figures 3A,3B,4A,4B --- -/--	1,9,10, 17,34

☒ 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

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"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

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INTERNATIONAL SEARCH REPORT

Int'l Patent Application No
PCT/US 01/44272

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 135 976 A (TACHIBANA COZIER ET AL) 24 October 2000 (2000-10-24) abstract column 9, line 44-58; figure 1M -----	1,9,10, 17,34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/44272

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.: 39-48
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 therapy
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.:
1-22, 34-38, 49

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: 1-22,34-38,49

Cathethers with a balloon having micro-needles.

2. Claims: 23-33

A system comprising a catheter a balloon and a shockwave generator.

INTERNATIONAL SEARCH REPORT

In International Application No

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