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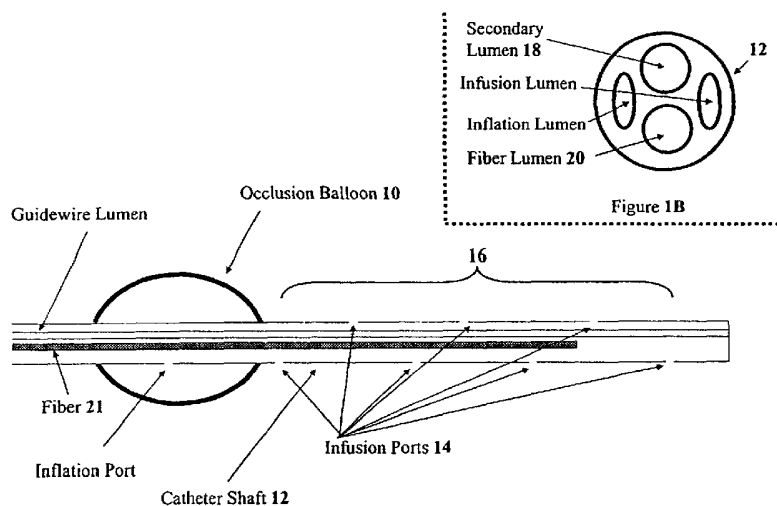
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[Continued on next page]

(54) Title: CATHETER FOR DIAGNOSIS AND TREATMENT OF DISEASED VESSELS



(57) Abstract: The application provides a catheter for detecting and treating diseased tissue in a blood vessel or other hollow body organ. The catheter comprises an elongated tubular catheter shaft having a distal end comprising a light transmission zone. A first fiber lumen in the catheter shaft contains a diagnostic optical fiber terminating within the light transmission zone for emitting and receiving light through the light transmission zone. A diagnostic subassembly at the proximal end and in communication with the diagnostic optical fiber processes diagnostic light for use in connection with a diagnostic method for detecting diseased tissue. A second fiber lumen can be provided in the catheter shaft for containing a treatment optical fiber for delivering treatment light from a light source. The treatment optical fiber has a distal end terminating within the light transmission zone for emitting light for treatment of the diseased tissue. An occlusion balloon is positioned on the distal end of the catheter shaft. Infusion ports deliver infusion fluid to the hollow body organ.

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European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**(88) Date of publication of the international search report:**  
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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

International Application No  
PCT/US 03/24657

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 A61B1/12 A61B5/00 A61B8/12 A61N5/06 A61B18/24

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 A61B A61N

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 576 145 A (NISHIMURA AKIRA ET AL) 18 March 1986 (1986-03-18) the whole document	1, 16, 17
Y	---	2, 3
Y	US 2002/068924 A1 (SINOFSKY EDWARD L) 6 June 2002 (2002-06-06) paragraphs '0017!', '0025!'-'0028!', '0060!', '0075!'; figures 3, 3A, 9-13	2, 3
A	---	9
X	US 6 134 003 A (BOPPART STEPHEN A ET AL) 17 October 2000 (2000-10-17) column 2, line 36-44; figure 6 column 7, line 54 -column 8, line 39	1, 16, 17
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Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

° Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*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)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>*&amp;* document member of the same patent family</p>
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Date of the actual completion of the international search  <b>15 April 2004</b>	Date of mailing of the international search report  <b>30. 04. 04</b>
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer   <p style="text-align: center;">Jonsson, P.O.</p>
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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.
X	US 5 178 616 A (UEMIYA TAKAFUMI ET AL) 12 January 1993 (1993-01-12) abstract; figures 1-3 column 3, line 25-64 ---	1,4-6
X	US 5 350 375 A (DECKELBAUM LAWRENCE I ET AL) 27 September 1994 (1994-09-27) column 6, line 51 -column 7, line 54 ---	1,4-6
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X	WO 96/07451 A (SINOFSKY EDWARD L ;FARR NORMAN (US); BAXTER LINCOLN S (US); RARE E) 14 March 1996 (1996-03-14) abstract; figures 1-5,17 page 16, line 24-32 ---	1,7-9
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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.
X	US 5 445 608 A (CHEN JAMES C ET AL) 29 August 1995 (1995-08-29) claim 24; figures 3A,16,17 ----	18
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 03/24657

## 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.:  
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).

## 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

As a result of the prior review under R. 40.2(e) PCT,  
part of the additional fees are to be refunded.

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

International Application No. PCT/ US 03 /24657

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-3

A catheter comprising a shaft, a fiber lumen, a diagnostic subassembly, an occlusion balloon, an inflation lumen, an infusion lumen and one or more infusion ports, further specifying the infusion port distribution

2. Claims: 4-6

A catheter as in 1, further specifying the diagnostic subassembly and the optical fiber therefor

3. Claims: 7-9

A catheter as in 1 being configured to transmit treatment light

4. Claim : 10

A catheter as in 1, further comprising a temperature sensing element

5. Claims: 11-15

A catheter as in 1, wherein the fiber lumen is replaced by a diagnostic lumen, and further comprising an intravascular ultrasound catheter subassembly

6. Claim : 16

A catheter as in 1 further comprising a second fiber lumen and a second fiber, the first fiber being adapted to emit diagnostic light and the second fiber being adapted to receive diagnostic light

7. Claim : 17

A catheter as in 1, wherein the fiber in the fiber lumen is only adapted to receive diagnostic light

8. Claim : 18

A catheter as in 1 further comprising a second fiber lumen and a second fiber, said second fiber being adapted to deliver treatment light

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/ US 03 /24657

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

9. Claims: 19,20

A catheter as in 18, further specifying the infusion port distribution

10. Claims: 21-24

A catheter as in 18, further specifying the diagnostic subassembly and the optical fiber therefor

11. Claim : 25

A catheter as in 18, further comprising a temperature sensing element

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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