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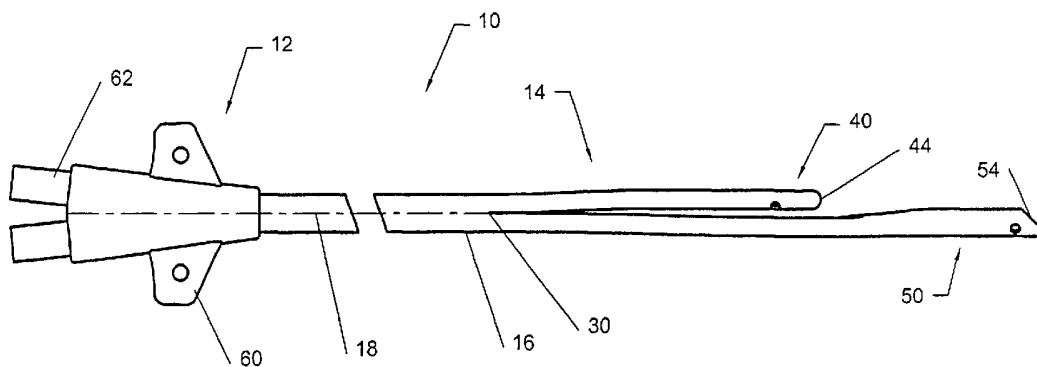
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(54) Title: MULTI-LUMEN CATHETER WITH SEPARATE DISTAL TIPS



(57) Abstract: A multi-lumen catheter defined by at least two separate tip sections (40, 50) distal to a dividing point (30) includes strategic placement of openings in the tip sections to facilitate fluid flow and minimize typical problems associated with catheters. In a multi-lumen catheter having tip sections with a releasably joined or splittable region, the bond strength between the tip sections is varied along their length such that an increasing separation force is required to separate the tip sections from one another distal to the dividing point. Delivery of a multi-lumen catheter is improved with respect to both sheathed and non-sheathed delivery methods, in which a friction reducing structure is provided on either the catheter, delivery sheath or both to provide a buffer for a sheathed delivery and in which a unique guidewire aperture or additional lumen is provided in at least one of the tip sections for a non-sheathed delivery.

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/005102

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61M25/00 A61M1/36 A61M25/06

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, BIOSIS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 190 349 B1 (MADISON ANTHONY J ET AL) 20 February 2001 (2001-02-20) cited in the application column 5, line 63 - column 10, line 38; figures 1,1a,3,3a,4a,4f,4g column 11, lines 32-48	1-14, 72-141
Y	-----	15, 16
P,X	WO 03/066148 A (BARD INC C R ; ZAWACKI JOHN A (US)) 14 August 2003 (2003-08-14) paragraphs '0029! - '0033!, '0046!, '0047!; figures 1-5,9,10	1-5, 13, 14
X	US 6 383 172 B1 (BARBUT DENISE R) 7 May 2002 (2002-05-07)	22-31
A	column 6, lines 55-67; figures 4a,4b ----- -/--	

☒ 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

\*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

8 December 2004

Date of mailing of the international search report

27. 12. 2004

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/005102

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/083223 A (BRADY EAMON ; CASEY BRENDAN (IE); SALVIAC LTD (IE); GRIFFIN PATRICK (I) 24 October 2002 (2002-10-24) page 27, lines 4-10; figure 14 page 26, lines 22-26; figure 12 -----	32-34
Y		15,16
X	US 5 496 292 A (BURNHAM WARREN) 5 March 1996 (1996-03-05) column 9, lines 44-50; figure 8a -----	32-34
A	WO 99/04844 A (MCGUCKIN JAMES F JR) 4 February 1999 (1999-02-04) page 15, line 11 - page 20, line 11; figures 7,12-23 -----	1

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/005102

## 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.:  
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 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:

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.:

### 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: 1-14

multi-lumen catheter with two tip sections, one having an opening on its inner surface in close proximity to the dividing point of the tip sections  
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2. claims: 22-31,15-21

multi-lumen catheter with two tip sections and friction reducing structure  
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3. claims: 32-34

delivery sheath for introducing a multi-lumen catheter with at least one ridge on inside surface  
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4. claims: 35-71

multi-lumen catheter with two splittable/separable tip sections and varying separation force  
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5. claims: 72-109

multi-lumen catheter with two tip sections where one tip section is longer and comprises a transition region with an aperture  
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6. claims: 110-127

multi-lumen catheter with two tip sections and an aperture formed on a portion of a first and second surface of the first tip section  
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7. claims: 128-141

multi-lumen catheter with two tip sections with transition region comprising a positive slope  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/005102

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