



US005397307A

# United States Patent [19]

[11] Patent Number: **5,397,307**

**Goodin**

[45] Date of Patent: **Mar. 14, 1995**

[54] **DRUG DELIVERY PTCA CATHETER AND METHOD FOR DRUG DELIVERY**

[75] Inventor: **Richard Goodin**, Blaine, Minn.

[73] Assignee: **Schneider (USA) Inc.**, Plymouth, Minn.

[21] Appl. No.: **163,852**

[22] Filed: **Dec. 7, 1993**

[51] Int. Cl.<sup>6</sup> ..... **A61M 29/00**

[52] U.S. Cl. .... **604/96; 604/101**

[58] Field of Search ..... **604/96-103, 604/265, 266, 52, 53; 606/192-196**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

- 550,238 11/1895 Allen, Jr. .
- 2,175,726 10/1939 Gebauer .
- 2,642,874 6/1953 Keeling .
- 3,948,254 4/1976 Zaffaroni .
- 3,977,408 8/1976 MacKew .
- 4,299,226 11/1981 Banka .
- 4,423,725 1/1984 Baran et al. .
- 4,445,892 5/1984 Hussein et al. .
- 4,496,345 1/1985 Hasson .
- 4,501,580 2/1985 Glassman .
- 4,531,936 7/1985 Gordon .
- 4,581,017 4/1986 Sabota .
- 4,627,837 12/1986 Gonzalo .
- 4,655,746 4/1987 Daniels et al. .
- 4,693,243 9/1987 Buras .
- 4,705,502 11/1987 Patel .
- 4,723,556 2/1988 Sussman .
- 4,781,677 11/1988 Wilcox .
- 4,821,714 4/1989 Smelser .
- 4,824,436 4/1989 Wolinsky .
- 4,832,688 5/1989 Sagae et al. .
- 4,883,459 11/1989 Calderon .
- 4,973,305 11/1990 Goltzer .
- 4,976,692 12/1990 Atad .
- 4,994,033 2/1991 Shockey et al. .
- 5,049,132 9/1991 Shaffer et al. .
- 5,087,244 2/1992 Wolinsky et al. .
- 5,090,960 2/1992 Don Michael .
- 5,092,841 3/1992 Spears .
- 5,098,381 3/1992 Schneider .
- 5,102,402 4/1992 Dror et al. .
- 5,112,305 5/1992 Barath et al. .
- 5,135,484 8/1992 Wright .

- 5,163,905 11/1992 Don Michael .
- 5,176,638 1/1993 Don Michael .
- 5,180,366 1/1993 Woods .
- 5,199,951 4/1993 Spears .
- 5,213,576 5/1993 Abiuso et al. .
- 5,236,413 8/1993 Feiring .
- 5,236,424 8/1993 Imran .
- 5,250,070 10/1993 Parodi .
- 5,318,531 6/1994 Leone ..... 604/101 X
- 5,324,261 6/1994 Amundson et al. .... 604/96

**FOREIGN PATENT DOCUMENTS**

- 9211895 7/1992 WIPO .
- 9211896 7/1992 WIPO .
- 9308864 5/1993 WIPO .

*Primary Examiner*—John D. Yasko  
*Attorney, Agent, or Firm*—Haugen and Nikolai

[57] **ABSTRACT**

An intravascular material delivery dilation catheter having a pair of longitudinally spaced inflatable balloons with a drug delivery region defined therebetween. The catheter is ideally suited for use after a PTCA procedure, wherein the proximate balloon seals the blood vessel while the distal balloon is uniquely contoured when inflated to define fluid communication paths therepast and proximate a blood vessel to be treated. The distal balloon, when inflated, has four lobes but could also be textured. Each lobe is separated from the next by a groove, which groove in combination with the blood vessel inner wall forms a fluid communication path therebetween. Upon inflation of both balloons in a blood vessel, a medicament such as heparin can be injected, via the drug delivery region between the inflated balloons, wherein the medicament flows past the distal balloon at a selected rate. Accordingly, a medicament can be injected directly to a treatment site rather than injected as a bolus dose, thus, a smaller dosage may be employed to minimize side effects. Alternatively, perfusion can be accomplished by only partially inflating the proximate balloon to constrict flow therepast, or eliminating the proximate balloon entirely, where the drug delivery region is disposed upstream of the contoured distal balloon.

**34 Claims, 4 Drawing Sheets**

