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Barrows

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(54) **FILAMENTARY MEANS FOR INTRODUCING AGENTS INTO TISSUE OF A LIVING HOST**

(75) Inventor: **Thomas H. Barrows**, Austell, GA (US)

(73) Assignee: **Aderans Research Institute, Inc.**, Beverly Hills, CA (US)

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,104,195 A *	8/1978	Ley et al.	516/15
5,486,593 A *	1/1996	Tang et al.	528/370
5,545,208 A *	8/1996	Wolff et al.	623/1.22
5,599,552 A *	2/1997	Dunn et al.	424/423
5,847,012 A *	12/1998	Shalaby et al.	521/61
5,898,040 A	4/1999	Shalaby et al.	
5,993,374 A	11/1999	Kick	
5,997,468 A	12/1999	Wolff et al.	

6,027,744 A *	2/2000	Vacanti et al.	424/426
2002/0049426 A1 *	4/2002	Butler et al.	604/892.1
2004/0039438 A1 *	2/2004	Alt	623/1.15

OTHER PUBLICATIONS

Peter X. Ma and Ruiyun Zhang, Synthetic nano-scale fibrous extracellular matrix, *J. Biomed. Materials Res.* 46(1):60-72 (Jul. 1999).

Seigi Arase, et al., *Tokushima J. exp. Med* 36: 87-95 (1989).
Edoardo Raposio, et al., *Follicular Bisection in Hair Transplantation Surgery: An in Vitro Model, Plastic and Reconstructive Surgery*, pp. 221-226 (Jul. 1998).

C.W. Patrick Jr., A. G. Mikos and LV. McIntire, eds., *Prospects of Tissue Engineering, Frontiers in Tissue Engineering*, Elsevier Science, Inc., New York, 1998.

A.J. Reynolds, C. Lawrence, P.R. Caerhalmi-Friedman, A.M. Christiano, and C.A.B. Jahoda, *Nature* 402: 33-34, Nov. 4, 1999.

* cited by examiner

Primary Examiner—James M. Spear

Assistant Examiner—Isis Ghali

(74) *Attorney, Agent, or Firm*—Michael Best & Friedrich, LLP

(57) **ABSTRACT**

The present invention provides a filamentary structure for the introduction of agents into a living host, comprising a filament comprising a solid core and a porous sheath which coats at least a portion of the solid core. When the filamentary structure is to be permanently implanted into a living host, both the solid core and the porous sheath are bioabsorbable. When the filamentary structure is to be temporarily implanted into the skin of a living host to deliver agents, such as cells, therein, the porous sheath is preferably bioabsorbable but the core need only be biocompatible, not bioabsorbable. The devices and methods of the present invention enable one to regenerate hair follicles, to introduce genetically altered cells or encapsulated cells to a living host transdermally, to regenerate bones, and to deliver drugs transdermally.

22 Claims, 9 Drawing Sheets

