ANTIBIOTIC ENDODONTIC FIBERS

TECHNOLOGY DESCRIPTION

The current invention describes novel endodontic fibers comprised of a biocompatible polymer (ethylene vinyl acetate – EVA) that is permeable to various medications/antibiotics. Such fibers can be used, for example, in a method for the local delivery and sustained release of antibiotics to periodontal or intracanal treatment sites. Despite recent advances in endodontic instrumentation, residual bacteria are inevitably present in teeth following standard chemomechanical debridement during endodontic treatment. This reflects the complex anatomy of the root canal system, as well as the fact that many viable bacteria are present but cannot be removed from dentinal tubules, where they may penetrate up to 1 mm into dentin. Residual bacteria, particularly Porphyromonas and Prevotella sp. may cause acute re-infections (‘flare-ups’) and have been associated with pain and abscess formation. These ‘flare-ups’ require emergency patient visits during multi-visit treatment; systemic clindamycin is the antibiotic of choice for their treatment in doses of approximately 2g/day. Our present clindamycin/EVA device releases 1000-fold lower levels of antibiotic locally in the root canal, and has the ability to prevent flare-ups and pain.

VALUE PROPOSITION

The endodontic fibers enable a delivery system and method capable of sustained, local release of any class of medication/antibiotic following endodontic therapy, which was not possible prior to this technology.

DEVELOPMENT STATUS

Fibers treated with the antibiotic clindamycin have been fabricated and tested in in vitro models against various bacterial species; all bacteria tested showed varying degrees of inhibition, including P. intermedia, F. nucleatum, P. micros, S. intermedius, and other anaerobes. Clindamycin-EVA fibers significantly reduced the number of bacteria present in extracted human teeth and demonstrated the ability to release active drug for at least two weeks. In a clinical trial with 57 individuals, after placement for 1-2 weeks, clindamycin-EVA fibers completely eliminated pain and other clinical signs of root canal failure versus calcium hydroxide treatment or the control group. This technology was previously licensed to Novalar Pharmaceuticals.

ADVANTAGES OVER CURRENT THERAPIES

- Decreased need for follow-up re-treatments
- Fibers are biocompatible synthetic or natural polymers – may be biodegradable
- Easily placed and removed in seconds
- Controlled rate of antibiotic release
- Delivery of additional therapeutic agents (i.e. anti-inflammatories)

COMMERCIAL MARKETS

Recent systematic reviews have demonstrated that the failure rate in endodontics has remained unchanged at ~20% in the past 4 decades, a finding supported by a recent NYU Practice-Based Research Network (PBRN) survey. A 10% reduction in the rate of root canal failure (~2 million re-treatment procedures) could potentially represent an annual patient savings of $400 million (using an estimate of $750 per re-treatment based on current dental costs).

Intellectual Property

US Patents: 6,712,610; granted – 3/30/04
7,331,787; granted – 2/19/2008
7,946,849; granted – 5/24/2011

Canadian Patents: 2343471; granted – 12/15/2009
2370784; granted – 10/5/2010

European Patent: 1 165 057; granted – 7/2/2008

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