SUSTAINED RELEASE COMPOSITIONS FOR TREATING PERIODONTAL DISEASE

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation-in-part application of application Ser. No. 439,066, filed Nov. 17, 1989 and now abandoned.

TECHNICAL FIELD

This invention relates to compositions/devices for treating diseases of the oral cavity which compositions/devices are placed in or around the periodontal pocket. The invention also relates to methods of using the compositions/devices in humans and lower animals suffering from such diseases.

Periodontal disease, for example, is a major cause of tooth loss in adults. Tooth loss from periodontal disease is a significant problem beginning at age 35, but even by age 15 it is estimated that about 4 out of 5 persons already have gingivitis and 4 out of 10 have periodontitis.

While good oral hygiene, as achieved by brushing the teeth with a cleansing dentifrice, may help reduce the incidence of periodontal disease, it does not necessarily prevent or eliminate its occurrence. This is because microorganisms contribute to both the initiation and progress of periodontal disease. Thus, in order to prevent or treat periodontal disease, these microorganisms must be suppressed by some means other than simple mechanical scrubbing. Towards this end, there has been a great deal of research aimed at developing therapeutic dentifrices, mouthwashes, and methods of treating periodontal disease which are effective in suppressing these microorganisms.

Recent developments in the art are directed toward delivering the therapeutic agent directly to the periodontal pocket, in some cases in a controlled release formulation. Gordon et al. have described the use of a drug-filled polymer hollow fiber. (J. M. Goodson et al., "Periodontal Therapy by Local Delivery of Tetracycline", *J. Clin. Periodontal.* 6, 83 (1979), J. Lindhe et al., "Local Tetracycline Delivery Using Hollow Fiber Devices in Periodontal Therapy", *J. Clin. Periodontal.* 6, 141 (1979) and R. L. Dunn et al., "Monolithic Fibers for Controlled Delivery of Tetracycline", in *Proc. Ninth Int. Symposium on Controlled Release of Bioactive Materials.* Ft. Lauderdale, Fla., July (1982). This device is tied around a tooth and gently pressed below the margin of the gingiva so that it resides in the periodontal pocket, and is capable of delivering an effective dose of 2.5 micrograms of tetracycline per day per periodontal pocket for a prolonged period of a week or more. Similar results have been obtained by Coventry and Newman (J. Coventry and H. N. Newman, "Experimental Use of a Slow Release Device Employing Chlorhexidine Gluconate in Areas of Acute Periodontal Inflammation", *J. Clin. Periodontal.* 9, 129 (1982) and Addy et al. (M. Addy et al., "The Development and in vitro Evaluation of Acrylic Strips and Dialysis Tubing for Local Drug Delivery", *J. Periodontal* 53, 693 (1982) using acrylic strips 1 mm or more long, impregnated with chlorhexidine, tetracycline or metronidazole, which were inserted into the periodontal pocket with tweezers. Such a strip, formed from ethylcellulose impregnated with metronidazole, is disclosed by Loesche in U.S. Pat. No. 4,568,538 (February 1986). Another strip, employing a water soluble polymer of a particular elasticity and viscosity, is disclosed by Suzuki et al. in U.S. Pat. No. 4,569,837.

In addition to the above approaches, the prior art also discloses using putty-like compositions containing an antimicrobial for insertion into the periodontal pocket. A material disclosed as suitable is a copolymer of lactide and glycolide. See U.S. Pat. No. 4,650,665, Mar. 17, 1987 to Kronenthal et al., incorporated herein by reference.

The present inventor has discovered that lactide and glycolide copolymers have limited pliability and solubility in terms of processing.

It is therefore an object of the present invention to provide lactide/glycolide compositions/devices suitable for treating diseases of the oral cavity overcoming such problems.

It is a further object of the present invention to provide such compositions/devices using copolymers of lactide and glycolide and using propylene carbonate as a solvent/plasticizer.

It is still a further object of the present invention to provide a method of treating periodontal disease.

All percentages and ratios used in here are by weight unless otherwise indicated.

All measurements are made at 25° C. unless otherwise indicated.

SUMMARY OF INVENTION

The present invention relates to compositions/devices and methods for treating diseases of the oral cavity by inserting the compositions/devices into the periodontal pocket or around said pocket of humans and/or lower animals. The compositions/devices comprise copolymers of lactide and glycolide, propylene carbonate as a solvent/plasticizer and an agent providing relief of oral cavity diseases.

DETAILED DESCRIPTION OF THE INVENTION

The essential as well as optional components of the compositions/devices of this invention are described below.

Lactide/Glycolide Copolymers

The copolymers of the present invention contain mixtures of lactide and glycolide monomers. Lactide monomeric species preferably comprise 15% to about 85%, most preferably from about 35% to about 65%, of the polymers while glycolide monomers comprise from about 15% to about 85% of the polymer, preferably from about 35% to about 65% on a molar basis. The molecular weight of the copolymer lies in the range of from about 1000 to about 120,000 (number average). These polymers are described in detail in U.S. Pat. No. 4,443,430, Apr. 17, 1984, to Mattei incorporated herein by reference.

The polymer generally comprises from about 10% to about 90%, preferably from about 20% to about 70% of the compositions/devices of the present invention. Less polymer is necessary as the amount of lactide goes up.

Propylene Carbonate

The second essential component of the present invention is propylene carbonate. This is a material of commerce and is used in the present compositions/devices at a level of from about 0.1% to about 90%, preferably from about 1% to about 70%, most preferably from