DENTURE BASED POLYMERS

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State of the Art

Currently, the most widely used denture-base material, poly(methyl methacrylate), a polymer, does not efficiently bind natural antimicrobial cationic proteins secreted in saliva as part of the pellicle surface (a thin layer of salivary glycoproteins and immunoglobulins, including mucins, amylase, and secretory IgA, deposited on teeth and other oral cavity surfaces). These antimicrobial peptides are absorbed onto teeth and oral cavity surfaces by electrostatic forces. However, poly(methyl methacrylate) does not have any ionically charged groups, and thus no electrostatic forces are present to absorb such antimicrobial peptides. This lack of antimicrobials in the pellicle may facilitate the colonization of *Candida albicans* and other microbial pathogens, and commonly results in Candida-associated denture infection (stomatitis) among denture wearers. Treatment of this condition is difficult due to incomplete disinfection and rapid reoccurrence of microbial colonization.

Invention

The present invention incorporates varying amounts of phosphate into poly(methyl methacrylate) to create a phosphated polymer useful for making denture bases, denture liners, and tissue conditioners. These phosphated polymers efficiently absorb natural salivary antimicrobial and antifungal cationic proteins such as histatins and bactenecins compared to the non-phosphated polymers because the phosphate group is ionically charged, and thus allows electrostatic forces to bind these antimicrobial particles. The absorption efficiency of the proteins is proportional to the extent of phosphate groups present in the polymer. These phosphated polymers inhibit the adherence of *Candida albicans* and *Aggregatibacter actinomycetemcomitans* and this inhibition is also proportional to the extent of phosphate within the polymer. These phosphated polymers may prevent *Candida*-associated denture stomatitis in denture wearers.

Stage of Development

Initial testing has shown that a phosphated polymer has the physical properties suitable for denture fabrication and appears to be safe based on cellular cytotoxicity studies. Antimicrobials are released from the surface at physiologic levels for up to 4 hours in the presence of saliva and are microbiocidal against planktonic organisms. Twenty four and 48 hour monospecies biofilms are also significantly reduced in the presence of antimicrobially loaded disks.

Patent Protection

A U.S. utility patent has been issued covering “Modified Dental Prosthesis” (#7,288,615) in 2007. A subsequent U.S. utility patent continuation application has also been filed for this invention.