



NYU



Novel, Non-Staining Filling for Minimally-Invasive Treatment of Dental Caries

A biocompatible material for minimal invasive dentistry (MID) treatment of dental caries that is non-staining

Technology

This invention pertains to the novel method of using zinc phosphate as an alternative to SDF for the treatment of dental caries. Past reports have shown zinc phosphate to possess several desirable characteristics, including biocompatibility and antibacterial and remineralization efficacy. In recent proof-of-concept studies (unpublished data), Dr. Walters' Lab found that zinc phosphate can form extensive crystalline deposits both within dentin tubules and on the dentin surface without causing adverse tooth discoloration. This data demonstrates the applicability of zinc phosphate as a next-generation mineral for filling dental caries.

Background

Dental caries occur from the deterioration of biological minerals in the tooth due to the production of acid by bacteria in the oral cavity. Caries are commonly treated through surgical removal of infected tissue, followed by filling of the resulting cavity with various mineral composites. Recently, minimal invasive dentistry (MID) approaches are being widely adopted as alternatives to traditional invasive surgery. Silver Diamine Fluoride (SDF) is the primary mineral used in MID approaches and acts to arrest caries progression by controlling plaque formation while also promoting remineralization of dentin. However, SDF causes a profound, permanent black stain on exposed dentin due to the formation of neutral silver nanoparticle aggregates. This black stain decreases the desirability of the product due to aesthetic drawbacks. Therefore, there is a current need in the MID market for a biocompatible mineral to fill dental caries that is non-staining.

Application

Treatment of dental caries with MID procedures

Advantages

Category

Life

Sciences/Therapeutics/Dental

Life Sciences/Dental

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- Non-staining and colorless material: No dentin discoloration was observed in PoC studies
- FDA-approved chemical entity: Zinc phosphate has already been used as a safe and reliable dental cement (luting agent)
- Efficacious filling agent: Zinc phosphate effectively occludes dentinal tubules, reduces dentin permeability, and increases dentin hardness
- Antibacterial activity: Zinc exhibits high anti-bacterial activity against gram-positive bacteria such as *Streptococcus mutans*, a primary bacterium driving dental caries formation
- Biocompatible: Zinc phosphate shows no toxicity against osteosarcoma cells nor elicits an adverse immune response
- Stimulates hydroxyapatite (HA) formation: When combined with calcium ions, zinc phosphate creates calcium phosphate which remineralizes carious tissue in dentin tubules

Intellectual Property

A PCT application has been filed covering method of use.