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Dental and Endodontic Filling Materials and Methods

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Background

Endodontic treatment entails the removal of the dental pulp and the subsequent shaping, cleaning, and filling or sealing of the root canals of a tooth. Endodontic materials must be highly biocompatible since they are sometimes placed directly on or against vital tissues. While mineral trioxide aggregates (MTAs) are commonly used, they suffer from poor handling properties, due to poor injectability, long setting times, and little washout resistance. Improper coronal sealing with some materials may lead to endodontic treatment failure. There is therefore a need for biocompatible endodontic materials with improved handling properties.

Invention Description

The compositions of this invention comprise a hydrogel phase combined with a filler phase which can include a self-hardening calcium phosphate cement, MTA or the like, in either a single-paste or a dual-paste injectable form. The paste is easy to handle, remaining soft and malleable in storage, only hardening once it is injected into a root canal, upon migration of water from surrounding tissues. Additives such as tricalcium silicate, a major component of Portland cement may be added easily to control the material's alkalinity, and hence provide the materials with antibacterial activity.

Potential Applications

The compositions can be formulated as a single paste or as a dual paste endodontic material for root-end filling, repair, obturating, and pulp capping.

Benefits and Advantages

- Highly biocompatible - materials are compatible with soft and hard tissues and will not produce chronic inflammatory tissue response
- Highly resistant to leakage – materials provide high sealing ability against penetration of bacteria and bacterial products
- Antibacterial – materials are alkaline and can neutralize acid products of bacteria or inflammatory cells
- Insoluble in acidic environments – resistant to acid production by bacteria or inflammatory cells
- Easy to use – injectable materials that can be premixed to eliminate mixing steps after dispensing
- Materials have short hardening time and are highly washout resistant
- Hydrophilic materials – eliminates need for thorough drying steps in endodontic procedures
- Eliminates need for separate sealer
- CPC materials may promote osteogenesis