Unique Functions of Hydroxyapatite with Mutans Streptococci Adherence


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Objective: Hydroxyapatite (HA) is used as a construction material for artificial supplementation of enamel tooth surfaces to improve oral hygiene. This study examined in vitro HA interactions with mutans streptococci (MS) and bacterial adherence to small (nanosize) crystal form of HA beads having a protean hexagonal structure. The adsorption and physical effects of HA employed in vivo is also described.

Method and Materials: [3H-thymidine]-labeled streptococci were incubated with HA noncoated or coated with salivary components or salivary agglutinin peptide (SRCRP2), a receptor for streptococcal surface proteins. Bacterial adhesion activities on HA were measured by uptake of [3H-thymidine]. Application of HA paste in an individual tray was tried on the tooth surface, and its effects on the colony ratio of MS/total streptococci (TS) in saliva were analyzed by culture technique.

Results: The adhesion assay showed that the binding of streptococci to HA was inhibited by coating with salivary components, whereas coating with SRCRP2 had nearly no influence on binding with or without Ca2+. Further, treatment with HA decreased the adherence of Streptococcus mutans to roughened enamel surfaces by one-third. In vivo application of a HA dentifrice to individual teeth demonstrated that the colony number ratio of MS/TS slowly decreased.

Conclusion: MS adhesion to HA was restricted by both salivary components, except for SRCRP2, and the physical effects of HA; in addition, the material itself has a unique effect for removing MS from the oral cavity.

Key words: dental drug delivery system, hydroxyapatite, oral biofilm, oral hygiene, SRCRP2, Streptococcus mutans