



## Reduction of Oral Mutans Streptococci by Small-Crystal Hydroxyapatite

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**Objectives:** Small crystal hydroxyapatite (scfHA) paste has been shown to adsorb and remove mutans streptococci (MS) from the oral cavity in a Dental Drug Delivery System (3DS). To assess the effect of scfHA both clinically and experimentally, we conducted (1) a 3DS trial in human subjects and (2) a test comparing the attachment of *Streptococcus mutans* to smooth and rough enamel surfaces.

**Methods:** 3DS using an scfHA paste containing 25% HA, an scfHA paste containing 38% HA, and a placebo paste containing 38% dicalcium phosphate dihydrate was applied to groups of 5, 15 and 10 subjects respectively for 5 minutes daily for 1 week. Oral bacteria numbers were determined quantitatively by culture of whole saliva samples collected a week before, then every week for five weeks after 3DS treatment. Two sets of tooth enamel blocks were cut to a size of 4x5x3 mm, and the surface of one set smoothed with fine abrasive paper and that of the other set roughened with coarse abrasive paper. The blocks were incubated in whole saliva, then immersed in 1.0ml of <sup>3</sup>H-labeled *S. mutans* suspension (OD=0.3, 550nm), at 37 degrees-centigrade for 24h, and adherence of *S. mutans* to the blocks was measured using a scintillation counter and SEM.

**Results:** Saliva testing 5 weeks after 3DS treatment showed a sharp decrease in MS in subjects using scfHA paste (HA 38%), in comparison with placebo controls. Attachment of *S. mutans* was greater on the rough enamel surface than on the smooth surface.

**Conclusions:** Our 3DS trial supported earlier evidence that scfHA paste is effective in removing MS from the oral cavity. The bacterial adhesion test suggested that scfHA paste might influence MS adhesion, if it is able to physically or chemically fill surface enamel cracks, restoring enamel from rough to smooth.

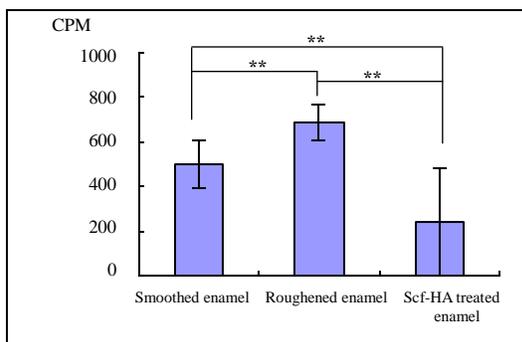


Fig.1 Adherence of *S. mutans* to different forms of enamel surface (n=9, \*\*p<0.01)

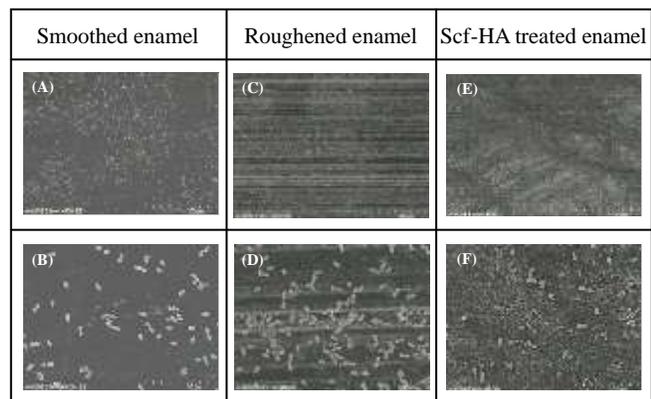


Fig.2 SEM images of *S. mutans* adhering to different forms of enamel surface  
(Magnification, A,C,E: × 500, B,D,F: × 5,000)