

Remineralization of Artificial Caries Lesions by Hydroxyapatite

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The purpose of this study was to examine the effect of apatite for dentifrice use on remineralization of initial caries lesion. Artificial caries lesions were formed on specimens of intact human enamel with demineralizing solution (50% synthetic hydroxyapatite saturated lactate buffer, pH 4.5 according to Moreno et al (1974)). A simply demineralized group was used as control. Enamel blocks were immersed and stirred in a water solution of sludgy apatite at 37°C for 55 hrs, followed by 24 hrs, washing with synthetic saliva prepared according to Brikeland (1973) (HA group), and another group was washed only with synthetic saliva (Saliva group). SEM observation, polarized light microscopy (PLM), contact micro-radiography (CMR), microbeam X-ray diffractometry and analytical electron microscope (AEM) were performed.

SEM image of artificial caries lesion surfaces showed a large quantity of minute on enamel surface of artificial caries lesions in the HA group. The surface was smooth as compared with the control group. This indicated clear remineralization of lesions rather than the deposit of apatite.

CMR showed a thin radiopaque surface layer and radiolucent body of the lesion in the control group. In the HA group, the surface radiopaque layer was thick and the radiolucent body was unclear. PLM showed that the mineralized layer occupied a major portion of the surface and a thinner decalcified layer was found in HA group. Microbeam X-ray diffraction pattern revealed hydroxyapatite.

In the HA group, crystallinity of the lesion body was high as compared with the control group and the saliva group by microbeam X-ray diffractometry. It was also higher than sound enamel.

SEM images of cross section showed notable remineralization in the HA group. Ca/P mole ratio of lesions determined by AEM was as high as that of sound enamel in the HA group, but was low in the saliva group.

Artificial caries lesions were remineralized slightly by immersion in artificial saliva solution. But in the HA group, significant acceleration of remineralization was observed.

We confirmed that remineralization of surface remineralized layer and demineralized lesion body of artificial caries lesions was advanced by exposure to a water solution of sludgy apatite for dentifrice use.

These findings suggested that the initial artificial caries lesion could be remineralized by exposure to a water solution of sludgy apatite for dentifrice use.

Key words : Apatite, Artificial caries lesions, Remineralization