Evaluation of Cariogenic Bacteria Removal by Nano-hydroxyapatite

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Objectives: Nano-hydroxyapatite (nHAP) is known to adsorb oral pathogens. We devised a method for quantifying nHAP's adsorption of cariogenic *S. mutans* (Sm), using a water pick to first flush bacteria from the pre-treatment tooth surface, then flush them from the same surface after treatment with nHAP paste, and from the nHAP paste itself.

Methods: (1) Two dental trays were prepared, an inner tray with four 4mm diameter holes cut to expose the labial surface of the four maxillary anterior incisors, and an outer retainer tray for wearing over the inner tray when applying different concentrations of nHAP paste (0%, 25%, and 38%) to the exposed tooth areas. (2) After fitting the inner tray, the exposed area on each tooth was washed five times, each with 100ml ion-exchanged water (IEW) at 80ml/min. 100 microliters from each wash was used for bacterial culture on MSB agar (37degrees C at 48h), and the bacteria counted. (3) After the fifth wash, subjects fitted the outer tray containing one of the three test pastes for 5 minutes. The tooth surface and outer tray were then washed with 100ml IEW, 100 microliters of which was used for bacterial culture and measurement as in (2). Eight volunteers participated, with a one-week washout before each test.

Results: Sm from the pretreatment tooth surface declined in number with each wash, and were similar in level at the fifth wash to those collected from the tooth surface and retainer using 0% nHAP. But Sm from the tooth surface and retainer when using 25% and 38% nHAP were progressively higher, in a dose-dependent manner.

Conclusion: Use of the water pick allowed fine differences in tooth surface Sm levels to be measured, and indicated that nHAP had greater ability to remove Sm from the tooth surface than the water pick.
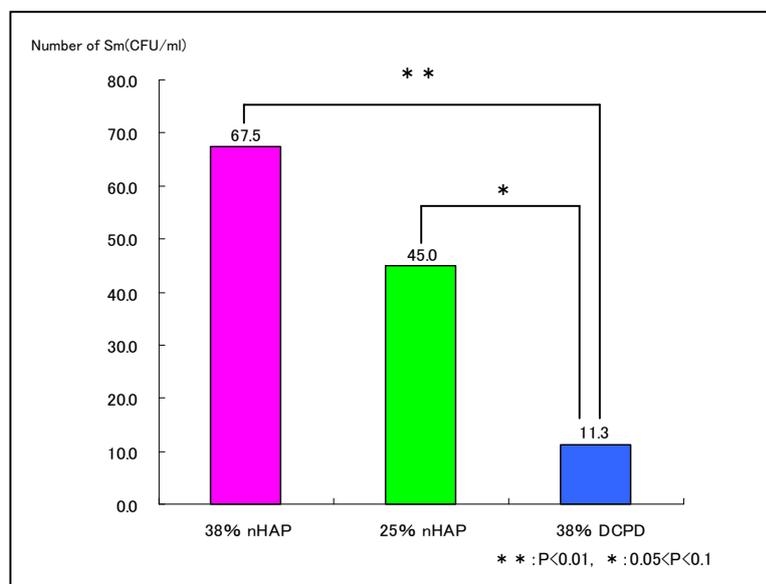
Fig. Average Bacterial Count from Suspensions of Test Paste