

Benign Shift in the Oral Flora Induced by Nano-hydroxyapatite

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Objectives: High oral *mutans streptococci* (MS) concentration can be associated with caries risk. We previously showed that nano-hydroxyapatite (nHAP) adsorbs oral pathogenic microbes, and reduced the ratio of MS in the oral flora in a clinical trial (IADR 2007, 2010, 2013). One unreported finding was a concomitant increase in *lactobacillus* (LB), which is believed to lessen caries risk. We here examined nHAP's ability to induce a benign shift in the oral flora. **Methods:** Saliva sampling to determine the MS ratio and LB count by culture techniques was done on 19 subjects before and after mechanical tooth cleaning, after which a paste containing nHAP (n=10) or a placebo (dicalcium phosphate dehydrate, n=9) was applied to the upper and lower teeth in a retainer tray for 5min. After further saliva sampling next day, each subject repeated the treatment once daily for 6 days, after nightly tooth-brushing, followed by further saliva sampling after 1 and 2 months. The HAP group alone underwent an additional saliva sampling at 3 months, followed by another 6 days home treatment, then successive saliva sampling after 1, 2 and 3 months. **Results:** Linear regression analysis showed a correlation, over 2 months, between nHAP treatment and the MS ratio decrease ($Y=-2E-07x+0.0026$) and LB increase ($Y=3E-04x+4.5878$). In contrast, the placebo group MS ratio increased ($Y=3E-06x+0.0013$) and LB was unchanged. The nHAP group showed a tendency toward recovery of the MS ratio and decline in LB after 2 months. But after a second round of home treatment, further reduction in the MS ratio ($Y=-4E-07x+0.0026$) and an increase in LB ($Y=1E-04x+4.6879$) were confirmed.

Conclusion: Results indicate treatment with nHAP both reduces the MS ratio and increases LB, causing a shift in the oral flora that may lessen caries risk. Signs of regression after 2 months suggest treatment intervals should be 2-3 months.

(300 words)