did not significantly differ between them, but they had significantly greater SL than F+Sn (2.68 ± 1.62) and F+Sn+LPP (2.10 ± 0.95). F+Sn and F+Sn+LPP did not differ from each other. Sodium fluoride alone did not exhibit a significant anti-erosive effect. The combination between sodium fluoride and stannous chloride reduced enamel erosion, regardless of the presence of the linear chain sodium polyphosphate.

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A Hand-Held Optical Reflectometer to Measure Initial Erosion on Dentine

T.S. Carvalho, T. Baumann, B. Beyeler, A. Lussi*

thiagosaads@hotmail.com

Department of Preventive, Restorative and Pediatric Dentistry, School of Dental Medicine, University of Bern, Bern, Switzerland

Previous studies have shown that a hand-held optical reflectometer can measure initial erosion on enamel, but this was yet to be tested on dentine. This in vitro study aimed to assess initial erosion on dentine with the optical reflectometer. We ground and polished premolar roots (n = 30) to obtain dentine specimens, which were sorted into 3 groups: tap water (TW), sodium fluoride (500 ppm F) solution (NaF) and Elmex® Erosion Protection (800 ppm tin and 500 ppm F) solution (EP). This cyclic experiment consisted of 5 erosion cycles. In each cycle, we immersed the dentine specimens in the respective solution (10 ml, 30°C, shaking; 2 min), washed them for 20 s, and then immersed them in citric acid (0.65%, pH 3.6, 30 ml, 25°C, shaking) for a total erosion time of 1, 2, 4, 6, and 8 min. Reflection intensity was measured using an optical reflectometer, and the amount of calcium released by the dentine specimens was quantified with an atomic absorption spectrometer. Between-group differences in relative surface reflection intensity (rSRI) and calcium release were tested using Kruskall-Wallis and post-hoc Mann-Whitney tests, association between the two variables was tested using Spearman's correlation. We observed dentine erosion in all groups to different degrees. After 8 min erosion, the lowest rSRI loss was observed in EP (median 85%), followed by NaF (91%) and TW (94%; $p < 0.01$). Likewise, the lowest calcium release values were observed for EP (median 38.1 nmol/mm^2), followed by NaF (55.0 nmol/mm^2) and TW (70.6 nmol/mm^2; $p < 0.001$). Additionally, the good correlation between rSRI and calcium release (correlation coefficient –0.70) shows that the optical reflectometer can measure and differentiate initial erosion on dentine.

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Modification of Acquired Pellicle with Cystatins Reduces Initial Enamel Erosion

M.A.R. Buzalaf[,a], V.T. Pelá[a], A.L. Leite[a], A. Bissaya[a], J.M. Edwardson[b], M.C. Miguel[c], A. Soares-Costa[c], F. Henrique-Silva[c]*

mbuzalaf@fob.usp.br

[a]Department of Biological Sciences, Bauru School of Dentistry, University of São Paulo, São Paulo, Brazil; [b]Department of Pharmacology, University of Cambridge, Cambridge, UK; [c]Department of Genetics and Evolution, Federal University of São Carlos, São Carlos, Brazil

Cystatin-B was identified as an acid-resistant protein in the acquired enamel pellicle; it could therefore be included in oral products to protect against erosion. However, its cost is high. Recently, a cystatin derived from sugar cane (canecystatin-5) was cloned and recombinantly expressed. This study evaluated the effect of pellicle modification, by incorporation of cystatin-B or canecystatin-5, on the protection against initial enamel erosion *in vitro*. Seventy-five bovine enamel specimens (4x4 mm) were divided into 5 groups: 1) deionized water (control), 2) 0.5% mucin + 0.27% casein solution, 3) 0.025 μg/μL cystatin-B solution, 4) 0.025 μg/μL canecystatin5 solution, and 5) 0.025 μg/μL canecystatin-5 solution applied before the formation of the acquired pellicle. Stimulated saliva was collected from three volunteers and used to form an acquired enamel pellicle on the specimens for 2 h. Specimens (groups 1–4) were exposed to the protein solutions with stirring at 30°C for 2 h. For group 5, blocks were exposed to canecystatin5 solution before the pellicle was formed. All specimens were then incubated in 0.65% citric acid (pH 3.4) for 1 min at 30°C. Treatment was done once/day for 3 days. Surface hardness was analyzed at baseline and after days 1 and 3 and percentage of surface hardness change (%SHC) was calculated. Data were analyzed by ANOVA and Tukey's test ($p < 0.05$). At day 1, treatment with cystatin B (35.1 ± 9.9%) and canecystatin-5 (35.2 ± 6.6%) before pellicle formation significantly reduced % SHC compared with control (46.9 ± 6.7%). At day 3, all treatments with cystatins (54.5 ± 8.6, 55.5 ± 10.7 and 53.1 ± 9.3% for cystatin-B, canecystatin-5 and canecystatin-5 before pellicle formation, respectively) significantly reduced % SHC compared with control (67.6 ± 9.4%). In addition, treatment with canecystatin-5 before pellicle formation significantly reduced % SHC compared with the combination mucin/casein (64.4 ± 9.4%) Thus, canecystatin-5 seems to be a good candidate to be added to oral products to protect against erosion.

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