Enamel Fluoride Uptake of **Profisil**® Fluoride Varnish

KETTENBACH DENTAL
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PURPOSE

The purpose of this in vitro study was to determine the effect of different dental materials on promoting fluoride uptake into incipient enamel lesions. The procedure was identical to the one identified as Procedure 40 in the FDA monograph except for the following two changes (1) the lesion was formed using a solution of 0.1M lactic acid and 0.2% Carbopol 907 and was saturated with HAP at a pH of 5.0 and (2) the enamel lesion was exposed to a dental material for 24 hours instead of a fluoride containing toothpaste for 30 minutes.

METHODS AND MATERIALS

Bovine incisors were cleaned of all adhering soft tissue. A core of enamel 3 mm in diameter was prepared from each tooth by cutting perpendicular to the labial surface with a hollow-core diamond drill bit under water. Each specimen was embedded in in the end of a plastic rod using poly (methylmethacrylate). The enamel specimens were polished with 600 grit wet/dry paper and then micro-fine Gamma Alumina. The resulting specimen was a 3 mm disk of enamel with all but the exposed surface covered with acrylic.

Each enamel specimen was then etched by immersion into 0.5 mL of 1.0M $HClO_4$ for 15 seconds while the solution was being stirred. A sample of each solution was buffered with TISAB to a pH of 5.2 (0.25 mL of sample, 0.5 mL of TISAB, 0.25 mL 1.0N NaOH) and the fluoride content determined by comparison to a similarly prepared standard curve (1 mL standard, 1 mL TISAB). For use in depth of etch calculation, the calcium content of the etch solution was determined by taking 50 µL and analyzing for calcium by atomic absorption. These data were the native fluoride level of each specimen prior to treatment with the prototype sealant.

The specimens were ground and polished again as described above. An incipient lesion was formed in each enamel specimen by immersion into a 0.1M lactic acid/0.2 % Carbopol 907 solution for 24 hours at room temperature. These specimens were then rinsed with distilled water.

The treatments were performed by application of the varnish placed on the enamel disc as seen in Figure 1. The 12 specimens of each group were immersed into 3 mL of ultrapure water for 24 hours. Following the treatment, the varnish was removed from the acrylic and the specimens were rinsed with distilled water. One layer of enamel was removed from each specimen and analyzed for fluoride and calcium as described above (15 second etch). The pretreatment fluoride (native) level of each specimen was subtracted from post treatment value to determine the change in enamel fluoride due to the test treatment.

Three sets of enamel specimens were prepared for testing. One set was a control in which no dental material was applied to the specimens. The other sets compared the fluoride uptake of the control relative to the **Profisil**® Fluoride Varnish (PFV) and leading competitor product.

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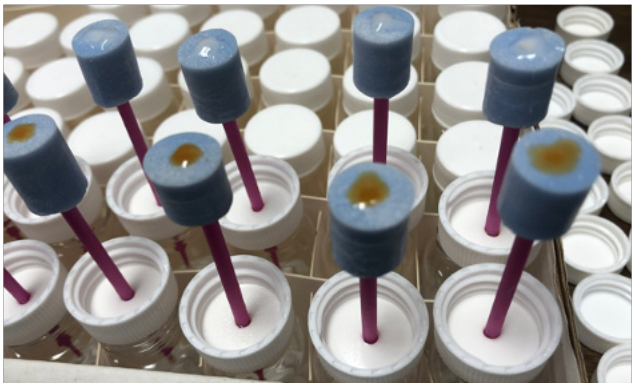
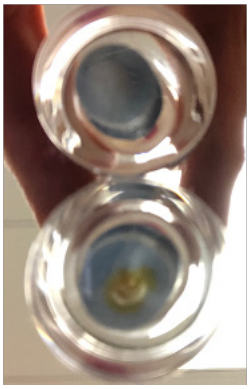
FIGURE 1





RESULTS

The results are shown in the table below.

Formulation	Enamel Fluoride before (µg F/g enamel)	Enamel Fluoride after (µg F/g enamel)
Control	2.2 ± 2.1	2.3 ± 0.5
Leading competitor product	4.4 ± 2.7	264 ± 86
Profisil® Fluoride Varnish	6.6 ± 2.8	251 ± 99

DISCUSSION/CONCLUSIONS

The fluoride uptake difference between the samples treated with different fluoride varnishes and a control with no fluoride varnish was determined (<0.05). The enamel fluoride uptake measurement is an indirect method to demonstrate the release of fluoride ions from the **Profisil®** Fluoride Varnish as there was no other source of fluoride present during the experiment other than from the prototype varnish. The enamel fluoride uptake from both varnishes were statistically greater than the control and statistically equivalent to each other.