

Fluoride Uptake Comparison of Marketed German Toothpastes Containing Desensitizing Agents

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SUMMARY SENTENCE

An *in vitro* fluoride uptake study was run on a number of German dentifrices containing desensitizing agents to assess the relative fluoridating efficiency of the fluoride systems in the presence of the desensitizing agents.

BACKGROUND

Previous *in situ* research reported by Eversole (AADR, 1995) showed that there were significant differences in fluoride uptake between two apparently similar sodium fluoride (NaF)/silica desensitizing dentifrices containing potassium nitrate (KNO₃) as the desensitizing agent. The two products that were tested by Eversole were Sensitivity Protection Crest[®] and AquaFresh[®] Sensitive. The AquaFresh[®] Sensitive product performed no better than the 250ppm F control (NaF) in this study. This result, along with similar previous *in vitro* results, means that it is critical for manufacturers to ensure that the fluoride in their products is indeed available to aid in remineralization. Just because a product has a similar formulation to a known standard does not mean that the fluoridating efficiency of that product will be equal to the standard.

In light of this, we set out to assess the relative fluoridating efficiency of a number of German anti-cavity dentifrices that also contained a desensitizing agent. This was done as part of a broader assessment of the fluoridating efficiency of German dentifrices. Dr. Helga Burk, from Philipps University in Marburg, Germany performed the testing in our Cincinnati research facility. The desensitizing dentifrices that were evaluated were: blend-a-med[®] Sensitiv, Oral B[®] Sensitiv, Elmex[®] Sensitiv and Sensodyne[®] F.

PROTOCOL

Subsurface human enamel specimens were placed in 25ml of a solution containing 0.5M/L lactic acid, 0.2% Carbopol 907 (B.F. Goodrich Co.), 50% saturated with respect to HAP, pH 5.0 for 96 hours at 37°C. After demineralization, specimens were thoroughly rinsed, then analyzed for surface microhardness with a Leitz miniload tester at a constant load of 200g.

Hardness numbers using the Vicker's scale were taken three times on each specimen, then averaged. Specimens were then placed, four to a group, in such a way that the average hardness for each group of specimens was not significantly different. After placing specimens in their respective groups of four, each group was placed in 20ml of fresh, pooled human saliva for a period of one hour to form an initial layer of pellicle on the demineralized enamel surfaces. Dentifrice slurries were prepared by thoroughly mixing 5g of dentifrice with 15g pooled, human saliva for a period of not less than 4, nor more than 5 minutes prior to use. A fresh slurry was prepared for each treatment. Treatments were made four times per day for a total of six treatment days, following the daily treatment schedule pictured below. Upon completion of pH cycling, specimens were analyzed for fluoride content, to a constant depth of 100µm, using the microdrill biopsy technique. Results are reported in µg of fluoride per cm² of surface sampled.

Daily Treatment Schedule:
1 hr. saliva bath (initial pellicle formed) [#]
1 min. treatment in 1:3 slurry of dentifrice:saliva [#]
1 hr. saliva bath
1 min. treatment in 1:3 slurry of dentifrice:saliva [#]
1 hr. saliva bath
3 hr. exposure to demineralization solution
1 hr. saliva bath [#]
1 min. treatment in 1:3 slurry of dentifrice:saliva [#]
1 hr. saliva bath
1 min. treatment in 1:3 slurry of dentifrice:saliva [#]
saliva bath overnight [#]
[#] indicates fresh saliva used

RESULTS

Product Tested	Fluoride Type	F-Uptake (µg/cm ²) [*]
blend-a-med [®] Sensitiv ⁽¹⁾ (1450ppm F)	NaF	29.6 ± 2.4 **
Crest [®] Control (1100ppm F)	NaF	28.5 ± 0.4
Oral B [®] Sensitiv ⁽²⁾ (1450ppm F)	NaF	23.4 ± 3.5
Elmex [®] Sensitiv ⁽³⁾ (1450ppm F)	AmF	19.8 ± 6.0
Control (250ppm F)	NaF	11.2 ± 1.0
Sensodyne [®] F ⁽⁴⁾ (1250ppm F)	SMFP	10.0 ± 0.9

^{*} Mean ± S.D. (N=4)

^{**} Values within brackets are not significantly different (p ≤ 0.05) as determined by Least Significant Difference Analysis

(1) Manufactured by: Procter & Gamble Co.

(2) Manufactured by: Oral B Laboratories

(3) Manufactured by: Wybert Lorrach

(4) Manufactured by: Block Drug

CONCLUSION

This research on German products supports the finding that desensitizing dentifrices with apparently the same key formulation variables (i.e., type and level of fluoride, abrasive and desensitizing agent) can provide different fluoridating efficiencies. In this case, the blend-a-med[®] Sensitiv product yielded significantly higher fluoride uptake than a similarly formulated Oral B[®] Sensitiv product. The blend-a-med[®] Sensitiv product also had significantly higher fluoride uptake than the AmF Elmex[®] Sensitiv toothpaste, and consistent with all other *in vitro* testing, higher fluoride uptake vs. the SMFP Sensodyne[®] product.