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Deposition of CaF₂-Like Material on and Fluoride Uptake into Demineralized Enamel after pH Cycling*M.J. Altenburger^{*}, M. Fleig, P. Ganter, K.-T. Wrbas, E. Hellwig*

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The in vitro fluoride uptake in demineralized enamel of an acidic fluoride varnish 43,000 ppm F⁻ combined with a Ca(OH)₂ suspension (group 1, Humanchemie, Alfeld, Germany) was compared with a standard neutral fluoride varnish (group 2, 23,500 ppm F⁻, Duraphat, Colgate, Hamburg, Germany). Demineralized bovine enamel specimens (2,500 vol.%×μm) were randomly assigned to 4 groups (n = 50). Specimens of groups 1 and 2 were treated with a defined amount of the respective study product. After storing all specimens in pooled human saliva for 3 h the specimens were brushed until no more remnants of the applied product were found. Specimens of all groups were pH-cycled for 10 days.

In the morning and in the evening specimens of groups 1, 2 and 3 (fluoride control) were stored in toothpaste slurry for 3 min. Group 4 served as negative control. CaF₂-like deposit on the enamel surface and structurally bound fluoride (three layers of 40 μm each) were determined using an ion-selective electrode and statistically analyzed using ANOVA and Tukey-B test. The highest amount of CaF₂-like material was found in group 1 (9.79 μg/cm²) followed by group 2 (4.64 μg/cm²), and 3 (3.39 μg/cm²), being significantly different from each other. In all three layers (outer/middle/inner) the highest fluoride concentration was found in group 1 (4,089.45 μg/cm³; 3,903.50 μg/cm³; 2,904.19 μg/cm³). Significantly less fluoride content was found in group 2 (1,771.84 μg/cm³; 1,534.49 μg/cm³; 936.27 μg/cm³) and group 3 (1,670.55 μg/cm³; 1,469.48 μg/cm³; 774.05 μg/cm³) being not significantly different from each other. The fluoride content of the specimens in group 4 was below the detection level. The combination of an acidic fluoride varnish and a Ca(OH)₂ suspension leads to a higher fluoride uptake after a pH challenge.

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