

9. Summary

The aim of this double-blind, placebo-controlled, randomized, crossover study was to evaluate the efficacy of three times daily consumption of either a fluoridated (0,5 mg) or a placebo baked food item on the mineral content of sound and demineralized human enamel in an *in situ* model. From 80 freshly extracted permanent human last molars 160 enamel slabs were prepared and gas steam sterilized with ethylene oxid at 55 °C. Half of each specimen`s surface was covered with nail varnish (control), while the other half was exposed to a demineralising solution for 12 days (pH 5,0). Subsequently, the applied nail varnish was partially removed and half of the demineralized surface was covered to serve as control of demineralized enamel.

In 10 intraoral mandibular appliances each four human specimens were inserted into one of the buccal flanges in randomly assigned order either positioned recessed (1 mm) or flush to the acrylic surface. The subjects were asked to refrain from other sources of fluorides (dietary protocol) except for the consumption of either a fluoride-containing or a placebo cookie during both study legs (effect/placebo) lasting four weeks. The specimens of one of the buccal flanges were brushed with a flouride-free toothpaste extraorally and twice daily for 20 seconds each, whereas the other flanges were not brushed at any time to allow the plaque to grow. Thereafter the appliances were stored in 10 % sucrose solution for 30 minutes. Mineral analysis was performed (TMR) and analyzed statistically using a general linear model (GLM) with respect to the effects of ‘fluoride’, ‘brushing’ and ‘position’.

The urinary fluoride concentrations were significantly increased while consuming the fluoridated cookie compared to baseline, wash out, placebo and run-out period ($p < 0,001$). Moreover, the salivary fluoride concentrations were significantly elevated immediately after the consumption of the fluoridated cookie compared to all other measurements ($p < 0,001$).

It can be concluded that in the absence of fluorides recessed surfaces seem to be more susceptible for demineralisation then flush lying specimens. Brushing is beneficial to arrest lesion formation in the absence of fluorides, but has negligible additional effects, if fluorides are used. This study demonstrates the efficacy of ingested fluorides in case of insufficient tooth brushing, but also shows that in the absence of fluorides with adequate cleaning, demineralisation can be hampered.