

Effect of oral biofilm on the formation and persistence of fluoride layers on dental enamel

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The use of dental care products containing fluoride for caries prophylaxis in the daily oral hygiene is established for many decades. However, little is known about the impact of oral biofilm on the formation and persistence of fluoride layers on enamel. The continuously growing oral biofilm develops immediately after oral hygiene starting with the adsorption of salivary macromolecules to enamel surfaces. The subsequent adhesion of microorganisms begins within hours. Here we studied the effect of oral biofilm on fluoridation with the most commonly used fluoride compounds NaF and olaflur (10,000 ppm). Fluoride application was performed *in vitro* either on biofilm-free or on 3 min-biofilm covered bovine enamel test specimens for 5 min. To examine the fluoridation persistence under *in vivo* conditions, 3 min-biofilm covered specimens were fluoridated and then exposed orally for 24 h before final evaluation. The analyses of all specimens were performed by scanning electron microscopy and energy dispersive X-ray spectroscopy. Both NaF and olaflur formed homogeneous and persistent fluoride layers on biofilm-free enamel and on 3 min-oral biofilms. The simulation of the *in vivo* conditions showed for both substances that fluoride is detectable on the tooth surface up to 24 h after oral exposure. However, in comparison to NaF fluoridation with olaflur was about twice as persistent.