

**P013**

**Effect of cigarette smoking on calcium fluoride uptake by enamel: an *in vitro* study**

K Basic, I Sutej, K Peros, K Rošin-Grget. *School of Dental Medicine University of Zagreb, Department of Pharmacology, Croatia*

**Introduction:** Calcium fluoride (CaF<sub>2</sub>) holds a principal role in caries-preventive mechanisms of topical fluorides by acting as a potential "reservoir" of fluoride, thus enhancing the remineralization and retarding the demineralization processes. The amount of CaF<sub>2</sub> formed is known to depend on several factors, such as the fluoride concentration in agents, the time of exposure, the pH of the solution, as well as the phosphate and calcium concentrations. The sources of calcium include the enamel, saliva, plaque and calculus. It has been shown that the presence of saliva, even in small amounts, is important for success of topical fluoride treatment, presumably because of its calcium content. There are some indications that heavy smokers have higher salivary calcium concentrations than their non-smoking counterparts. The aim of this study was to assess the difference in calcium fluoride uptake by enamel between smokers and nonsmokers who use fluoridated toothpaste, assuming there exists a difference in salivary calcium concentrations.

**Materials and methods:** Four enamel slabs were cut from each of 14 impacted third molars and randomly assigned into 4 groups. The slabs were mounted in dental wax, which covered all surfaces except the enamel surface. Unstimulated saliva was collected from two volunteers who expectorated for 15 minutes into sterile containers. Both subjects were healthy young males with good oral hygiene. One of the subjects was a smoker, smoking 30 cigarettes a day for the past 5 years, while the other subject was a non-smoker. Calcium concentration and the pH of the saliva were measured after collection. Inductively coupled plasma mass spectrometry (ICP-MS) was used for the determination of calcium concentration in saliva. Two groups of enamel slabs (A and B) were shaken in saliva (A in smokers' saliva, B in nonsmokers' saliva) for 5 min, and then shaken for 3 min in a toothpaste slurry (toothpaste/deionized water slurry (1:3 w/w); Elmex®, GABA International AG, Münchenstein, Switzerland - silica based toothpaste, 1400 ppm F<sup>-</sup>, Amine fluoride (Olafur), pH=4.6). One of the groups (C) had no saliva treatment and was only shaken in toothpaste slurry for 3 min. The treatment was repeated after a 6-hour period. One of the groups (D) served as the control group, receiving no treatment. The fluoride concentrations were determined by an ion selective electrode using the method of Caslavská *et al.* (1975), and the amount calcium fluoride was calculated as described by Dijkman *et al.* (1983).

**Results:** Calcium concentration in smokers' saliva was higher (52.68 mg/L) than in nonsmokers' saliva (23.95 mg/L). The enamel uptake of calcium fluoride ( $\mu\text{g}/\text{cm}^2 \pm \text{SD}$ ) in group A was significantly higher ( $1.43 \pm 0.48$ ) than in the other two treatment groups: B ( $0.76 \pm 0.26$ ) and C ( $0.96 \pm 0.27$ ),  $P < 0.015$ . Enamel uptake of calcium fluoride in all 3 experimental groups was statistically different from that in the control group. The only difference that was not statistically significant was observed when comparing the uptake of calcium fluoride in groups B and C ( $P > 0.015$ ).

**Conclusion:** The results demonstrate that saliva collected from heavy smokers, which contains higher salivary calcium concentrations, enhances enamel uptake of calcium fluoride.