for either 4 or 6 days. They were then treated with remineralizing solutions for either 2 or 3 weeks at pH 7.0, 37°C. The level of remineralization was determined using contact microradiography. A 4-way analysis of variance (ANOVA) was used to evaluate significant differences among samples. The results showed that: (1) the contribution of demineralizing agent on subsequent remineralization was 29.6% to lesion depth (LD) and 22.7% to mineral loss ($\Delta Z$) with a significant difference in both LD and $\Delta Z$ ($p < 0.001$) among groups; (2) duration of demineralization contributed 39.2% to the outcome of LD and 37.1% to $\Delta Z$ with a significant difference between groups ($p < 0.001$); (3) no significant difference was found with respect to either Ca/P concentration or duration of remineralization. It was concluded that duration and type of demineralizing agent are key factors affecting the outcome of this in vitro enamel demineralization and remineralization study.

**163**

## Effects of Ozone and Sodium Hypochlorite Treatments on Caries-like Lesions in Dentin

*E. Zaura*, M.J. Buijs, J.M. ten Cate*

* e.zaura@acta.nl

Academic Centre for Dentistry Amsterdam (ACTA), Amsterdam, The Netherlands

Ozone is used in industry, medicine and dentistry because of its antimicrobial potential. For caries therapy, an additional beneficial effect of ozone has been proposed [Baysan and Lynch: Am J Dent 2004;17:56–60]: remineralization of lesions may be promoted by oxidation of demineralized dentin. The aim of this study was to compare the effects of ozone and another potent oxidizer – sodium hypochlorite (NaOCl) on demineralized dentin and on subsequent remineralization and demineralization of the treated lesions. Bovine dentin was demineralized in methylcellulose gel/lactic acid (pH 5). Part of each lesion was coated with nail varnish for baseline reference. The specimens were exposed for 60 s to ozone gas (HealOzone, KaVo Germany), NaOCl (10%) or water. Then the specimens were remineralized in 20 mM HEPES buffer (pH 7) containing 1.5 mM Ca and 0.9 mM phosphate for 2 or 8 days and subsequently demineralized (lactic acid, pH 5) for 2 days. Mineral content was assessed by transverse microradiography (TMR) in subgroups of samples right after the treatments, or following the subsequent re- and demineralization steps. No difference was found between ozone- and water-treated groups at any time point. After NaOCl treatment, the surface of the samples had 'moth-eaten' appearance. If not corrected for this bulk surface loss, NaOCl-treated samples remineralized significantly more than the other two groups. However, if the loss of the surface was included into the results then the beneficial effect of NaOCl on remineralization was lost. Additionally, after being remineralized, the NaOCl group demineralized significantly more than the ozone or water groups. We conclude that ozone does not affect mineral content of demineralized dentin, while concentrated sodium hypochlorite has detrimental effects on demineralized dentin. HealOzone unit provided by KaVo Nederland.

**164**

## Low Fluence $CO_2$ Laser (10.6 μm) Parameters for Caries Prevention

*M. Esteves-Oliveira [a,*], D.M. Zezell [b], W.F. Velloso [c], J. Meister [d], R. Franzen [d], F. Lampert [d], C.P. Eduardo [a], C. Apel [d]*

* marcella@usp.br

[a]Dentistry School of University of São Paulo, [b]IPEN/CNEN-SP, São Paulo, [c]SIMFAB/FZEA, University of São Paulo, Pirassununga, Brazil; [d]RWTH Aachen University, Aachen, Germany

Although $CO_2$ laser irradiation can decrease enamel demineralization, thermal damage to the surface is a common side effect. The occurrence of fissures and cracks may compromise in vivo application. Therefore, the aim of the present study was to find $CO_2$ laser (10.6 μm) parameters resulting in maximum caries-preventive effect with the lowest thermal damage. Five low fluences of 0.12, 0.29, 0.39, 0.50 and 0.60 J/cm$^2$ combined with high repetition rates of 500, 154, 167, 182, 187 Hz, respectively and 10 μs pulse duration were chosen for the experiments. 78 bovine enamel cubes were divided into 5 laser groups and one control. After treatment the samples were submitted to an 8-day pH-cycling regime. Demineralization was assessed by lesion depth measurements with a polarized-light microscope. The temperature rise at the enamel surface and the propagation into deeper layers were calculated using a finite element model. Surface morphology was evaluated by SEM. All laser groups resulted in statistically significant lower lesion depths than the control group (ANOVA; $p < 0.05$). Morphologically, the two lowest fluences resulted in no surface changes. The calculated temperature rise at 1.5 mm depth was less than 5°C in all groups. In the present in vitro study irradiation with 0.12 J/cm$^2$, 500 Hz and 2500 pulses of $CO_2$ laser increased enamel caries resistance without causing undesirable surface damage or excessive temperature rise.

Supported by DAAD.

**165**

## Effect of Er,Cr:YSGG Laser and Fluoride Application on Enamel Demineralization

*P.A. Ana [a,*], C.P.M. Tabchoury [b], J.A. Cury [b], D.M. Zezell [a]*

* paana@usp.br

[a]Instituto de Pesquisas Energéticas e Nucleares, São Paulo, [b]Faculdade de Odontologia da UNICAMP, Piracicaba, Brazil

This study evaluated the influence of sub-ablative Er,Cr:YSGG laser and topical fluoride application on incipient caries development in vitro. One hundred and sixty human enamel slabs were ramdomly divided into eight equal groups: (1) untreated (control); (2–4) irradiated with Er,Cr:YSGG laser at 0.25, 0.50 and 0.75 W, respectively; (5) treated with acidulated phosphate fluoride (APF; 1.23% F) for 4 min; (6–8) pre-irradiated with Er,Cr:YSGG laser at 0.25, 0.50 and 0.75 W, respectively and subjected to APF application. All groups were submitted to pH-cycling simulating a cariogenic challenge, and after 10 cycles mineral loss ($\Delta Z$) was measured in enamel. Calcium, inorganic phosphorus ($P_i$) and fluoride concentrations were also measured in the demineralizing



Downloaded by:
Universidade de Sao Paulo - USP + SIBI
143.107.255.190 - 11/4/2022 3:03:51 PM