

27

## **Remineralization Processes Visualized with Confocal Laser Scanning Microscopy**

A.M. Pfarrer\*<sup>1</sup>, R.V. Faller<sup>1</sup>, H. Duschner<sup>2</sup>

<sup>1</sup>Procter & Gamble, Cincinnati, OH, USA

<sup>2</sup>Dept. of Applied Structure and Microanalysis, University of Mainz, Germany

Confocal Laser Scanning Microscopy (CLSM) has been identified as a nondestructive tool for viewing the subsurface tomography of enamel and dentine hard tissue. This tool has been previously shown to be useful in not only assessing aspects of the demineralization process (Ando, *et al.*, *J Dent Res.* 74, #289, 1995), but it is also able to visualize both into and through the depth of enamel lesions (Pfarrer, *et al.*, *J Dent Res.* 75, #543, 1996). The purpose of this study was to determine if CLSM is capable of visualizing not only the demineralization process in a lesion, but monitoring the remineralization process as well. Specimens were prepared by cutting 4mm diameter discs of human enamel from incisors which were free of visual cracks or surface imperfections (10X magnification). Specimens were ground with silica carbide paper (600 grit), removing approximately 50µm of the natural surface, then polished to a high lustre using AB Gamma alumina (particle size < 1.0µm). Surface hardness of specimens after polishing (Leitz microhardness tester @ 200g load) was ~ 360VHN (Vickers hardness). One-third of the specimen was covered with a clear, acid resistant nail varnish. The remaining portion of each specimen was exposed to 25ml of demineralization solution consisting of 0.1M/L lactic acid, 0.2% Carbopol 907, 50% saturated with HAP, pH 5.0 for 24h at 37°C. One-half of the demineralized portion of each specimen was then exposed to fluoride treatments (1:3 mixture of toothpaste [Crest<sup>®</sup>, 1100ppm F as NaF] and saliva) for a period of 6 days under pH cycling conditions. CLSM images were taken in the areas of sound enamel, demineralized enamel and remineralized enamel. CLSM images (x,y) were made at a depth of 10µm from the surface. Changes in the porosity of the enamel were clearly visible as a function of the demineralization and remineralization processes, with the remineralized areas exhibiting a crystallinity that approached sound enamel. **Results from this study indicate CLSM is capable of visualizing not only demineralization processes, but remineralization processes as well. Methods to quantify these images are under investigation.**

310

## **Decreased Disease Progression is Associated with Increased IgA in Gingival Crevicular Fluid**

J. Grbic, R.E. Singer\*, K. Lam, J.B. Fine, I. Lamster

Periodontics, Columbia University, NY, USA; Procter & Gamble Co., Cincinnati, OH, USA

In our previous studies, patients having high levels of IgA in GCF had a decreased risk of disease activity. In this study, we examined the effect of scaling and root planing (Sc/RP) on the levels of IgA in GCF over a 24 week period in 29 subjects with periodontal disease. Subjects received a Sc/RP at the baseline visit. Clinical parameters including attachment level were recorded at 6 sites per tooth at baseline, 4, 8, 12 and 24 weeks. GCF was collected at baseline, 2, 4, 6, 8, 12, and 24 wks from the mesial surfaces of the posterior teeth by filter paper strips and analyzed for IgA by ELISA. We calculated the initial IgA response to therapy by averaging the IgA levels at 2 and 4 wks post Sc/RP while the late response to therapy was determined by averaging the IgA levels in GCF at 6, 8, and 12 wks. Each subject's initial and late IgA responses were ranked and categorized into low, intermediate, and high IgA responses. 17 subjects (58.6%) demonstrated at least 1 site losing ≥ 2.5mm of clinical attachment loss (CAL). When subject's clinical responses were compared among subsets defined by their initial IgA response, 80% of subjects with a low IgA response, 44% with an intermediate IgA response and 50% with a high IgA response demonstrated CAL. When comparing clinical responses for the subsets defined by the late IgA responses, 89% of the subjects with a low IgA response, 60% of the subjects with an intermediate IgA response, and 30% of the subjects with a high IgA response demonstrated CAL. These data indicate that subjects who had higher IgA responses at 6 to 12 weeks post Sc/RP were statistically (Chi-square; p<.05) less likely to demonstrate CAL. **These results support the hypothesis that maintenance of high levels of IgA in GCF may be 'protective' against periodontal attachment loss.**