

Poster Presentations - Research Supported by P&G

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Stannous Fluoride Effects on Dentinal Tubules

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Effective treatments for dentinal hypersensitivity may include topical application of chemistries to occlude patent dentinal tubuli. **Objectives:** This study examined the ability of concentrated stannous fluoride gel (Gel-Kam™ 0.454 % stannous fluoride in a glycerin Carbopol base) to occlude patent tubuli in vitro and to resist solubilization with dietary acids. **Methods:** Human root dentin blocks were mounted in methacrylate, ground to form smear layers and then acid etched (phosphoric) to produce surfaces with patent tubuli. Specimens were soaked 24 hours in pooled human saliva and then cycled for 3 days with 4x/day soaks (2-min.) in slurries of standard sodium fluoride dentifrice (Crest™ Regular) or stannous fluoride gel (Gel-Kam™) interspersed with saliva incubation. Before and after cycling specimens were evaluated for surface hardness and profilometry. Following cycling specimens were 1/2 coated in parafilm and cycled through an additional 3 day acid challenge protocol including saliva soaks, standard F dentifrice soaks and dietary acid challenges including bid 3 min. soaking of specimens in Coca-Cola™ soft drink. Hardness and profilometry were repeated following which treated and acid challenged sides were compared by SEM and CLSM microscopy. **Results:** Dentin hardness did not change on treatment cycling but roughness decreased with NaF dentifrice and with SnF₂ gel (R_a controls 0.35 - 0.40 sig. NaF 0.18 sig. SnF₂ 0.28). Post acid cycling surface roughness increased (R_a NaF 0.25 sig. SnF₂ 0.33). SEM revealed superior tubule obturation with SnF₂ gel and EDAX and XPS showed high surface stannous and fluoride concentrations. Stannous fluoride treated dentin also strongly resisted acid solubilization. **Conclusion: Stannous fluoride shows efficacy in the blocking of patent dentinal tubuli through chemical precipitation which resists future acid solubilized tubule disclosure. These effects help explain clinical benefits of stannous fluoride in the relief of dentinal hypersensitivity.**

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Raman Spectroscopic Changes in Teeth Interiors When Externally Bleached In-Vitro

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Objectives: The location and magnitude of bleach interactions with teeth was examined by comparing fluorescence and Raman Total Spectral Intensity changes in subsurface tooth enamel, DEJ and dentin in teeth bleached externally.

Methods: Extracted human premolars were cleaned and analyzed for external CIELAB color (Fuji-1000CCD) and stratified into treatment groups including 0; 6; 24; 48 hours bleaching in bulk 6 % H₂O₂ gel 37°C. External tooth colors were recorded post bleaching and teeth were hemi-sectioned along their vertical axis. Following this, teeth were analyzed in cross section ultrastructure and chemical environment applying nondestructive confocal laser scanning microscopy (reflection mode, He/Ne laser 632 nm). Laser light emitted from subsurface tissues was used for fluorescence and Raman spectra uptake (prototype fibre optic coupling of Raman spectrometer to CLSM, Ar laser 488 nm, He/Ne laser 632 nm). Combined line scans at discrete intervals measured from central DEJ of fluorescence and micro-Raman scattering were thus carried out. **Results:** Raman Spectra Total Integral (50-3600 cm⁻¹) for non bleached enamel was larger for subsurface enamel (range 7-10 x 10⁶) than subsurface dentin (4 x 10⁶) and largest for DEJ regions (15 x 10⁶). RSTI in subsurface enamel was reduced by > 60 % following just 6 hours bleaching with only minor further time dependent changes. DEJ showed a time dependence of RSTI reduction with bleaching, from 6-48 hours external bleaching, e.g. % reductions in RSTI with bleaching at 6, 24 and 48 hours measuring 45, 65, and 74 % respectively. **Conclusion: These results show that external tooth bleaching produce RSTI and fluorescence reductions in enamel, DEJ and dentin and with enamel through DEJ exhibiting the largest relative changes. This may provide further insight into the location of oxidation substrates in dental tissues.**