Primary Tooth Enamel Surface Topography with *In Vitro* Argon Laser and Fluoride Exposure: Scanning Electron Microscopic Study. R Ellis*, C Flaitz, G Westerman, J Hicks. Creighton U, Omaha NE; Tx Child Hosp, Baylor Coll Med, U Texas-Houston, Houston Tx.

This scanning electron microscopic (SEM) study determined surface alterations of primary tooth enamel after *in vitro* argon laser (ArTx) and acidulated phosphate fluoride (APF) treatment. 20 extracted or exfoliated primary teeth underwent soft tissue debridement and a fluoride-free prophylaxis. Buccal and lingual surfaces were determined to be caries-free by macroscopic examination (stereo-zoom binocular microscope, 16x). Treatment groups were: 1) Control [n=5]; 2) ArTx 11.5J/cm^2 [0.231W, 5-mm beam size, 10s; n=5], 3) 1.23% APF for 4min [n=5] before ArTx; 4) ArTx before APF [n=5]. Buccal and lingual surfaces were evaluated following standard SEM preparation techniques. With controls, enamel surfaces (n=10 surfaces) were relatively smooth with occasional enamel prism ends present on their surfaces. There were no areas with cavitations or surface defects. With ArTx, the irradiated surfaces had roughened mildly to moderately irregular surface coatings without cavitation of the underlying enamel or exposure of enamel prism ends. The surface coatings were composed of granular to globular deposits with most <3μm in greatest dimension. Only occasional fine cracks and porosities in the surface coatings were noted and these were typically less than 1mm in size. With APF before ArTx, the surfaces possessed an irregular contour with numerous granular to globular precipitates varying in size from 1 to 3μm in greatest dimension. With ArTx before APF, homogenous confluent surface coatings that masked the underlying enamel surface were present. Granular and globular precipitates were not seen. The argon laser effects on the enamel surfaces were masked by the uniformity of the surface coatings. Argon laser irradiation and APF treatment of primary tooth enamel create surface coatings without compromising the integrity of the subjacent enamel. This surface coating may act as mineral reservoirs that protect the underlying enamel from demineralization during a cariogenic challenge.

Supported by an American Academy of Pediatric Dentistry Foundation Grant