

175. Title: Terahertz pulsed imaging study to assess remineralization of artificial caries lesions

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Abstract: We compare terahertz-pulsed imaging (TPI) with transverse microradiography (TMR) and microindentation to measure remineralization of artificial caries lesions. Lesions are formed in bovine enamel using a solution of 0.1 M lactic acid/0.2% Carbopol C907 and 50% saturated with hydroxyapatite adjusted to pH 5.0. The 20-day experimental protocol consists of four 1 min treatment periods with dentifrices containing 10, 675, 1385, and 2700 ppm fluoride, a 4-h/day acid challenge, and, for the remaining time, specimens are stored in a 50: 50 pooled human/artificial saliva mixture. Each specimen is imaged at the focal point of the terahertz beam (data-point spacing = 50 μ m). The time-domain data are used to calculate the refractive index volume percent profile throughout the lesion, and the differences in the integrated areas between the baseline and post-treatment profiles are used to calculate ΔZ (THz). In addition, the change from baseline in both the lesion depth and the intensity of the reflected pulse from the air/enamel interface is determined. Statistically significant Pearson correlation coefficients are observed between TPI and TMR/microindentation ($P < 0.05$). We demonstrate that TPI has potential as a research tool for hard tissue imaging.