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Radiation Dosimetry of Dental Enamel Using X-Band and Q-Band EPR Spectroscopy TANIA DE, Howard University, ALEX ROMANYUKHA, Naval Dosimetry Center, BARRY PASS, PRABHAKAR MISRA, Howard University — Electron paramagnetic resonance (EPR) dosimetry of tooth enamel can be used for individual dose reconstruction following radiation accidents. The purpose of this study was to develop a rapid, minimally invasive technique for obtaining a sample of dental enamel small enough to not disturb the structure and functionality of a tooth and to improve the sensitivity of the spectral signals using X-band (9.4 GHz) and Q-band (34 GHz) EPR spectroscopy. EPR measurements in X-band were performed on 100 mg isotropic powdered enamel samples and Q-band measurements done on 4 mg (1x1x3 mm) enamel biopsy samples. All samples were obtained from discarded teeth collected during normal dental treatment. In order to study the variation of the Radiation-Induced Signal (RIS) at different orientations in the applied magnetic field samples were placed in the resonance cavity for Q-band EPR. In X-band spectra, the RIS is distinct from the "native" radiation-independent signal only for doses > 0.5Gy. Q-band, however, resolves the RIS and "native" signals and improves sensitivity by a factor of 20 enabling measurements in 2-4 mg tooth enamel samples.

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