

## **ESR studies of irradiated tooth enamel with X-rays**

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**Body of Abstract:** In the last years, the studies involving the retrospective dose assessment have been concentrated in improving the methodologies and the evaluation of the uncertainties. Measurement of the stable free radicals induced by the action of the ionising radiation in calcified tissues can be associated with the absorbed dose and has been used for dose assessment in retrospective dosimetry. Electron Spin Resonance (ESR) dosimetry using teeth enamel is a powerful tool for the evaluation of absorbed doses for individuals exposed to radiation. In this paper is evaluated the ESR response of the tooth enamel irradiated with X-rays for doses in the range between 0 - 2 Gy. The analysis of the ESR signal is complex, the ESR spectrum of the tooth enamel is composed of multiple elements divided in two categories: radiation induced and radiation insensitive signals. For the low doses range, where the studies were concentrated, to improve the evaluation of the dose, special cares have been taken. In this regard, practical considerations of tooth selection, sample preparation, parametrization of the ESR spectrometer, conduction of the measurements and numerical pos-treatment of the ESR spectra are discussed. The measurements were carried out at room temperature with 50 mg of powdered samples, using a Bruker EMX spectrometer operating at X-band. The peak-to-peak amplitude values of the ESR spectra were evaluated for different doses and parametrizations of the equipment. The spectra were recorded with many scans for improvement of the signal-to-noise ratio. Experiments were carried out to estimate the lowest detectable dose limit and to evaluate the stability and reproducibility of the technique. Numerical methods for pos-treatment and extraction of the signal from the spectrum are discussed.