

MRI EVALUATION OPTIMIZATION OF FRICKE XYLENOL GEL DOSIMETER IRRADIATED WITH CLINICAL PHOTON BEAMS

C.C. Cavinato^{1*}, R.K. Sakuraba², E.S. Santos³, O. Rodrigues Jr.¹, L.L. Campos¹

¹*Instituto de Pesquisas Energéticas e Nucleares, Gerência de Metrologia das Radiações; Av. Prof. Lineu Prestes, 2242, Cidade Universitária, 05508-000, São Paulo, Brazil; ccavinato@ipen.br*

²*Hospital Santa Catarina, Unidade de Radio-Oncologia; Av. Paulista, 200, Bela Vista, 01310-000, São Paulo, Brazil*

³*Hospital Santa Catarina, Centro de Diagnóstico por Imagem; Av. Paulista, 200, Bela Vista, 01310-000, São Paulo, Brazil*

Because of the increased use of complex radiation treatment techniques, the care to obtain an effective and reliable dosimetry has also increased. The gel dosimetry has been studied for this purpose because it enables the absorbed dose distribution verification, with good spatial resolution. It is possible to evaluate the dose distribution in gel phantoms using the magnetic resonance imaging (MRI) technique. For spatial resolution with sufficient quality to distinguish different dose regions in phantoms, one must use a MRI sequence which best fits the gel phantom composition. In this work, different MRI sequences were used to evaluate, using MRI technique, the images quality obtained of the Fricke xlyenol gel (FXG) dosimeter developed at IPEN, non-irradiated and irradiated with photon clinical beams, in order to establish a appropriate protocol for the calibration curves and FXG phantoms imaging. The FXG samples were prepared using 270 Bloom gelatine (made in Brazil) and conditioned in polymethyl methacrylate (PMMA) cuvettes, for the irradiations and measurements. The PMMA cuvettes filled with FXG dosimeter were irradiated with 6 MV clinical photon beams, absorbed doses from 2 to 20 Gy, dose rate of 600 cGy.min⁻¹, 15 x 15 cm² radiation field size, build-up bolus 2.5 cm thick, backscattering solid water plates 4.5 cm thick and source to top of bolus distance being 100 cm, using a VARIAN[®] Clinac 6EX linear accelerator. The FXG samples MRI images (non-irradiated and irradiated) were obtained using a GENERAL ELECTRIC[®] Signa 1.5 T MRI scanner, on cranium protocol. Different MRI sequences changing the some parameters values were used in order to achieve good spatial resolution and contrast, and to optimize the image acquisition time. The MRI sequence that generated the most suitable image in relation to predetermined criteria was chosen for future image acquisition.