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Dose evaluation of a 137-cesium source exposition using a solid water phantom

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Introduction

Dose values in radiotherapy patients are important so that the treatment is efficient according to the protocols defined for each patient. Dose fractionation is often used in radiotherapy treatments and doses lower than those defined as therapeutics may be inefficient, as higher doses can cause injury and burns. The high accuracy in radiation release adjusts the prescribed dose to the target volume, better preserving the adjacent healthy tissues. Dosimetric films are often used for dose recording in radiotherapeutic processes and the calibration of these films must be performed so that they can be used as dosimeters. Irradiation from exposures of a cesium-137 source at the dose of 2 Gy allowed to obtain the curves in the regions of interest. Irradiation from exposures of a cesium-137 source at the dose of 2 Gy allowed to obtain the curves in the regions of interest.

Methods

A phantom made of two solid water plates was used in exposures from a cesium-137 source. This phantom was placed 1,0 m from the source and a cone collimator with a diameter of 2.48 cm was used to limit the gamma beam. Radiochromic film sheets were used to record isodose curves at the frontal surface and 1 cm deep when the phantom was irradiated frontally. To obtain the dose variation in depth a second irradiation was done in lateral beam incidence in the phantom. The experiments were carried out at the Calibration and Dosimetry Laboratory (LACD) of the Nuclear Technology Development Center (CDTN) where Grafchromic EBT QD+ films were exposed to Entrance Kerma value of 2 Gy.

Results

The images obtained from the film sheets allow obtain three curves to observe the absorbed dose variation: in the central longitudinal axis, to observe dose variations deep; dose variations in axial axis in at the entrance (around 2 Gy) and 1 cm deep where the dose recorded reached around 2.5 Gy.

Conclusions

The obtained absorbed dose curves allow to observe dose variations at the entrance and 1 cm depth where the dose was higher than in the entrance, The increase of the absorbed dose initially happens in the depth and then reduces considerably with the beam penetration into the solid water phantom.

References

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