Computational simulation of the detectors designed for computer tomography

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Considered a diagnostic technique with high exposure of the patient to ionizing radiation, computed tomography (CT) makes use of a parameter, the $P_{KL,CT}$ (air kerma-length product), to determine the total absorbed energy in a volume, considering a specific protocol. From the values of PKL,CT, it is possible perform the detectors calibration in laboratories successfully [1]. To perform $P_{KL,CT}$ measurements it is necessary the use of a specific detector for the diagnostic technique, requiring the calibration of the detector every 2 years in a calibration laboratory. In this work we propose to simulate methodologies for the calibration of radiation detectors for CT, applied in a calibration laboratory of the IFBA- Labprosaud - Bahia Technological Park, Salvador, Brazil. The dimensions and configuration, of the calibration laboratory, RQT8 (100 kV), RQT9 (130 kV) and RQT10 (150 kV) radiation qualities, used in calibration procedures for CT, as well as the characteristics of two Radcal radiation detectors 10x6-3CT and 10x6-0.6 [2] were all considered in the simulations. All details of the irradiation scenario were constructed in the MCNPX Monte Carlo code [3]. The interaction of the radiation with the detectors made use of the spectrum for each beam quality. The simulated results showed that the reference PKL values measured directly, with the ionization chamber, as well as, the simulated results are similar to those from the literature [4].

Keywords: Detectors Calibration, Monte Carlo simulation, Computer Tomography.

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