

Paediatric phantom performance evaluation in computed tomography radiation standard beams

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Computed tomography is a technique in the field of radiology with remarkable technological advances in the last ten years. Although its effectiveness in diagnosing pathologies accurately, there is a concern regarding radiological protection considering that in some diagnostic radiology clinics the protocol applied for adults and children patients are the same [1]. The children have smaller body structure and are in constant change, they are more susceptible to cancer development when they are exposing to radiation high doses. In 2013, International Atomic Energy Agency, IAEA, published the Human Health Series No. 24, a special guidance on dosimetric standards and methodologies related to dosimetry for paediatric patients undergoing diagnostic radiology in order to complement the previous publications TRS 457 (2007) and its implementation (2011) [2,3,4]. Recently it was developed a new paediatric head phantom simulating a five years old child that uses special materials to simulate the cortical and the cancellous bone and in this work its performance was evaluated in CT standard radiation beams at two calibration laboratory, the LCI-IPEN, Brazil and LMRI-IST, Portugal. The goal was to evaluate the quantities: air kerma index ($C_{a,100}$), weighted air kerma index (C_w), average volumetric air kerma index (C_{vol}) and the air kerma-length product (PKL). The reference radiation qualities used in both laboratories were the radiation qualities recommended by the norm IEC 61267 (RQT8, RQT9 e RQT10) to computed tomography dosimetry measurements [5]. The calculated values of C_w show attenuation of 11%, 13% and 10% for the qualities RQT 8, RQT 9 and RQT 10, respectively, from cortical to cancellous bone.

Keywords: diagnostic radiology, computed tomography, paediatric phantom and CT air kerma indices

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