AbstractID: 1318 Title: A Tomographic Anthropomorphic Newborn Phantom for Diagnostic Dosimetry in Pediatric Radiology

Various types of phantoms and tissue-equivalent materials have been developed for use in diagnostic dosimetry. However, the vast majority of these are designed to represent adult patients. Over the past few years, doses to pediatric patients during diagnostic exams (especially CT) have been the topic of much discussion. Therefore, to address this problem, several tasks have been undertaken. The first of these is the development of a family of tissue-equivalent materials designed to mimic newborn soft, bone, and lung tissues, and the soft, bone, and lung tissues of other ages (according to the tissue compositions of ORNL/TM-8381). These materials have been used to construct an anthropomorphic, tomographic newborn dosimetry phantom. This is the first phantom in a series of phantoms designed to simulate pediatric patients throughout their entire age range. This phantom was constructed using the tissue-equivalent materials mentioned above. A whole-body CT scan of a newborn cadaver (1 mm) was used as the data set for the phantom, which was constructed on a slice-by-slice basis at a slice thickness of 5 mm. Also included with this phantom is an integrated dosimetry system utilizing MOSFET dosimeters. This dosimetry system can be used to measure doses in projection radiography, CT, and fluoroscopy. A benchmarking experiment was also performed using a heterogeneous cylindrical tissue phantom with an identical dosimetry system. These experiments are then compared with simulations within the MCNP 4C radiation transport code.

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