

AbstractID: 11780 Title: The Impact of the new ICRP-103 Recommendations on the Assessment of Effective Doses from CT Procedures

Purpose: To apply a pair of adult phantoms representing ICRP-89 50th- percentile adult males and females to the study of impact of the new ICRP-103 recommendations on the assessment of Effective Dose from CT procedures.

Method and Materials: a pair of mesh-based computational phantoms, RPI Adult Male (RPI-AM) and RPI Adult Female (RPI-AF) that were recently developed to represent the ICRP-89 50th-percentile adult males and adult females. This pair of phantoms has the detailed bone structures, including the spongiosa which contains the red bone marrow. The detailed RBM distribution was adjusted according to ICRP Publication 70. The CT scanner model used in this study is an MDCT scanner which includes the source geometry and movement, the source energy spectrum, the bow-tie filter as well and the beam shape. CT scan protocols including whole body scan were carefully modeled in this study, and tube potential of 120 kVp were considered. All simulations were performed using the Monte Carlo code, MCNPX 2.5.0. The three-correction factor method was used to calculate the RBM dose. Effective Dose results were calculated following the algorithm from ICRP 103.

Results: A new set of organ absorbed dose results has been presented using this pair of new developed reference adult phantoms from CT procedures, as well as the effective dose results. Also the new results of red bone marrow dose have been provided. The recently published ICRP 103 updated the radio-sensitive organ list; also it improved the algorithm of effective dose calculations.

Conclusion: Advanced red bone marrow dose calculation method has been used in this study due to the detailed bone structures of this pair of RPI-AM and RPI-AF phantoms. This new set of effective dose dataset based on the new ICRP-103 recommendations could be used to provide latest information for clinical diagnostic dosimetry area.