

AbstractID: 11771 Title: Comparisons of Organ and Effective Doses from ImPACT and DLP/ED Methods to MDCT-Specific Monte Carlo Simulations

Purpose: Organ and effective dose (ED) are the preferred metrics for estimating risk from CT. Common methods to obtain these values include the ImPACT CT Patient Dosimetry Calculator and DLP to ED coefficients. This study compares the reported values from these methods to doses calculated from MDCT-specific Monte Carlo (MC) simulations.

Method and Materials: Using two 64-slice MDCT scanners, organ doses were obtained from the ImPACT calculator for a 120 kVp, helical (pitch 1) chest\abdominal scan. Analogous MC simulations were performed on two voxelized female models of different sizes. ED values (ICRP 60 and 103) were calculated using the resulting organ doses and also using the DLP method. The agreements of the ED and organ doses from ImPACT and the DLP methods to MC values were calculated for each scanner and patient.

Results: The % differences between ImPACT and MC organ doses had a wide range (-76% to 465%) depending on the scanner, patient, and organ, with an absolute mean of 53%. For a given scanner and organ, the agreement level across patients varied considerably. For a given patient and organ, the agreement across scanners varied less. Agreement between ImPACT and MC ED values were within 10% (both scanners) for one patient but varied between 28% and 46% for the other. The DLP method resulted in % differences ranging from 5% to 32% depending on the patient.

Conclusion: Organ dose comparisons demonstrate differences up to 400% between approaches, which could be due to different patient models (MIRD vs. voxelized phantoms of different sizes) and/or variations in scanner modeling approaches (ImPACT scanner matching vs. MC method). Agreement levels between ED values obtained from the ImPACT or DLP methods to MC results are highly dependent on the particular scanner and patient under consideration but were within 30% in all cases.