

Purpose: CT Dose reports include several values (CTDIvol, DLP) for each series in an exam and often the Total DLP. The purpose of this work was to examine potential methods to calculate effective dose (ED) estimates from these reported values and to assess the accuracy of these ED estimates.

Method: ED estimates for three types of CT exams were obtained for an adult female patient (who was slightly larger than reference woman size) using region-specific DLP-to-ED coefficients (k-factors) by: (A) summing the ED calculated for each scan component in each study, and, (B) calculating ED using the total DLP and the average k-factor across all anatomical regions included in the exam. ED estimates were obtained for a routine abdomen, a three-phase liver, and a trauma exam. For each exam, ED estimates were compared to reference values obtained using Monte Carlo simulations to estimate organ doses and then applying ICRP Publication 103 definitions.

Results: The routine abdomen exam consists of only one scan, thus methods A and B both resulted in an ED estimate of 5.0mSv which underestimated the reference ED by 37%. For a three-phase liver exam, both methods A and B estimated an ED of 27.9mSv, which also had an error of -37%. For the trauma exam, method A resulted in an ED estimate of 32.2mSv, which had error of -20% and method B produced an ED estimate of 36mSv, which had a smaller error of 10%.

Conclusions: In theory, ED estimates should be obtained by multiplying the DLP for each series by the region-specific k-factor and summing (Method A); however, for the trauma exam Method B resulted in an ED with lower error. Regardless of what method is used, the ED estimates from k-factors differed from the reference method for several reasons including not adjusting for patient size.