

Purpose: The effective doses (ED) were compared between the MOSFET method and the DLP method for a variety of clinical CT scans.

Methods: Two CT scanners (Manufacturer A and B) were used in this study. Organ doses were measured with MOSFET detectors. Twenty MOSFET detectors were inserted in the 5-year-old anthropomorphic phantom (CIRS, Norfolk, VA). The calibration factor for each MOSFET was determined using equivalent CT beam quality of respective manufacturer separately. The phantom was scanned using head, chest, abdomen-pelvis and chest-abdomen-pelvis protocols at our institution. CTDIvol and DLP were recorded from the scanner console display. The MOSFET method employed the ICRP 103 weighting factors to calculate ED; the DLP method used the AAPM 96 (2008) anatomy-age specific k-factors. Pediatric protocols except head used CTDIvol data from 32 cm CTDI phantom. For this reason a factor of approximately 2 was applied to the CTDIvol and DLP in body protocols. In addition, CTDIvol measurements were performed with a Piranha CT Dose Profiler (RTI, Fairfield, NJ).

Results: The calculated ED from manufacturer A scans underestimated the ED for the head, chest, chest-abdomen-pelvis and abdomen-pelvis scans by 133.27%, 55.84%, 30.24% and 19.13%, respectively. The calculated ED from manufacturer B scans underestimated the ED for the head by 85.66% and overestimated the ED for the chest, chest-abdomen-pelvis and the abdomen-pelvis scans by 102.81%, 114.52% and 96.19%, respectively. The percent difference between console and measured CTDIvol ranged from 11.04% to 24.88%.

Conclusions: ED calculations from the DLP method differed grossly from the MOSFET method.

Console displayed CTDIvol showed good agreement with measured values. One possible explanation for ED disagreement between the two methods may lie in inaccuracies of k-factors. These k-factors were computed from old Monte Carlo codes based on mathematical phantoms. Additionally, manufacturer specific conversion factors may need to be proposed.

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