

Purpose: To evaluate the weighted computed tomography dose index (CTDI_w) under the high resolution mode of the state-of-the-art GE Discovery HD750 scanner. The pencil ionization chamber measurements were cross-validated with thermoluminescent dosimeters (TLDs).

Methods: CT scans were performed on a GE Discovery CT 750 HD scanner under high resolution axial mode, using the scan parameters of 120 kVp, and 200 mA, 1 sec/rotation. Two beam collimations were used in this study: 40mm and 10mm. A Standard Imaging Exradin A101 CT ionization chamber (effective length 12.08 cm) was used to determine CTDI_w. To calculate CTDI_w using TLDs, the CT dose profiles at both central and peripheral positions in a CTDI head phantom were measured with arrays of TLD-100 chips. With the measured dose profiles, integrations along the z-direction within ± 50 mm were performed to calculate CTDI₁₀₀ values. CTDI_w with TLD was determined and compared with pencil chamber measurements.

Results: In the studied scan modes, for 40 mm scan thickness, CTDI_w was determined to be 34.37 mGy and 35.67 mGy (in terms of dose to air) from charge readings with pencil chamber and TLD-measured CT dose profile, respectively. For 10 mm scan thickness, CTDI_w was determined to be 41.97 mGy and 44.60 mGy with the pencil chamber and TLDs, respectively.

Conclusions: The CTDI_w determined by the TLD-measured dose profile agreed well with pencil chamber measurements for both scan thicknesses studied. Future work will include measurements using additional scan thicknesses and under another new scan mode provided by the scanner: Gemstone Spectral Imaging (GSI) mode. Comparison with regular scan modes will be performed as well.