

AbstractID: 14177 Title: How Accurate is Estimating CT Skin Dose Based on CTDI?

Purpose: To explore alternative techniques for the measurement of CT skin dose and compare with the CTDI method.

Method and Materials: Using a Farmer chamber, point doses were measured under various scan conditions on the surface of anthropomorphic phantoms, as well as at the top-hole position of CTDI phantoms on two CT scanners of different manufacturers. Also at the top-hole position of CTDI head and body phantoms, CTDI100 values were measured using a 100mm pencil ion chamber. These CTDI100 (top) values were then normalized by the pitch factors. The ratio of CTDI100 (top)/pitch over the point dose was obtained under each scan condition and evaluated for quantitatively determining if the CTDI method underestimates or overestimates skin dose. Size of the Farmer chamber (length 18.8mm) prompted the use of nanoDOT dosimeters (4mm diameter, Landauer) for additional point dose measurements under the same conditions as the Farmer chamber. The nano DOTs were calibrated using the same kVp as the CT scans; calibration was conducted separately for each scanner.

Results: For cine scans, CTDI100 (top) overestimated skin dose by ~20-65%. For helical scans, CTDI100 (top)/pitch overestimated skin dose by ~20-50%. The variations mainly depend on the size and shape of the phantom, and on the type of scanner. The nanoDOT system produced results in general agreement (within 15%) of those obtained using a Farmer chamber.

Conclusion: Alternative techniques using Farmer chamber and nanoDOTs for determination of CT skin dose were evaluated and compared to CTDI results. Farmer chamber produces readily available dose reading vs the nanoDOTs which must be processed using a separate readout system. On the other hand, nanoDOTs can be attached to a patient's skin for monitoring skin dose during a clinical exam and do not cause artifacts in images. Both techniques show promise for clinically practical skin dose CT dosimetry.