

AbstractID: 10554 Title: Can Patient Shielding Reduce Fetal Dose During Thoracic CT Scans?

Purpose: To determine the potential for reducing fetal dose in early pregnancy during thoracic computed tomography by shielding the patient's abdomen and pelvis.

Method and Materials: An anthropomorphic phantom (Rando) representing a medium sized adult was used to measure relative tissue doses in the abdomen/pelvis during thoracic CT scanning. TLD's were used to measure the dose along the central axis of the phantom from the level of the adrenals to the location of the uterus. The phantom was scanned on a GE Lightspeed VCT 64 slice scanner using 120 kVp, 750 mAs, and pitch of 0.984 to increase the TLD signal. Scans were performed with no shielding, with shielding (lead apron) on the anterior aspect of the phantom over the abdomen and pelvis, and with shielding on both the anterior and posterior aspects of the phantom. Tissue doses were normalized to the in-scan value measured at the level of the adrenals.

Results: Tissue doses decreased exponentially with increasing distance from the bottom of the scanned anatomy. The rates of decay were $-0.18 \pm 0.010 \text{ cm}^{-1}$, $-0.21 \pm 0.0024 \text{ cm}^{-1}$, and $-0.23 \pm 0.0018 \text{ cm}^{-1}$ for the no shielding, half shielding, and full shielding cases, respectively. The dose values at the level of the uterus were 0.99%, 0.65%, and 0.51% of the dose at the level of the adrenals, for the no shielding, half shielding, and full shielding cases, respectively.

Conclusion: These data show that the total absolute dose received by a fetus early in the pregnancy may be reduced by approximately 1/2 during thoracic CT by use of shielding on the abdomen/pelvis. For a clinical technique of 120 kVp, 150 mAs, and pitch of 1.375, this would reduce the fetal dose from an estimated 0.1 mGy to 0.05 mGy.