AbstractID: 5345 Title: Do lead aprons reduce patient CT doses?

Purpose: Hitherto, the Radiology community has assumed that scatter radiation in CT originates within the patient, and that any use of lead aprons would have no measurable effect on patient (scatter) doses. In this study, we investigated the validity of this assumption, and quantified the potential for reducing patient (scatter) doses in CT when lead aprons are placed adjacent to the directly irradiated region.

Method: Thermoluminscent dosimeters (TLDs) were used to measure dose distributions in three anthropomorphic phantoms (newborn, 10-year old, and adult male). Phantoms were scanned on a 4-slice GE Lightspeed CT scanner using 140 kV, 900 mAs, and contiguous axial scanning. We performed a chest CT scan of each phantom with approximately 45 TLDs distributed through the directly irradiated chest region, and distal regions (head and abdomen). A second CT was also performed with the head and abdomen regions wrapped with a 0.5 mm equivalent lead apron. We estimated the effect of the lead apron on regional doses, as well as the change in total energy absorbed.

Results: As expected, the addition of a lead apron had no effect on doses in the directly irradiated chest region. The addition of a lead apron reduced head doses by about 40%, and abdominal doses by about 25%. However, the scatter radiation in the “head” accounts for ~3% of the total energy imparted to the patient, and the corresponding value for the abdomen is ~7%. As a result, the reduction in total energy imparted to the patient from the introduction of lead aprons was only ~5%.

Conclusions: Our results show that lead aprons reduce patient doses from “external scatter” by about 5%. The origin of “external scatter” in CT merits additional study.