AbstractID: 5387 Title: Use of Tissue Air Ratios to obtain organ doses in CT

Purpose. To develop a practical method for obtaining organ doses in CT.

Method. We measured tissue air ratios (TAR) as the ratio of the air kerma at a specified location in an anthropomorphic phantom to the corresponding iso-center free-in-air kerma. Measurements were obtained using a pitch ratio of 1, identical radiographic techniques (kV/mAs), and a scan length to ensure the full contribution from scattered radiation. TAR values were measured at selected head and body locations in a Rando phantom on a GE LightSpeed CT scanner operated at 80 and 120 kV.

Results. The average iso-center free-in-air kerma for modern CT scanners operating at 120 kV is 0.25 ± 0.05 mGy/mAs for head imaging, and 0.23 ± 0.08 for body imaging. At 120 kV, the average TAR value in the head of a Rando phantom was ~0.70 and the average body TAR ratios was ~0.64. Head TAR values showed only minor spatial variations, whereas body TAR ratios were highest on the anterior surface and lowest at the lateral chest surface and the abdomen center. The average ratio of TAR values at 120 kV to those at 80 kV was 1.28.

Conclusions. TAR offer a direct method for obtaining organ doses in CT, and can be readily measured for any CT scanner or patient size. Modern CT scanners operated at 120 kV have result in tissue doses in the directly irradiated region of ~0.19 mGy/mAs for head examinations and ~0.16 mGy/mAs for body examinations.