AbstractID: 1335 Title: Unreported Scatter Tails in CTDI and a New CT Dose Measurement Method

Computed tomography dose index (CTDI) conventionally specifies the patient dose in CT studies. It is measured as the integration of the longitudinal single-slice dose profile (SSDP) by using a 10 cm long pencil ionization chamber. However, the assumption that most of the SSDP is contained within the chamber length may not be valid even for thin slices. Additionally, a– simple pencil chamber method for measuring doses in helical CT is not available. Dixon[1] (2003)– derived convolution equations for determining the accumulated dose in axial and helical CT from the SSDP. In addition, a new dose measurement method using a small volume ion chamber was suggested. Our work is a thorough experimental verification of this technique. The SSDPs were measured using a diamond detector in a 30 cm long phantom for several slice widths. The integrals over 25 cm length of the SSDPs, measured along the phantom (rotational) axis, were approximately 25-30% higher than the integrals over 10 cm length for almost all slice widths on two scanners. Dose equilibrium was only achieved for scan lengths >35 cm, suggesting the need for longer phantoms and new measuring techniques. These predictions were verified for several scan lengths using an IC-10 ion chamber at the center and periphery of the phantom for helical and axial scanning modes. Central and peripheral doses were found to be up to 29% and 21% higher respectively than pencil chamber readings.

[1]R.L. Dixon, "A new look at CT dose measurement: Beyond CTDI," Med. Phys. **30**, 1272-1280 (2003).