AbstractID: 1770 Title: Multi-Detector CT Dose Index Assessment with MOSFET Technology

Traditional CT dosimetry includes the CT dose index (weighted, or CTDIw, and volume - for pitch adjustment, or CTDIvol) based on a 10 cm CT pencil ion chamber in standard acrylic phantoms. With widening beam widths in multi-detector CT (MDCT), this method does not incorporate the scatter (tail) portion of the dose profile. We compared the traditional CTDIvol from a 16-slice MDCT console with a new method of dose assessment using MOSFET technology. Helical MDCT examinations of an entire standard 16 cm acrylic (head) phantom was performed using a variety of pitches (0.5625 – 1.75) and collimations (10 mm and 20 mm) with MOSFET detectors placed in the five standard holes. MOSFET dose assessment was performed using a similar method as the standard formula for the weighted CTDIw. Pitch-unfolded MOSFET measurements of dose (mGy) exceeded CTDIw by an approximate constant of 8.0 mGy (16%) for 10 mm, and 7.1 mGy (18%) for 20 mm collimations, respectively. Conclusions: Use of MOSFETs has demonstrated a real-time advantage of measuring CT dose, offering a rapid and less cumbersome method for CT dosimetry. MOSFET technique also incorporates complex MDCT scatter contributions into the dose measurement not possible with traditional CTDI . A good correlation ($p < 0.0001$) was observed between the CTDIvol and the measured dose using MOSFETs for each beam width. Underestimations of CTDIvol may be attributable to the scatter tails. MOSFET technology may offer more accurate measures of CT dose for use in clinical and regulatory management of dose.