AbstractID: 9565 Title: Radiation Dose to the Female Breast in 64-slice Computed Tomography

Purpose: To evaluate in a phantom study the dose to adult female breast tissue using current clinical body CT protocols on 64-slice systems.

Method and Materials: An anthropomorphic phantom with breast modules (Rando-Alderson) was scanned on a variety of 64-slice CT scanners (GE LightSpeed VCT; Toshiba Aquilion; Siemens Sensation64; Philips Brilliance – in progress). Standard clinical protocols which either directly expose the breast or have scatter/edge-of-field dose were evaluated: (1) lung screening (smoker); (2) chest-abdomen-pelvis (CAP - oncology follow-up); (3) cardiac calcium scoring (60bpm); and (4) virtual colonoscopy (supine & prone). Protocols were similar, but not identical, between systems. Scan coverage was matched; no breast shields. Absorbed dose to the breast tissue was measured by loading 10 TLDs into each breast module. LiF TLDs were calibrated individually for 9mm Al HVL (120 kVp), with an NIST traceable ion chamber, and a correction applied for the CT HVL. Image noise was also measured.

Results: Standard clinical protocols for an adult female, including adaptive mA methods for the CAP exam, were utilized on each scanner. Averages of the TLD dose to the breast ranged from: (1) 0.56-1.36 cGy lung exam; (2) 1.27-2.98 cGy CAP; (3) 1.01-2.98 cGy calcium scoring; (4) 0.67-1.35 cGy virtual colonoscopy.

Conclusion: The expected broad range of breast tissue dose for various CT exams was seen, but also indicate a possible reduction in dose compared to earlier reports from 4-slice (Mahoney et al, RSNA 2005) and 16-slice systems (Hurwitz et al, 2006 – extrapolated estimate). Variation between manufacturers was observed, but note that the protocols tested were those ***currently*** in clinical use. Further optimization of protocols for the given system design is/may be possible, especially given the significant interest from the entire radiological community to improve awareness of dose issues and to minimize exposures.