AbstractID: 6836 Title: CT Doses: Changes in the Last Twenty-five Years

Purpose. To quantify how CT patient doses, and the corresponding scan times, have changed over the last 25 years.

Method. We analyzed data for five generations of CT scanners from one vendor (GE), ranging from the 9800 single slice scanner without slip ring technology used in the early 1980s to a 64 slice VCT, the current state of the art. We determined values of $CTDI_{air}$ and $CTDI_{w}$ at a constant kV/mAs. Effective doses were performed for a standard 32 cm chest CT examination performed at 120 kV using contiguous axial scanning on the 9800, and a pitch of 1 on the VCT. Scan times were computed assuming (contiguous) axial images with a 5 mm thickness.

Results. $CTDI_{air}$ of a VCT scanner (30 mGy/100 mAs) is 12% higher than that of a 9800 scanner, whereas the corresponding body VCT $CTDI_{w}$ (9.5 mGy/100 mAs) is 53% higher. The increased doses on modern scanners are a result of reduced focus-isocenter distances to accommodate faster rotation speeds, changes in beam shaping filters, and overbeaming used on MSCT scanners. Patient effective doses for a routine chest CT examination are 5 mSv/100 mAs on a VCT and 3.2 mSv/100 mAs on a 9800. Acquisition of 64 axial images for a routine chest CT in the early 1980's took ~5 minutes , whereas modern scanners cover the same volume in only 8 x-ray tube rotations taking ~3 seconds.

Conclusion. Over the last 25 years, normalized CT patient doses (i.e., per unit mAs) have increased by ~50%, whereas image acquisition times have been reduced by two orders of magnitude.