AbstractID: 6669 Title: Pediatric Patient Dose Management From a 64 Slice VCT

PURPOSE: As the clinical utilization of CT grows, it becomes more important to manage patient dose without compromising image quality, especially in children. A special effort should be made to reduce pediatric patient dose through age- and size-specific protocols.

METHODS & MATERIALS: A pediatric 64 slice VCT scanner (GE Lightspeed) was tested with a group of cylindrical acrylic phantoms with diameters ranging from 6 - 32 cm. In addition, anthropomorphic phantoms (CIRS adult and pediatric dosimetry verification phantoms) were employed to correlate the CTDI values with the skin doses measured by a solid state dosimeter (Unfors PSD). The dose affecting factors included: kVp, mAs, beam filtration, beam collimation, pitch, patient size, detector configuration and dose reduction techniques such as mA modulation and post-processing. Various techniques and their combinations were included in this study. Finally, clinical protocols for pediatric applications were evaluated and adjusted based upon the measured patient dose and image quality.

RESULTS: The automated CTDI values displayed on the system agreed with our measurements when the standard phantom sizes were used, i.e., 16 cm in diameter for head, 32 cm for adult body and 16 cm for pediatric body. However, the measured dose differed from the automated CTDI by a factor of 1.72 for a reduced head phantom size of 6 cm in diameter and a factor of 3.2 for a reduced body phantom size of 10 cm in diameter. Patient age also played an important role in estimating effective dose. The changing beam filtration caused a variation of up to 42% in the in-air dose output. Concurrently, noise from the phantom images was evaluated.

CONCLUSION: The clinical protocols were established based upon the dose level corresponding to the patient size and age as well as the tolerable noise level corresponding to the specific clinical applications.