AbstractID: 12982 Title: Optimize Pediatric Abdominal CT Protocols Based on Circumferences

Purpose: There is an increasing demand on lowering the radiation dose in pediatric CT to reduce the long-term cancer risks. In this study, pediatric CT protocols are optimized based on "equivalent abdominal circumference (EAC)" by varying both kVp and effective mAs (mA*exposure_time/pitch). **Methods and Materials**: All measurements were taken using a 16-row CT scanner. To mimic the shape of the pediatric abdomen, a saline bag was placed on each side of 10cm and 16cm-diameter, circular cylindrical phantoms. Dose was measured using a 100 mm pencil probe ion chamber. Noise was measured by recording the standard deviation near the center of selected images while kVp, mAs and phantom diameter were varied in turn. Dose was collected at four available kVp settings. At each kVp, measurements were taken at five different mAs. For CNR measurement, iodine contrast was diluted to match clinically relevant CT number of ~300 HU and this diluted contrast was injected into the center holes of the CTDI phantoms. Distilled water was also injected to one of the peripheral holes as reference. The contrast was measured based on the difference of CT number between iodine and water. **Results:** Optimal scan techniques are selected for each EAC range based on the clinical noise tolerance < 20HU and CTDIvol < 2.5cGy. For the smallest patient (< 30 cm EAC), scan technique of 80kVp and <100 mAs can be used; for 50 cm EAC, 100 kVp and <60 mAs. The signal-to-noise ratio measurement indicated lower kVp can effectively enhance the iodine contrast and increase CNR under the same dose with higher kVp. **Conclusions:** For pediatric CT, the most effective way to strike the balance between image quality and radiation dose is to adjust dose according to patient abdominal circumference. The EAC-based technique optimization curve can be used to optimize kVp and mAs.