

AbstractID: 3409 Title: The UF Series of Tomographic Anatomic Models of Pediatric Patients

Purpose: To develop a series of detailed tomographic computational models of pediatric patients for the use in patient dose evaluation under various diagnostic and therapeutic procedures.

Method and Materials: IDL-based image manipulation tools were utilized to develop five tomographic head and torso models of different pediatric patients (9-month male, 4-year female, 8-year female, 11-year male, and 14-year male) from CT image data of live patients. The models were created from fused images taken from head and CAP CT exams of the same individuals (9-month and 4-year models) or two different individuals of the same sex with close age (8-year, 11-year, and 14-year models) since continuous images from head to CAP were not available. During the process, the image resolutions and slice positions were adjusted based upon their anatomy and engineered into single head-torso image sets. Lungs, bones, and adipose tissues were automatically segmented by using window leveling of original CT numbers. The remainders were either semi-automatically or manually segmented with the aids of both anatomical knowledge and available image processing techniques. Skin layers were created by adding voxels along the contour of the bodies.

Results: Total of five high-resolution pediatric tomographic model series were developed. More than 60 regions of interest were identified for each model to be used for the organ absorbed dose calculation and consequent effective dose assessment. Organ masses are compared to the age-interpolated values of ICRP 89 reference data.

Conclusion: This work provides the medical physics community with tomographic computational models, which are readily adaptable to general Monte Carlo codes to evaluate radiation risks of pediatric patients under various radiation procedures.

Conflict of Interest (only if applicable):