

AbstractID: 10792 Title: Comprehensive CT dosimetry database for pediatric and adult reference males and females: A Monte Carlo study

**Purpose:** To establish an organ dose database for pediatric and adult male and female reference individuals undergoing computed tomography (CT) examinations and to develop software providing the dose information within a graphical user interface (GUI).

**Methods and Material:** A series of hybrid computational human phantoms was developed at the University of Florida by using realistic patient CT images and flexible Non-Uniform Rational B-Spline (NURBS) surfaces. The phantoms include newborn, 1, 5, 10, 15, and adult male and female matched to the four reference data: reference organ mass from ICRP Publication 89, anthropometric data from CDC, tissue composition from ICRU Report 46, and intestine models of ICRP Publication 100. The 12 reference phantoms were ported into MCNPX2.5 code where helical fan beams from SOMATOM Sensation 16 helical multi-slice CT scanner were modeled. Organ absorbed doses were calculated for Head, Chest, Abdomen, Pelvis, CAP examinations. Software was developed to provide the dosimetry database with GUI. The scanner matching algorithm was employed from the commercial software CT-EXPO to take different scanner parameters from different scanner models into account.

**Results:** Normalized values of organ absorbed dose (mGy/100 mAs) were calculated for 25 organs in the 12 phantoms undergoing CT examinations were calculated. The comprehensive CT dose database was incorporated into GUI-supported software to provide realistic and consistent dosimetry information to end-user. The dose results were compared with those from CT-EXPO and significant differences were shown in major organ absorbed doses which were mainly caused by the anatomical difference between UF hybrid phantoms and limited stylized and old voxel phantoms in CT-EXPO.

**Conclusion:** The software developed in this study significantly improved accuracy and consistency of organ dose assessments in CT examinations which have not been implemented in a couple of previous CT dose evaluation software.

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