

AbstractID: 13430 Title: Development and Testing of a CT Dose Software
"VirtualDose" Using Anatomically Realistic Patient Phantoms: Preliminary Results
for the Phase I of the project

Purpose: To demonstrate the need and feasibility for developing a new software for reporting patient imaging dose who undergoing CT or PET/CT examinations.

Method and Materials: Existing CT dose reporting software do not meet the need because of the simplified anatomical phantoms, updated ICRP data and scanner information. A new software is being designed with original dose data derived from Monte Carlo simulations involving CT scanner models and anatomically realistic phantoms. Specified scanning protocols and CT sources are modeled. Dosimetry capabilities for tube current modulation (TCM) and PET/CT protocols are currently under development. The RPI Pregnant Women series, RPI Adult Male and Adult Female phantoms are used in the dose calculation. Organ doses and effective doses are computed using ICRP Publication 60 and 103. The software framework is developed using the Visual C#.NET.

Results: VirtualDose offers a modern graphical user interface (GUI) designed to allow interactive 3D phantom display and user-selectable scanning parameters. Standard scanning ranges can be selected from a pull-down menu or manually specified on the displayed phantom. When compared with data reported by existing software using stylized MIRD-type phantoms, the organ dose estimates have been found to differ by a ratio ranging from 0.77 to 1.24 for organs or tissues covered in the scan range, and a ratio as small as 0.13 for organs outside of the scan region. The TCM technique can reduce the dose by around 20% for pregnant patient phantoms.

Conclusion: It is clear that existing software do not meet the need for accurate and state-of-the-art CT dose reporting. The preliminary GUI design and reporting features of VirtualDose improve upon existing tools by considering the latest CT scanners, new ICRP recommendations and anatomically realistic patient phantoms. VirtualDose is expected to improve both the accuracy and usability in reporting CT doses in the future.