

AbstractID: 10779 Title: A Method of Modeling Multidetector CT (MDCT) Source from Measured CTDI Values: A Feasibility Study

Purpose: To propose a method of using the Monte Carlo (MC) technique to model MDCT scanners from CTDI values so the assessment of organ doses can be performed more accurately and easily. **Method and Materials:** The MC code, MCNPX, was used to perform all the simulations. Several parameters influencing CTDI values were analyzed and prioritized. The modeling method starts with employing the preliminary parameters necessary to perform the single axial scan to obtain the calculated CTDI values. Along with a priority list, each parameter was adjusted by comparing MC calculated CTDI values with measured CTDI values. The iterative process is completed when the parameters yield results that match the calculated and measured CTDI values. The validated CT model was then integrated with patient phantoms to calculate the organ doses for a specific CT procedure. **Results:** It was found that, in the modeling procedure, there are actually only two main parameters that exhibit the greatest influence on the finally calculated CTDI values: the thickness of the bowtie filter (BTF) and the length of BTF semimajor axis. These two parameters were thus given the highest priority. The modeling algorithm involves a total of six parameters including anode angle, thickness of flat filter, width of BTF, thickness of BTF, length of BTF semimajor axis, and source number. Based on this method a MDCT was modeled and the calculated CTDI values within around 5% of the measured CTDI values. **Conclusion:** Results demonstrated the feasibility of this iterative method based on analysis and priorities of various parameters. To our knowledge, this work is among the first attempts to develop the modeling method only using CTDI values. The CT scanners therefore can be modeled without the common problem of lacking information of parameters, thus facilitating accurate and easy MDCT dose assessment.