AbstractID: 7267 Title: Validation Study Of A Monte Carlo CT Dose Simulation Code

The availability of dose information to internal organs or the fetus from modern helical CT scanners is often limited. Dose indices such as the dose-length-product are available from the manufacturer; however, they do not represent actual organ dose and are of limited value in risk assessment. The purpose of this study was to evaluate the validity and clinical usefulness of a Monte Carlo simulation routine in estimating CT dose from a commercially available CT scanner. The simulation code was developed at the Department of Biomedical Engineering, Aarhus University Hospital, Denmark. In this study we used a GE CTi scanner and compared results using two clinical protocols at our institution, i.e., (a) pelvis protocol and (b) renal stone protocol. An anthropomorphic phantom containing thermoluminescent dosimeters (TLD-100) was used for direct organ dose measurement and results from TLDs were compared to the Monte Carlo simulations. For calibration of TLD chips, a beam quality of 8 mm HVL Al equivalent at 120 kVp was used. Based on our preliminary experience, we conclude: (1) The simulation software is easily implemented on a PC; (2) Results obtained by direct TLD measurement correlated well with the results of simulation. For example, for the renal stone protocol, the effective dose equivalent was 16 mSv by TLD as compared to 14 mSv by Monte Carlo; (3) the code enables us to simulate effects of pitch, slice thickness, kVp, and mAs on organ dose; thus it can be used in optimizing scan parameters and assessing the radiation risks.