AbstractID: 10675 Title: Estimation of uterus dose from abdominal CT examinations using a new patient-specific Monte Carlo software package

Purpose: To investigate uterus radiation dose from abdominal CT examinations using a new Monte Carlo tool for patient-specific dose simulations. **Method and Materials:** Thirty six consecutive female patients who underwent abdominal CT examination were included in this study. CT examinations were performed using a Siemens Sensation 16 multi-detector CT scanner (Siemens AG, Forchheim, Germany). Patient images were imported in the ImpactMC patient-specific and scanner-specific dose calculation Monte Carlo software package (ImpactMC, Vamp GmbH, Germany). Voxelized models were created on the basis of image data of patients included in this study. Patient body size was defined according to the cross-sectional area (CSA) of the CT slice containing the central area of the uterus. The Monte-Carlo N-particle (MCNP, version 5) transportation code was also used to model the Siemens Sensation 16 CT scanner. To calculate uterus dose using MCNP, a mathematical anthropomorphic phantom was used. This phantom represented the average adult female human body. **Results:** The dose to the uterus from an abdominal CT examination estimated using MCNP was 8.7 mGy/100 mAs. Uterus doses calculated using ImpactMC ranged from 4.6 to 12.9 mGy/100 mAs. Thus, differences between radiation doses calculated using ImpactMC and the dose calculated using MCNP ranged from -47% to +50%. CSA values ranged from 383 to 1074 cm^2. A statistically significant relationship was found between CSA and uterus dose calculated by ImpactMC ($p<0.001$). **Conclusions:** Radiation dose from CT depends on patient size as well as on the size and position of organs. ImpactMC can provide dose distributions specific for individual patients. Patient-specific dosimetry is important when accurate estimation of uterus dose from a CT procedure is needed, for example in case of inadvertent irradiation of a pregnant patient during a CT examination.

Research sponsored by the European Community