

## AbstractID: 2832 Title: Two male tomographic models segmented from MR and CT images

**Purpose:** To develop two new tomographic models of Korean typical adult males from magnetic resonance (MR) and computed tomography (CT) images of living subjects, and to calculate photon dose conversion coefficients for external irradiation geometries.

**Method and Material:** Two healthy volunteers, subject A (172 cm in height, 65 kg in weight) and subject B (172 cm in height, 68 kg in weight), whose body size was within the range of Korean average values ( $170.9 \pm 3.7$  cm in height,  $67.9 \pm 4.8$  kg in weight), were recruited. Whole body MR images were obtained from one subject and CT images from the other. The source images were semi-automatically segmented to construct three dimensional matrices. The resulting matrices were ported into Monte Carlo transport code, MCNPX2.4, and photon dose conversion coefficients for external monoenergetic photon beams with the energies from 0.015 MeV to 10 MeV were calculated for idealized irradiation geometries.

**Results:** The resulting Korean tomographic models were named KTMAN-1 and KTMAN-2. Up to 80% of organs and tissues in both models were within 30% of average values of Korean adult male. 21 and 23 organs and tissues were segmented in KTMAN-1 and KTMAN-2, respectively. Dose conversion coefficients were computed for all organs and tissues in external irradiation geometries: antero-posterior (AP), postero-anterior (PA), right lateral (RLAT), and left lateral (LLAT). Through investigation of differences in organ doses between tomographic models and stylized model (ICRP74 data), unrealistic position of thyroid, testes, arms, and stomach in stylized models were revealed.

**Conclusion:** Two new tomographic models constructed in this study provided more realistic dose conversion coefficient than stylized models. Although difference of organ mass and position between the Korean models and western reference model caused insignificant discrepancies of organ doses for external dosimetry, the Korean models will be more meaningful for internal dosimetry.