

AbstractID: 2752 Title: The dosimetric effect of unrealistic arm structure of stylized human model

Purpose: To investigate the dosimetric effect of unrealistic arms in stylized human models on organ doses for external irradiation geometry by comparing organ doses of ICRP74 to those from four realistic tomographic models for gamma radiation in lateral geometry.

Method and Materials: By comparing the transversal images of the representative stylized model, MIRD (Medical Internal Radiation Dose) phantom to those of VHP (Visible Human Project) human, it was obviously manifested that arms of the MIRD phantom are unrealistically included in trunk region. Dose conversion coefficients of ICRP 74 were adopted as representative dosimetric data based on stylized models. Photon dose conversion coefficients of four organs (lungs, stomach, esophagus, and liver) which seemed to be sensitively affected by arms in lateral geometries were compared with those from four realistic tomographic human models: KTMAN-1, KTMAN-2, VIP-man, and Zubal phantom. All models have arms except for KTMAN-1 of which arms were upward stretched when scanned. Organ doses for lateral geometries were computed by MCNPX2.4 using KTMAN-1, KTMAN-2 and Zubal phantom, and those of VIP-man were obtained from published article. KTMAN-1 and KTMAN-2 are Korean tomographic models under preparation for publication.

Results: Absorbed dose conversion coefficients of four organs from ICRP 74 were higher up to 88% (esophagus) than tomographic models. The overestimation was caused by less shielding offered by arms-included torso in stylized models than arms-attached torso in tomographic models. Organ doses of armless KTMAN-1 were higher than those of other tomographic models, and less than those from ICRP 74 as expected.

Conclusion: The unrealistic arms in stylized models cause overestimation of some major organ doses for external photon beams in lateral geometry up to 88% depending on individuals. One should keep in mind the overestimation when using stylized models for dose evaluation of medical staffs.

Conflict of Interest (only if applicable):