



Contribution ID: 24

Type: Oral

Assessment of specific absorbed fractions for HDRK-man phantom using Geant 4 code

The main purpose of this paper is to present an overall study of the specific absorbed fractions (SAFs) of photon and electron sources to assess the internal doses after incorporation of radionuclides into the human body. SAF values for self and cross-absorption were calculated for a uniform distribution of mono energetic photon and electron emitters with energies ranging from 15 keV to 3 MeV. The voxelized human phantom “High Definition Reference Korean Man” (HDRK-man), which was implemented using GEANT4, has been used for many combinations of target-source organ. The results were compared to those of the International Commission on Radiological Protection Reference (ICRP133) and Zubal phantoms. It has been found that SAF values of the three models have a similar trend. Although, the SAF values for the HDRK-man phantom were higher than those of the other two models with a relatively good agreement with those for the ICRP133 phantom (differences of 13.9 ± 2.8 and 12.1 ± 3.2 for photon and electron particles, respectively). In order to analyze the differences in SAF values, we calculated the chord length distributions (CLDs) for selected source-target combinations. The parameters of organ mass (or volume) and CLDs, other than the adopted computational procedures, mainly causes such discrepancies

The new arrangement of SAF values can be considered as an added-value for multidisciplinary research and the clinical community

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Session Classification: Medical applications

Track Classification: Medical applications