

Purpose: Introducing a new CT based Monte Carlo calculation for dose evaluation following LDR brachytherapy and comparing the results with conventional TG-43 calculation

Methods: We adapted a voxel based mathematical phantom of patient's body modeling in MCNP using conventional DICOM images from post implant of prostate brachytherapy. With the aid of Image processing software, the implanted seed and their position are detected and conveyed to Monte Carlo SDEF source definition. The results of MCNP dosimetry is presented to the physicists in a GUI medium.

Results: The developed software could aid the physicist to browse, explore or modify patient's CT and explore the results of Monte Carlo dosimetry. The software is designed to evaluate the absorbed dose (dose distribution contours) and the volumetric dose histograms. The software is used to evaluate the dose distribution of HDR seeds in a gel phantom [1] and the results are within 3% of experimental data.

Conclusions: The developed image processing and mathematical voxel phantom generation software package is successful in producing accurate dosimetry data based on exact patient body information. Besides producing dose distribution in CTV and PTV, the dose distributions of adjacent sensitive organs are readily available with Monte Carlo accuracy. This is an advantage of the developed software compared with conventional TG-43 based software which ignores patient's body heterogeneity in dose evaluation