

AbstractID: 2095 Title: Uncertainties of Monte Carlo simulation for brachytherapy source dosimetry

Within the past several years, several different designs of ^{125}I and ^{103}Pd seeds have been introduced into the brachytherapy field in order to meet the increasing demand of sources. As recommended by the American Association of Physicists in Medicine, two independent investigators must determine the dosimetric characteristics of new brachytherapy sources. In this recommendation, it is suggested that one of the two investigators must include Monte Carlo simulations technique. The accuracy of the Monte Carlo simulation technique is highly dependent on accuracy of the source geometry and material information that have been provided by the manufacturer. For instance, the thickness of the encapsulation, depth and thickness of the radioactive material, size of the end caps, etc., are all key factors for determining accurate dosimetric information of seeds. In this work, the effects of various geometric parameters to the dosimetric characteristics of the brachytherapy sources have been investigated. The results have shown that the anisotropy function and anisotropy factors of the source were affected by the thickness of the capsule and end caps. The radial dose function and the dose rate constant is not effected by these parameters. This study suggests that the experimental investigation is essential to determine the dosimetric characteristics of source, since the thicknesses of inactive and active layers are very difficult to be measured accurately. These evaluations were performed using MCNP and PTRAN Monte Carlo code, in Solid WaterTM phantom materials medium