

AbstractID: 1484 Title: The Monte Carlo Simulation on the Dose Disturbance Effect

of the Dentures in Intensity Modulated Radiation Therapy

This study performed the simulation of the dose disturbance of the dentures in the IMRT fields by using Monte Carlo method. In the planning system, there may exist dose uncertainties for regions near dentures because the ramps used to determine the material and density from CT, may misinterpret those for dentures, which are very high-density materials and their CT number is saturated. The BEAM and modified DOSXYZ Monte Carlo codes have been used for the accelerator head simulation and dose calculation inside the patient respectively. To improve the efficiency, the fluence maps obtained directly from clinical treatment planning systems have been used to approximate the effects of IMRT delivery during Monte Carlo dose computation. The accuracy of this approximation was verified by film dosimetry in a homogeneous water phantom. Two clinical IMRT cases were selected in this study, one for PTV adjacent to the dentures, and the other for PTV at a distance. The original CT images with misinterpreted material and density were applied in the Monte Carlo simulation and the results were compared with those using the real denture medium/density in the denture regions. For both cases, slight differences in dose contour were observed but only significant in low dose region (<10%). No significant difference in the DVH was found. This may be due to the flexibility of beam angle selection for IMRT treatment technique. It has been shown in this study, there are no significant impacts using the real denture medium/density in the two clinical IMRT cases.