AbstractID: 1528 Title: Monte Carlo Dose Verification for IMRT Plan Delivered Using Micro-Multileaf Collimators

A commercial inverse optimization treatment planning system (TPS) was commissioned in our center for intensity-modulated beam delivery using a micro-multileaf collimator (Radionics). Monte Carlo (MC) simulations were performed to verify the dose calculation in this work. The leaf sequence files generated by the TPS were used to build the intensity map. The effects of scattering photon and leakage were accounted in this process. The photon beam was represented using a three-source model and it was commissioned using the standard measured data. MC dose calculation phantoms were created from the patients' CT scans and the density and material were converted from CT numbers. Dose distributions for 5 prostate IMRT plans were recalculated using the Monte Carlo method. Isodose distributions and dose volume histograms were compared with the results of the TPS. A general agreement in dose distribution was observed. The differences of the mean dose to the target, the dose received by 95 percent (D_{95}) of the target volume and the dose received by 5 percent (D_5) of the target volume were within ±3% for most of cases. The maximum differences in the mean dose, D_{95} and D_5 for the target were up to 6%. Up to 8% differences in the percentage volume receiving a certain dose, such as 65Gy and 40Gy, for rectum and bladder were observed. The differences in the maximum dose received by critical structures were up to 7% of the prescription dose. The possible reasons for the differences are discussed.