

AbstractID: 4675 Title: An Investigation of the Effect of IMRT with Large Jaw Defined Back-up Fields on the Accuracy of Dose Calculations

Purpose: To investigate the effect of IMRT with large photon-jaw defined back-up fields on the accuracy of dose calculations by analyzing the deviation between calculated and measured dose, DV, for 19 IMRT cases with various jaw defined field sizes.

Method and Materials: Suppose that D_c is the point dose calculated from a Pinnacle treatment planning system (TPS), and D_m is the dose measured at the same point in IMRT-QA. The DV is defined as $(D_m - D_c)/D_m$. Each IMRT case in this work had two PTVs, PTV1 and PTV2. For every case, the average equivalent field size (AEFS) of jaw defined fields for PTV1 was considerably larger (at least 3.5 cm larger) than that for PTV2 of the same case. The point at which the dose was measured and calculated was the same for PTV1 and PTV2 for each case. We compared the DV for PTV1 with that for PTV2. The beam energy used was 10 or 18-MV.

A 0.3cc ion chamber placed in solid water was used for measurements.

Results: The AEFS of jaw defined fields for PTV1 ranged from 12.8 to 16.3 cm, and for PTV2 from 7.2 to 9.9 cm. The DV for PTV1 was from 2.7 to 8.9%, and for PTV2 from -2.1 to 3.3%. For 17 of 19 cases, the DV for PTV1 was much larger than that for PTV2. The average DV for PTV1 and PTV2 were 6.1 and 1.8% respectively.

Conclusion: The results indicate that significant deviation between calculated and measured dose could be associated with IMRT using large jaw defined fields. It is possibly because the TPS doesn't fully account for radiation transmission and leakage through MLC and interleaf for large jaw defined fields. We believe that, to increase dose accuracy, MU corrections are necessary for IMRT with large jaw defined fields.