AbstractID: 14115 Title: An independent MU Calculation Program for dynamic IMRT

Purpose: The performance of an independent monitor unit calculation program is evaluated to verify the monitor unit (MU) for dynamic IMRT fields. The MU calculation program runs on a PC and is based on an empirical pencil-beam model to determine D/MU. A correction methodology is used to correct for the output (head-scatter) change for the dynamic IMRT fields.

Methods and Materials: The D/MU of IMRT fields at the same point (mostly the hot spot point) was compared between treatment planning system and the independent MU calculation program. Here MU for an IMRT field refers to the total MU delivered. The fractional MU of each segment of an IMRT field, defined as the MU for the segment per total MU, was assumed to be the same. The commercial treatment planning system is based on a pencil-beam convolution algorithm with headscatter modeling. D/MU of a subset of IMRT fields, which is delivered to a Mapcheck, were compared among the treatment planning system calculation, the independent MU calculations, and measurements.

Results: Among the 10 patients examined, the difference of D/MU for all IMRT fields delivered to a point agreed to within 7% for 90% of patients. This error is slightly worse then the measurement, where 100% of patients are within 7% limit. However, when each individual IMRT field is examined, 15.6% (25/160) of the fields have a discrepancy larger than 7%. All those fields (>7%) lie in the valley region of an IMRT field.

Conclusion: The independent MU calculation program can effectively verify the dose calculation accuracy for most IMRT fields. Only in very rare instances, which invariably involves the calculation point to be in very low dose region, actual measurements are needed to further verify the accuracy of dose calculation for IMRT field.