AbstractID: 3617 Title: Long-Term Reproducibility of IMRT Planning and Dosimetry using Clinical Fields

Purpose: To augment our patient-specific IMRT QA program by checking the individual and overall reproducibility of the DMLC planning and delivery systems periodically using standardized patient data sets and a commercial diode array.

Method and Materials: Clinical fields were chosen from IMRT treatment plans using 6MV and 15MV, respectively. It is our intent to completely re-plan the same patients, generate leaf sequence files, and use the diode array to measure the absolute dose distributions for at least one different linac/MLC combination each month, thereby performing the evaluation for all MLC-equipped linacs every six months. The dose distributions are recalculated in a flat homogeneous phantom using the clinical treatment planning system. Data are analyzed using dose-difference and distance to agreement (DTA) methods. The supplied analysis program also provided a score for each field, which is defined as the percentage of the number of detectors satisfying the user defined dose-difference and dose threshold constraints and DTA constraint.

Results: The scores for the fields used in this study range from 75-100% of an average ~200 points for each field for the 3% dose, 10% dose threshold, and 3 mm constraints that we specified.   The diode array is able to identify the dose discrepancies relative to treatment planning calculations and earlier measurements and provides a quantitative score to grade each comparison, which along with the relative distribution of the failed points will serve as means for comparisons of measurements and/or calculations over time.

Conclusions: The protocol that we present here enables us to provide a quick, accurate and reproducible evaluation of the overall DMLC planning and delivery process. With periodical evaluation using the same patients' data sets, we should be able to detect differences in performance among similar MLCs and linacs, and very small variations introduced over time for the same components.