AbstractID: 7453 Title: Factors Affecting IMRT QA

Purpose: We evaluate the impact of plan parameters and setup errors on IMRT QA results.

Methods and Materials: Prostate (23MV, 5 field) and H& N (6 MV, 7 field) IMRT plans were exported to a cubic QA phantom. First, the magnitude of random errors in IMRT QA was estimated by repeating each measurement ten-times. Next, the following parameters were independently adjusted: intensity levels (5 to 20), minimum MLC segments (0.5 to 1.5cm), phantom setup error (0.5cm), and their impact on IMRT QA was evaluated via ionization chamber and EDR film. Coronal plane film results were analyzed using γ-index, dose difference, and distance to agreement.

Results: Based on repeat QA measurements, the central axis ion chamber dose was found to be highly reproducible and in good agreement with planned dose (mean deviation, prostate: 1.79±0.10%; and H&N: 2.62±0.25%). Measured isodose distributions displayed similar consistency (mean γ-index, prostate: 0.72±0.04; H&N: 0.60±0.09). Varying the number of intensity levels and MLC segment size had a small effect on the central axis ion chamber dose (<1.2%). However, film results showed that mean γ-index changed by 10% when minimum MLC segment size was increased from 0.5 to1.5cm. The number of intensity levels had a smaller effect on γ-index. For a 0.5cm setup error in H&N plan, 3.8% deviation was noted in the measured dose, however this coincidentally improved QA results. No corresponding dose discrepancy was seen in a fiducial-less film.

Conclusions: For an accurately modeled linac**,** IMRT QA results show remarkable consistency and agreement with planned dose. Plan complexity tended to worsen QA results for H&N patients. Sub-optimal IMRT plans with incorrect plan parameters and setup errors can have detrimental effect on patient treatment. However, IMRT QA does not always flag these errors, as their impact on QA results may not be large enough to be noticed.