AbstractID: 11106 Title: RapidArc patient specific quality assurance: Comparison with DMLC

Purpose: To compare RapidArc (Varian Medical Systems) intensity modulated arc therapy and dynamic multileaf collimated IMRT (DMLC) delivery accuracy using patient specific quality assurance measurements.

Method and Materials: We selected 6 cases (head and neck, para-aortic lymph nodes, and 4 prostates) that were treated using both DMLC and RapidArc. The DMLC and RapidArc plans were equivalent with respect to target and critical structure dosimetry. Absolute dose measurements were made with an ionization chamber in a custom acrylic phantom, which was positioned such that the chamber was located in a high-dose, low-gradient region of the dose distribution. Film was used to obtain the dose distribution in a coronal plane at the level of the ionization chamber. A 2D ionization chamber array (Matrixx, IBA Dosimetry) was used to obtain a second measurement in the same coronal plane. The gamma index was calculated for both the film and 2D array measurements using the criteria of 3%/3mm.

Results: The mean difference between the ionization chamber measurements and the calculations was 1.0% for both RapidArc and DMLC. The ranges were 0.6% to 1.6% and 0.0% to 2.3%, respectively. The mean fraction of pixels with gamma > 1 for the film was 4.3% (range 0.8% to 6.9%) for RapidArc and 10.4% (range 5.4% to 17.3%) for DMLC. For the 2D array the mean fraction of pixels with gamma > 1 was 0.5% (range 0.0% to 1.1%) for RapidArc and 1.6% (range 0.5% to 4.1%) for DMLC.

Conclusion: The results demonstrate that RapidArc delivery is at least as accurate as that for DMLC. The mean fraction of pixels with gamma >1 and the range of fractions for both film and the 2D chamber array suggests that RapidArc may be modestly more accurate than DMLC.

Conflict of Interest: Research sponsored by Varian Medical Systems.