AbstractID: 8993 Title: Monthly Quality Assurance For Rotation Delivery Using an Ion Chamber Array

Purpose: The objective of this study was to develop a single delivery procedure for machine QA.

Method and Materials: QA test procedures were delivered on TomoTherapy HI-ART and a Varian 21EX using an IBA MatriXX for measurements.

The tomotherapy treatment procedure consisted of 40x5-cm field that completed six rotations around the detector array. The detector was offset laterally allowing the detector array to measure half a 40-cm field from the anterior and half from the posterior.

The VMAT treatment delivery sequence was developed using a full rotation. During the first 90°, four beamlets were directed at array chambers to test the synchrony of gantry rotation and MLC position. For the next arc segment, the performance of all leaves was tested. Changes in the dose rate were evaluated from 0-90°. At 90°, the PDD curve and beam quality were measured. At 180°, the output, flatness, symmetry, field size, laser and central axis alignment were tested.

Results: Routine QA measurements for HT and VMAT have been acquired using the MatriXX ionization chamber array. A technique has been developed for evaluating energy, flatness, symmetry, field size, laser alignment, central axis alignment, MLC performance, gantry rotation speed, dose rate modulation, couch speed, and rotation period using the MatriXX data. The PDDs measured with the MatriXX agree well with those measured with a scanning water tank. An analysis of the "cone-shape" from the MatriXX data can help identify problems with the target. With a temporal sampling time of 50-ms, the synchrony and machine output can be easily evaluated.

Conclusions: A simple delivery procedure has been developed that can be used for monthly testing of HT and VMAT delivery. However, the MatriXX is limited in its spatial resolution. With the detectors spaced 7.62-mm, the accuracy for field size, laser alignment, and central axis alignment is limited.