AbstractID: 11133 Title: Use of a commercial linac QA device for RapidArc routine quality assurance

Purpose: Intensity modulated arc therapy is entering clinical use; however, quality assurance standards for this technology are still evolving. We investigated the QA BeamChecker Plus (Standard Imaging, Madison, WI) linear accelerator QA tool, for use with RapidArc (Varian Medical Systems, Palo Alto, CA).

Method and Materials: The QA BeamChecker Plus (BC+) is comprised of 5 parallel plate ionization chambers embedded within buildup material. One of the chambers is located at the center and the remaining 4 are equidistant along orthogonal axes. The device has a rotational mode for use with helical tomotherapy. We obtained a CT of the device, contoured the ionization chambers and two phantom avoidance regions, and optimized a RapidArc treatment plan to deliver a uniform dose to each of the chambers. The dose to the avoidance regions was constrained to produce significant gantry and dose rate modulation. The plan was delivered to the BC+ in rotational mode 11 times over 6 days. To monitor the machine output independent of RapidArc, a static reference field was also delivered. The treatment table has movable support rails that have non-negligible attenuation, so the plan was always delivered with the rails in the center.

Results: The standard deviation of the center detector for the static field was 0.1%. The mean difference for all 5 detectors was 0.0%, with a standard deviation of 0.2%. The range was -0.5% to 0.5%. If the rails are not in the center, dose measurements change by up to 5%.

Conclusion: The BC+ can be used to verify consistent RapidArc delivery for daily system QA. Future work is necessary to evaluate the types of errors that the BC+ can identify.