AbstractID: 13116 Title: Can two dimensional diode arrays serve as an effective tool for VMAT quality assurance?

Purpose: Two dimensional diode arrays have been widely adopted in the verification of fixed field IMRT deliveries. With increasing adoption of volume modulated arc therapy (VMAT), an immersed question is whether these diode arrays can be used for quality assurance for rotational therapy. The major concerns are the angular dependence of diode arrays and the detector to detector variance within the array. In this work, we studied the angular dependence of each detector and investigated the tools for correcting this dependency.

Material and Methods: A MapCheck-I (Sun Nuclear Inc.) was used as the diode array for this study. The two dimensional (2D) array was inserted in a multi-cube solid water phantom and was irradiated on an Elekta Synergy Linac using open square fields from different gantry angles. The measured 2D intensity map was then compared to theoretical map generated in the treatment planning system (TPS), Pinnacle^3. A 2D correction ratio map for each gantry angle was produced. Correction was implemented to static beams and VMAT plans of prostate cases.

Results: The correction maps for all gantry angles were obtained and the angular response of each individual detector was determined. The correction map was found be dependent on the field size that was used to irradiate the diode array. The correction ratio, as defined as measure/planned, is higher for larger field size. The correction to prostate VMAT cases has no significant improvement. The verification of individual segment reveals that the irregular MLC shapes has impact on the diode response.

Conclusion: Cautious should be taken to use 2D diode array for rotational arc therapy quality assurance. More studies need to be done to correct the complex dependence of the correction ratio on field size and aperture shape.

Research supported by Elekta.