AbstractID: 11577 Title: Evaluation of Angular Response of 2D Diode Array Detectors with Buildup Phantom

Purpose: To evaluate the angular response of a 2D diode array with a buildup phantom using simulated volumetric modulated arc therapy (VMAT) beams.

Method and Materials: A 2D diode array (MapCHECK™) with a 5-cm thick buildup phantom (MapPHAN™) was scanned in horizontal and vertical orientations on a Philips Brilliance Big Bore CT scanner. Four treatment plans were generated for the phantom in 4 settings at 2 orientations with 10x10 cm^2 open fields or different MLC-shaped fields. All plans consist of eighteen equally spaced 6MV photon beams. Inhomogeneity corrections were applied to all four treatment plans. Dose deliveries were carried out on a Varian Cl-iX machine while MapCHECK™ with MapPHAN™ combination was used for measuring the delivered doses with reproduced scanning parameters. The measured doses were compared with the plans using an in-house evaluation software. A measured arc calibration factor from the setup was determined and applied to the final measurements.

Results: The measured isodoses of all four plans show agreement with the plans. A gamma index with a 3% (dose difference, DD) and 3mm (distance-to-agreement, DTA) criteria was also used to evaluate comparisons of measured and TP data. Among the four plans in this study, the plan of horizontal position with different MLC-shaped fields had the highest passing rate and the plan of vertical position with open fields was the worst. This is probably because the calibration is at horizontal position and different MLC shapes could even out some uncertainties due to the limited number of detectors.

Conclusions: In this independent study, the angular response of MapCHECK™ with MapPHAN™ for rotational dosimetry has been evaluated in both coronal and sagittal directions. Results from our unique setting demonstrate that with the use of a properly calibrated 2D diode array and a buildup phantom VMAT patient QA is feasible and accurate.