Abstract ID: 16120  Title: Patient specific quality assurance for volumetric modulated arc therapy (RapidArc) using COMPASS 3D dosimetry system

Purpose: To implement the COMPASS (IBA, Inc) quality assurance (QA) system as a patient specific QA tool for Volumetric Modulated Arc Therapy.

Methods: RapidArc is a treatment technique which produces conformal dose distribution by delivering the dose in a rotational fashion while simultaneously changing MLC position, dose rate as well as gantry speed. The COMPASS has the potential to calculate and display the delivered 3D dose distribution on a patient CT data by using beam modeling, dose map from detector measurements (I-MatriXX Evolution) and dose map reconstruction using Collapsed Cone Convolution Algorithm. Dose maps for 10 Ten RapidArc plans were measured using I-MatriXX Evolution with a gantry mount (SSD=76.2cm) along with gantry angle sensor. This device captures the RapidArc plan delivery in real-time in a pre-treatment QA context. The measurement data were read directly by the control software, which provides the ability to import patient plan data from the treatment planning system via DICOM export. The COMPASS software also provides the user a dose calculation engine, including a physics based head fluence model. The doses and dose-volume histograms reconstructed from the fluence measurements were compared to the TPS calculated plans.

Results: Maximum and minimum deviation of PTV Volume receiving 95% of the prescribed dose(V95%) was found to be -2.89% and 0.16% respectively and mean deviation -1.12%. Average deviation of maximum and mean doses of OAR's (organ at risk) were -0.5880±0.012% and -0.6952±0.011% respectively. Average 3D mean gamma for 3mm and 3% criteria was found to be 0.067±0.0013 and Maximum absolute dose deviation at isocentre was 1.3573%.

Conclusions: Compass system can be used as an accurate and visually enhanced patient specific QA tool for VMAT plans to provide a complete clinical relevance of dose discrepancies for better patient treatment.