AbstractID: 14042 Title: Commissioning, validation, and implementation of the COMPASS system into a clinical intensity modulated radiotherapy quality assurance program.

Purpose: The purpose of this work was to commission, validate, and implement the COMPASS (IBA, Inc) system into a clinical intensity-modulated-radiotherapy (IMRT) quality-assurance (QA) program. **Method and Materials:** The COMPASS system is comprised of an array of ionization detectors (MatriXX) mounted to the gantry using a custom holder and a software package for the analysis and visualization of quality assurance results. Commissioning of the COMPASS required reformatting 6-MV photon data from a Varian-Novalis-TX linac into a software acceptable beam model. Validating COMPASS was a multi-step process including the qualification of our Varian-Eclipse-treatment-planning system (TPS) and the COMPASS computation, prediction, and reconstruction algorithms. Prior validation of our TPS included comparisons of measured dose in a pelvic phantom to calculated dose and correlation of predicted IMRT fluence with measured fluence using the MatriXX and OmniPro software. Validation of the computation algorithm involved direct comparison of TPS calculated dose to COMPASS calculated dose. The prediction algorithm was validated by comparing the predicted response to measured response on the MatriXX. Finally, the validation of the reconstruction algorithm included fluence measurements taken using COMPASS for actual patients undergoing IMRT treatment at our facility and comparing the reconstructed dose to the TPS calculated dose. **Results:** Validation of our TPS using point dose measurements was found to be within less than 1% from our TPS calculated dose. The COMPASS fluence prediction algorithm was evaluated using difference histograms; analyses indicated that ~96% of the pixels were within ±1.5% difference. **Conclusion:** This work shows clinical potential for a new visualization display of IMRT QA; 2D fluence measurements in conjunction with a valid beam model and patient CT information can be utilized to reconstruct measured dose onto a patient 3D data set.

Conflict of Interest: This study was sponsored by IBA, Inc., Bartlett, Tennessee.