AbstractID: 11736 Title: The effects of low dose regions on 3D IMRT QA delivery using a MatriXX 2D array and MULTICUBE

Purpose: IMRT quality assurance performed at treatment gantry angles using 2D arrays allows for the evaluation of rotational aspects of beam delivery. We investigate aspects of angular-based IMRT QA that contribute to lower-than-average passing rates when compared to treatment planning calculations.

Method and Materials: Planar dose profiles calculated on a CT of the IBA MatriXX 2D array device with the MULTICUBE phantom at iso-center were exported from the Philips Pinnacle TPS. Beam angles of 0, 90, 180, and 270^{o} were delivered using a Varian Clinac 2300iX. IBA OmniPro-I´m*RT* software was used for analysis. Individual beams of 4x4 and 10x10 cm^{2} were compared to calculated profiles using gamma index criteria of 3 % and 3 mm. Additionally, composite profiles of 0 and 90^{o} beams were assessed for each field size. Finally, IMRT-delivered clinical beams were assessed.

Results: The gamma index pass rates of individual 4x4 and 10x10 cm^{2} beams at 0^{o} were greater than 98%. However, 90^{o} beams were found to achieve below 90% pass rates, with the 4x4 being below 85%. The measured and calculated results compared worse in the exit dose region. Composite profiles of 0 and 90^{o} beams agreed with calculated to within 98 % for both field sizes. Clinical IMRT beams showed good agreement in high-dose regions, but passing rates in exit-dose regions demonstrated reduced passing rates.

Conclusion: An angular dependency is evident in the measurement of radiation fields when using the MatriXX device. Gamma index pass rates can show significant improvement through composite dose comparison. However, individual beam information can be lost, particularly the low-dose beam exit contribution, when applying composite evaluation. This becomes important when considering the dose to organs-at-risk which lay in these low dose regions.