AbstractID: 13920 Title: Dosimetric Investigation of Patient Specific IMRT QA using MatriXX

Purpose: This study is to investigate the dosimetric differences between two methods of IMRT plan delivery with the IBA-I'mRT MatriXX measurements: gantry-straight-down and patient-specific-angle deliveries for three treatment sites.

Methods and Materials: Varian-Eclipse and CMS-XiO TPSs are used for 6 IMRT patient plans including 2 each of Head-and-Neck(HN), prostate and breast. The MatriXX has a total of 1020 ion chambers distributed within a 24.4x24.4 cm^2 area. Each chamber is 4.5mm diameter, having an active volume of $0.08cm^3$. Ion chambers are separated by a center-to-center distance of 7.62mm. IBA Dosimetry-OmniPro I'mRT software is used to analyze 2D dose distributions. Comparisons between planning calculations and QA delivery measurements are made. Gamma analysis with different dose thresholds(10~30%) and a fixed dose-gradient-threshold are applied to compare two dose distributions. Gantry angle dependence is explored by comparing dose planes between measurements and exported plans from the TPS in gantry-straight-down and patient-specific-angle scenarios.

Results: The MatriXX total-pixel-passing-percentage differences between gantry-straight-down and patient-specific-angle deliveries on MatriXX are small, 0.8% for prostate, 1.1% for breast, 2.7% for HN sites. Due to larger dose-gradient angular dependence effects for complicated dose distribution(HN cases), slightly lower IMRT QA passing rates for HN cases can be expected and this could suggest lower QA passing criteria for HN cases. However, these large differences observed for HN cases between straight-down and patient-specific-angle deliveries could also reflect dosimetric differences due to the machine gantry or MLC sag and other issues related to the detector array. Therefore, treatment plans with very low passing rates should be examined individually.

Conclusion: Slightly lower passing rates for IMRT QA using MatriXX are expected for complex dose distributions and treatment geometries with MatriXX measurements. To reproduce the actual treatment situation for QA, patient-specific-angle deliveries are desired as it can detect real gantry and MLC delivery problems at different gantry angles.