

Purpose: Pre-treatment QA of IMRT plans are critical to uphold patient safety. Given that IMRT plans are becoming more prevalent in radiation oncology it is important to exam the limitations of current IMRT QA devices. Current IMRT QA devices use a 2D array of detectors to examine IMRT QA plans, and 3D analysis is lacking. The Delta⁴ is a relatively new IMRT QA device, that can perform 3D plan analysis, however the field size limitations of the device are unknown. We herein examine the abilities of the Delta⁴ to perform IMRT QA on 80 IMRT plans on various treatment sites.

Methods and Materials: Clinical IMRT plans from an in-house TPS, PlanUNC, were retrospectively examined to determine the field size limitation on the Delta⁴. 20 IMRT plans for each of the following sites were examined: head and neck (H&N), prostate, breast, and pelvis. We determined if the entire intensity map could be measured using the Delta⁴ based upon the treatment field size using the suggested isocentric set-up. We also determined which treatment field intensity maps with large field sizes could be completely measured using isocenter shifts for the Delta⁴.

Results: Using the Delta⁴, 6 H&N, 20 prostate, and 3 pelvis IMRT QA plans were deliverable. Due to large field sizes 14 H&N, and 17 Pelvis plans required a shift to complete measure the dose fluence. All 20 breast IMRT QA plans were deliverable on the Delta⁴, however all fields were prescribed a table kick out, which greatly increased the time required to measure the plans.

Conclusions: The 20cm x 20cm field size of the Delta⁴ limits its ability to measure large treatment fields using the isocentric set-up. However shifting the device can increase the detector size, but also decreases IMRT QA efficiency.