AbstractID: 10985 Title: Assessing the sensitivity of a multi-detector array for IMRT patient QA

Purpose: To assess the response of the Delta4 (Scandidos) detectors for the dose range [20%, 160%] of the prescribed dose in IMRT QA delivery

Method and Materials: We used an IMRT head-and-neck 9 field plan to develop a total of 8 QA plans based on the Delta4 phantom with the prescribed dose distribution scaled in steps of 20% covering the range [20%, 160%]. In addition, all the QA plans were re-planned with all the beams in the position of 180 degrees. A pinpoint chamber was used in conjunction with the phantom for additional dose verification. To assess the response of the Delta4 detectors to the various scaled doses, we evaluated the planned versus delivered dose distributions using gamma index analysis and dose profiles.

Results: We observed in general a better agreement between planned and detector measured dose for the up scaled (100-160%) QA plans. Using a DTA/dose difference tolerance of 3mm/3% for the gamma index analysis, the percentage of voxels satisfying this criterion were 60.7%, 81.8% and 90.4% for the 40%, 100% and 160% scaled dose QA plans respectively. The corresponding percentages for the single gantry QA plans were 75.3%, 95.9%, 98.5%. The point measurement dosimetry with the pinpoint chamber showed a 2% and 1% discrepancy against the treatment plan for multi-angle and single angle delivery respectively.

Conclusion: This preliminary study indicates better response of the array detectors at higher doses. In addition, these appears to be an angular dependence on the Delta4 response that is totaly attributable to the geometry at the detector array.