

AbstractID: 12618 Title: Characterization of responses of 2D-Array seven29 detector and its combined use with Octavius Phantom for the patient specific quality assurance in Rapid Arc treatment delivery

Purpose:

To study the dosimetric characteristics of 2D Seven29 ion chamber array and henceforth to perform the patient specific QA for RapidArc treatment delivery in combination with Octavius phantom.

Method and Materials:

The dosimetric characteristics of PTW 2D seven29 array such as linearity, reproducibility, dose rate, output factors, and directional dependency were evaluated for 6 and 15 MV X-rays using CLINAC 2100. Performance of detector for measuring clinical dose maps for open and wedge modulated fields and MLC QA were studied. The pre-treatment patient specific QA of RapidArc for ten different clinical cases was performed.

Results:

The detector response to dose was linear within the range of 2-500 MUs. Standard deviation for short and long term (5 months) reproducibility were 0.1% and $\pm 1\%$ respectively. The detector response to dose rates was independent with a standard deviation of ± 0.7 for 6MV and ± 0.5 for 15MV. Output factor showed no significant deviation. The directional dependency for static fields is found to be less than 1.0% when the array is irradiated from the front side. Variation of -4.9% for 6MV and -5.95% for 15MV was found when the array is irradiated parallel to the beam axis. Less than 4% variation was observed when the beam is incident through the rear of the array for both the energies. MLC and wedge modulated fields matched very well with ion chamber and film measurements. For pre-treatment QA of RapidArc, Gamma analysis shows that 95% of evaluated dose points in planned and delivered fluence agree for 3mm DTA, 3% dose difference (except for two studies).

Conclusion:

This study concludes that 2D Array Seven29 is a reliable and accurate dosimeter. The combination of 2D Array with Octavius phantom proved to be a fast and reliable method for pretreatment verification of RapidArc with a satisfactory accuracy for clinical practices.