AbstractID: 8167 Title: Dosimetric characteristics of 2D ion chamber array for radiotherapy dose verification

Purpose: To study the dosimetric characteristics of 2D ion chamber array matrix for verification of Radiotherapy treatment plans.

Method and Materials: The ionization chamber array consists of 1020 single air-vented plane-parallel plate ion chambers arranged in 32 x 32 matrix. Each chamber is of 4.5 mm diameter, 5 mm height and 0.08 cc of sensitive volume. The measurements were performed in Clinac DHX linear accelerator with 6 MV and 18 MV photons in a solid water phantom. The absolute dose and output factors were estimated for 6 and 18 MV photons using matrix device. The detector reproducibility, dose linearity and dose rate effect was studied. The performance of 2D array, in measuring clinical dose maps, was also investigated. Dose profiles of physical and enhanced dynamic wedge fields were analyzed. Furthermore, various IMRT fluence patterns generated from treatment planning system (TPS) were measured and compared.

Results: The matrix device gives the absolute dose values based on estimated calibration factor. The reproducibility of measurements was good and the output and the output factor values were in good agreement with the standard ion chamber measurements. The system response was found to be linear in the dose range of 2- 500 cGy and the response of the detector was found to be independent of dose rate. The 2D verification of intensity map at different depths for physical and enhanced dynamic wedges were in good agreement. The calculated and measured IMRT fluence patterns were found to be in good agreement ($\gamma \leq 1$:96 %, criteria 3 % &3 mm).

Conclusion: On the basis of broad range of tests performed in this study, we conclude that the 2D array matrix is dosimetrically accurate and it can be a useful device for QA and verification of clinical radiotherapy beams.