AbstractID: 6796 Title: Impact of volume effect of detectors in multiple points absolute dose and the choice of plane of measurement in 2D planar dose verification in patient specific IMRT QA

Purpose
To evaluate the volume effect of detector’s in multiple points dose in small and large field IMRT verification and to compare the planar dose distribution between fixed-fields coronal-plane and multifield axial-plane verification methods.

Method and Materials
Patient-specific dosimetric verification was conducted for 20 patients of nasopharynx’s small-field, SIB-IMRT large-field and prostate tumors. Eclipse-Helios system, Clinac-2300C/D linear accelerator, Med-Tec IMRT phantom and ionchambers of 0.6, 0.13 and 0.015cm$^3$ and MOSFET detectors were used. For each patient, 15 IMRT plans were generated. The multiple points doses were measured at multifield and fixed-fields on-axis, 4-offsets and inhomogeneous points. The agreements between calculated and measured doses were found for small and large field IMRT verification. For relative dosimetry, EDR2 films, Virtual Water phantom for fixed-fields coronal-plane and IMRT Body phantom for multifield axial-plane verifications RIT system and Vidar scanner were used. The agreements between calculated and measured dose distributions between two methods were compared using various gamma criteria.

Results
The agreements between measured and calculated doses using 0.6 and 0.13cm$^3$ chambers at multifield and fixed-fields on-axis points were within 4.7% ±2.3. The dose differences of 6% ±1.7, 19.7% ±5.5, and 12.1% ±3.2 at offset1 to 3 points were found. The 0.015cm$^3$ chamber and MOSFET detectors were showed the dose differences of upto 8.4% in large field verification. The mean differences in percentage of pixels passing the gamma criteria of 3mm/5% were 98.2% ±0.9 and 90% ±5.4 for fixed-fields coronal-plane and multifield axial-plane verifications.

Conclusions
This study is useful in evaluating the detector’s response at high and low dose, outside the fields and inhomogeneous points dose verification. In offset points, 0.6cm$^3$ is more accurate than 0.13cm$^3$ chamber in both small and large field verification. The fixed-fields coronal-plane verification is more accurate, however, the multifield axial-plane is clinically realistic method of verification and to be adopted.