

AbstractID: 12598 Title: Portal dosimetry for pre-treatment verification of IMRT plan: A comparison with 2D ion chamber array

Purpose: To compare portal dosimetry (PD) and 2D pixel ion chamber (MatriXX) for pre-treatment verification of photon fluence. **Method and Materials:** PD was performed for 181 fields from 14 IMRT plans of various clinical sites using aSi1000 electronic portal imaging device (EPID) and portal dose prediction (PDP) algorithm implemented in Eclipse Treatment planning system (TPS). Agreement of PDP predicted and EPID measured photon fluence were evaluated using gamma (γ) index set at 3% at 3 mm. Three γ scaling parameters, maximum γ (γ_{\max}), average γ (γ_{avg}) and percentage of points with $\gamma \leq 1$ ($\gamma_{\% \leq 1}$) were estimated for each field. An independent measurement was carried out using MatriXX with detector plane at 100 cm and γ_{\max} , γ_{avg} and $\gamma_{\% \leq 1}$ were estimated using Omnipro IMRT analyzing software. Effect of extended source to detector distance (SDD) and gantry rotation on PD outcome was also investigated for another 45 IMRT fields. **Results:** PDP predicted and EPID measured photon fluence agrees well with overall mean values of γ_{\max} , γ_{avg} and $\gamma_{\% \leq 1}$ at 2.02, 0.24 and 99.43% respectively. γ_{\max} value was lower in 15 MV compared to 6 MV IMRT plan. Independent verification using MatriXX showed comparable overall mean values of γ_{avg} and $\gamma_{\% \leq 1}$ at 0.25 and 99.80%. However, in all plans, MatriXX showed significantly lower γ_{\max} ($p < 0.05$) with an overall mean value of 1.35. In PD, compare to γ values at 100 cm SDD, γ_{\max} , γ_{avg} and $\gamma_{\% \leq 1}$ values improve from a mean of 0.16, 0.03 and 0.25 at 110 cm SDD to 0.34, 0.05 and 0.29 at 140 cm SDD. PD outcome was independent of gantry rotation. **Conclusion:** Both PD and MatriXX showed comparable result and can be use as an alternative to each other for relative photon fluence verification. While portal dosimetry reduces measurement time, absolute dose measurement needs further investigation.