AbstractID: 8595 Title: Dose response of spectral change of aS1000 EPID

Purpose: Amorphous silicon electronic portal imaging devices have been used as 2D dosimeters due to its excellent dose linearity response. However, dose response (cGy/signal) may be spectra-dependent when patients are in the beam. The aim of this study was to evaluate the dosimetric sensitivity of a Varian aS1000 EPID to spectral change caused by the presence of a patient and give conclusive recommendation for clinical applications.

Method and Materials: The signal-to-absolute-dose response curves of the EPID were established for 0 to 40 cm thick of solid water phantoms on couch. The thickness can well cover the water equivalent thicknesses of most patients from head (11 to 19 cm) to pelvis (AP 15 to 25 cm, lateral 26 to 37 cm). Monte Carlo simulation (BEAMnrc 2006) was used to evaluate spectral variation at the EPID plane.

Results: The results show that spectra at the EPID plane change dramatically for phantom thickness from 0 to 5 cm, and become more stable with further increased phantom thickness. Direct measurements have shown that large discrepancy up to 9.6% can be found for dose response within phantom thickness between 0 and 30 cm. It was also shown that the max variation between 10 to 40 cm which cover thicknesses of head and pelvis, 10 to 20 cm which cover thicknesses of head , 15 to 40 cm which cover thicknesses of pelvis, were 2.7%, 1.3%, 1.1% respectively.

Conclusion: We thus concluded that for clinical absolute dose measurements, opened field dosimetry (without patient in the beam) and transit dosimetry should have identical dose response curves. From the different variations of dose response among 10 to 40 cm, 10 to 20 cm, and 15 to 40 cm, we suggest that for transit dosimetry, head and pelvis should have its own one dose response curve.