

**Purpose:** To test a commercial EPID dosimetry system for the accuracy and usefulness for head&neck, whole-pelvis, mesothelioma IMRT QA.

**Materials and Methods:** Portal Vision (PV) dosimetry system was configured and experimentally used as intended by the manufacturer (Varian) for 6MV 2100Ex. Additional data analysis software was developed. Collimator angle=90deg and the smallest possible SDD=105cm and were selected to maximize the functional area of the EPID. EPID responses were calculated by Eclipse and compared to the experimentally determined responses in two ways: by comparing individual images and 3D-response reconstructions for cumulative plans (home-built software).

To account for the PV arm sag during gantry rotation, and the need to shift the detector, raw PV images were automatically magnified and registered with calculated images. 3D-response reconstructions for the measured and calculated images were performed by: backprojecting the images and applying attenuation and phantom scatter in a homogeneous virtual patient. Patient beam configuration and depths to isocenter were used.

**Results:** PV dosimetry for large/complex targets is difficult and time-consuming due to practical limitations (detector size, arm sag, manual shifting). Experimental response images show strong tongue&groove effects and elevated values outside of the field edges compared to Eclipse. Response discrepancies inside treatment fields cause ( $\pm 2-3\%$ ) discrepancies in cumulative plan. Discrepancies outside of field edges cause systematic shift up to (5-7%) in cumulative plan, because fluences are split into 2-3 narrower subfields in the delivery. The observed discrepancies are consistent with but stronger than ion chamber measurements in solid water. The reason may be the small 1cm-buildup and therefore larger PV sensitivity to MLC scatter and T&G.

**Conclusions:** Neither MLC scatter nor T&G are modeled in Eclipse. Their contributions may be significant for large/complex IMRT due to the increased MLC blockage. PV dosimetry may capture these effects, but caution is indicated in interpretation.