AbstractID: 11615 Title: An Effective Correction Algorithm For Off-Axis Portal Dosimetry Errors

Purpose: Portal dosimetric images acquired for IMRT pretreatment verification show dose over-response of up to 15% with increasing off-axis position, compared to TPS portal dose predictions. Quality assurance measurements with other standards (e.g. diode arrays, ion chambers) verify these IMRT fluences are delivered accurately. This work explores an effective, highly useable correction algorithm accounting for TPS/EPID disagreements. **Method and Materials:** By creating test fields of various sizes and positions, then comparing acquired vs. predicted dose, correction factors were determined to precisely modify the diagonal calibration profile utilized in calibrating the EPID for absolute dosimetry. Because the diagonal profile modifications need be calculated only once, then applied during each dosimetry calibration, this correction algorithm is both straightforward and efficient. With the modified calibration, portal dose images were acquired for IMRT fluences varying in size, position, and complexity (70 fields total) to verify the accuracy of the correction, independent of these parameters. These methods were completed for both 6 MV and 23 MV beams. **Results:** Along the major diagonal, EPID over-response increases linearly with off-axis distance, from 1.7% at 10.0 cm to 7.1% at 17.5 cm for the 6 MV beam, and 2.1% at 4.5 cm to 11.7% at 16.5 cm for the 23 MV beam. Before correction, gamma evaluation (3mm, 3%) for asymmetric fields results in only 69.5% passing points on average. After applying the correction algorithm, pass rates for the same fields improve by up to 60%, to an average of 98.5% passing points. **Conclusions:** This correction algorithm is effective and convenient, producing excellent agreement between TPS predictions and EPID measurements in most regions of the detector. Because the diagonal calibration profile is applied by circular symmetry, this algorithm does not account for over-response in those regions of the detector with high backscatter from non-uniform components below the imager.