AbstractID: 12772 Title: A Field Size Specific Backscatter Correction Algorithm for Accurate EPID Dosimetry

Purpose: Portal dose images acquired with an amorphous silicon electronic portal imaging device (EPID) suffer from artifacts related to backscattered radiation. The backscatter signal varies as a function of field size (FS) and location on the EPID. Most current portal dosimetry algorithms fail to account for the FS dependence. The ramifications of this omission are investigated and solutions for correcting the measured dose images for FS specific backscatter are proposed. **Method and Materials:** A series of open field dose images were obtained for field sizes ranging from 2x2 to 30x40 cm^2 and analyzed to determine the amount of backscatter present. Two methods to account for the relationship between FS and backscatter are offered: discrete FS specific correction matrices and a single generalized equation. Each approach was tested on the clinical dosimetric images for 10 patients, 49 treatment fields to see whether there was an improvement in the dosimetric result over the vendor's algorithm. **Results:** Backscatter manifests itself as an asymmetry in the measured signal primarily in the inplane direction. The maximum error is 3.6% for 10x10 and 12.5x12.5 cm^2 field sizes. The asymmetry decreased with increasing FS to 0.6% for fields larger than 30x30 cm^2. The dosimetric comparison between the measured and predicted dose images was significantly improved ($p << .001$) with the FS specific backscatter correction. The average percentage of points passing a 2%, 2mm gamma criteria increased from 90.6% to between 96.7% and 97.2%. **Conclusion:** The error observed in a measured portal dose image depends on how much its FS differs from the 30x40 cm^2 calibration conditions. The proposed methods for correcting for FS specific backscatter effectively improved the ability of the EPID to perform dosimetric measurements. Correcting for FS specific backscatter is important for accurate EPID dosimetry and can be carried out using the described methods.