AbstractID: 6737 Title: Comparison for Analytical Anisotropic Algorithm and Adaptive Collapse Cone Convolution Algorithm for Small Field Dosimetry

**Purpose:** The objective of this study is to compare the calculation accuracy of Analytical Anisotropic Algorithm (AAA) to that of Adaptive Collapse Cone Convolution (CCC) algorithm for small beam sizes where the electron disequilibrium becomes significant.
**Method and Materials:** The comparison of CCC and AAA calculations were performed for various field sizes (2x2, 4x4, 6x6 and 10x10) at 6- and 10-MV photon energies on different phantom situations (homogeneous water phantom, cork/water heterogeneous phantoms, step phantom and IMRT lung phantom). Treatment plans for open beams, MLC shaped beams and IMRT plans were created and calculated by each algorithm. Absolute dose comparisons were made based on measurements, calculations and Monte Carlo Simulations. The XV radiographic films, GAFCHROMIC_EBT radiochromic films, PTW Ion Chamber and Sun Nuclear Map checker were used for measurements.
**Results and Conclusions:** Point dose comparison along the central axis of beams shows that in homogeneous phantom AAA predicts dose within 2%, which is compatible to CCC. For the heterogeneous phantom with vertical density gradient, AAA predicts an up to 5% difference and compared to CCC with less than 2.5% difference. Depth Dose curves also showed that AAA overestimates the dose after passing through low density region. But inside the low density region, AAA gives a compatible prediction to CCC for very small fields. For those points far from heterogeneity, AAA results show a relatively good estimation. Profiles at different depths in the phantoms with density gradient along horizontal direction show that AAA does not model lateral scatter adequately which leads to discrepancies of up to ± 7% in the region of $\pm 1cm$ lateral from the heterogeneous interface, compared to less than 2% for CCC. Planar dose comparison for IMRT plans shows AAA calculated dose fluence matches with film measured data.