

Abstract ID: 8724 Title: Minimum Segment Size for the Collapsed Cone Convolution Superposition Algorithm

Purpose: A comparison between film measurements, ion chamber measurements and the collapsed cone convolution superposition (CCCS) algorithm for small field sizes prone to electronic disequilibrium is presented in this study. **Method and materials:** Using a Varian Clinac 2100 C/D with a Millennium 1201 electron multi-leaf collimator (MLC), field sizes from $10 \times 10 \text{ cm}^2$ to $0.5 \times 0.5 \text{ cm}^2$ were created using both square fields and fields comprised of small rectangular segments using control points, for 6 MV and 18 MV photon beams. Using an ion chamber inside a solid water phantom, and Kodak EDR2 film these fields were measured. The monitor units were set to 200 for each field or segment. The results were compared against calculations using the CCCS algorithm in Pinnacle³. **Results:** Agreement, within 2%, between Pinnacle and measurements was observed for all open fields. For the fields using control points, the discrepancy between Pinnacle and measurements was in the order of 10-15% for most of the fields for both energies used. Ion chamber and film measurements agreed within 3% for the same fields throughout the range of field sizes and energies used. **Conclusion:** Because the ion chamber, film and Pinnacle calculation agreed very well for the open square field sizes, it is unlikely that a setup error caused the unexpected results. At present, it can be concluded that the CCCS is not in good agreement (fa ilst predict accurately) the dose when the minimum segment has been reduced to an area with the smallest side smaller or equal to 1 cm. Further investigation will be carried out and more measurements will be taken to confirm the accuracy of the current data, and provide guidelines when small fields are needed for treatment.