AbstractID: 6565 Title: Dosimetric verification of AAA algorithm in clinical situations when treating lung

Purpose: The goal of this study was to investigate the dosimetric accuracy of the analytical anisotropic algorithm (AAA) for the treatment of lung tumors. This algorithm, recently implemented in Eclipse (Varian Inc., Palo Alto, CA), was also compared to the Pinnacle's (Philips Medical, Cleveland, OH) collapsed cone (CC) algorithm.

Methods: Four phantoms were used in this study. Three lung-, bone- and water-equivalent slab phantoms were designed to validate the accuracy of the calculated doses in simple geometries. Doses were additionally measured in the CIRS (Norfolk, VA) thorax solid water phantom, which includes lung cavities and a cylindrical spine. All four phantoms were CT-scanned with thermoluminescent dosimeters (TLD) in place. Plans were generated with the AAA algorithm using anterior-posterior (AP), AP/PA, oblique, and intensity modulated (IMRT) beams with both 6MV and 18MV photons. The dose distributions for all plans, excluding the IMRT, were re-computed with Pinnacle using monitor units matched to the AAA plans. Dose measurements were performed with TLDs and ion chambers at 6 different positions including three in tissue, one in spinal cord, and two in lung.

Results: The AAA algorithm was found to calculate the dose in lung and tissue accurately to within 6% in all four phantoms. Ion chamber measurements showed 2-3% better agreement than the TLDs in the thorax phantom. For 6 MV, the differences between measured and calculated doses were less than 2% for both AAA and Pinnacle for all six points. However, for the 18 MV beam, the dose measured in the spinal cord was 5.9% greater than the calculated dose with both algorithms. Measured and calculated doses agreed to within the 2% for the IMRT plan.

Conclusion: The AAA algorithm provides accurate dose calculations in and around heterogeneities, similar to that provided by the CC algorithm implemented in Pinnacle.