AbstractID: 9003 Title: The feasibility of using the anisotropic analytical algorithm (AAA) for IMRT treatment planning with the Varian Trilogy high dose rate (SRS) mode

Purpose: To determine the feasibility of using the anisotropic analytical algorithm (AAA) for IMRT treatment planning using the Varian Trilogy stereotactic radiotherapy (SRS) high dose rate mode.

Method and Materials: Varian Trilogy has a special treatment mode designed for SRS. The SRS flattening filter limits the 6MV field size to 15x15 cm^2 and allows a dose rate of 1000 MU/min at isocenter. AAA was implemented at Stanford Cancer Center in 2007 by modeling the intensity profile, extra-focal photons and electron contamination using diagonal profiles of a 15x15 cm^2 and an extrapolated 40x40 cm^2 field. 8 IMRT treatment plans and 9 dynamic conformal arc patient plans were delivered to a homogeneous solid water phantom. Verification measurements were made using ionization chamber and film.

Results: Percent depth doses calculated using AAA of open fields defined by collimators, agreed with measurement to within 2%. However larger discrepancies, 2.6%, were observed in small fields defined by MLC at depths larger than 20 cm. Of the 8 IMRT patient plans, measurements showed differences from 0.25% to 3.7%. The 9 dynamic conformal arc plans had a consistently higher discrepancy with AAA calculations, 0.78% to 6.5%. It was found that for smaller target volumes for both IMRT and conformal arc plans, differences between AAA and measurements are greater. It was also noted that for the dynamic conformal arc plans, the discrepancy with measurement is related to treatment volume size with larger variations for smaller target volumes.

Conclusion: Due to the limited maximum field size and small field sizes used in SRS, implementation of AAA proved to be a challenge. It is shown that acceptable results, (average ~2%) though not perfect, could be achieved. AAA is still the preferred calculation algorithm for clinical use as the majority of our SRS cases are targeting the thoracic region.