

AbstractID: 8533 Title: Application and Dosimetric Analysis of Multiple Static Tangential Intensity-Modulated Radiotherapy Beams in an Elliptic Paraboloid-Shaped Superficial Tumor

Purpose is to evaluate dosimetric efficacy for LINAC-based IMRT for an elliptic paraboloid-shaped shallow target. **Materials/Methods:** This study includes a case with advanced facial multi-focal basal cell carcinoma. The lesion variably extended entire face, up to 3.5 cm deep. A simulation target was created in a cylindrical water phantom for evaluating different plans. All IMRT plans comprised of eleven coplanar 6-MV photon beams with 5mm sMLC. Only outer portion of each beam opens to the PTV. Identical beam constraints with 4mm MLC stepping were used. In group A, the MLC travels along the shorter dimension of PTV cross section, while in group B, MLC moves along the longer dimension. 50.0 Gy is normalized to 95% of PTV in all plans.

Results: Dose for the organ at risk (OAR) was shown reduction in both groups, when the independent jaw blocks more open field. The mean dose reduction was 15.9% and 18.9% respectively when the jaw moved from +2 cm to 0 cm (half beam blocked). More significant improvement ($> 27\%$) in dose sparing was indicated with the jaw set further into the field. No consistent trend of changes in dose homogeneities was found, except when the jaw partially blocked the PTV. In the final clinic case, more than 90% of PTV received the prescribed 45Gy dose with about 19% meaningful dose heterogeneity (effective 50Gy for majority of treated areas), and satisfactory dose conformity. Treatments were comfortably fitted in 15-minute daily schedule. The treatment resulted in an excellent clinical outcome without cosmetic complications seen during the first 12 month follow-ups.

Conclusions: This study demonstrates the feasibility of the application of LINAC based individualized IMRT for an elliptic paraboloid-shaped superficial target. Further clinical trials will be designed for the treatment of chest malignancy.