AbstractID: 8918 Title: Volumetric Modulated Arc Therapy for Head & Neck Cancer

Purpose:
Volumetric Modulated Arc Therapy (VMAT) is an arc-based technique that utilizes dynamically modulated arcs to deliver intensity-modulated radiation therapy (IMRT) treatments on a conventional linear accelerator. In this work, we evaluate VMAT as a treatment technique for patients with carcinomas of the head-and-neck.

Method and Materials:
Five complex head and neck cancer patients, with multiple prescription levels, were selected for this study. Fully inverse planned VMAT plans were optimized for these patients using our homegrown arc-sequencing software. The software uses simulated annealing to optimize the aperture shapes and weights while minimizing the differences between the optimized (ideal) and sequenced intensities. The optimized plans were compared with step-and-shoot IMRT plans generated using the Pinnacle^3 treatment planning system. VMAT plan verifications have also been performed using Elekta's Precise Beam Infinity™ control system which has been installed on an Elekta Precise linear accelerator in our clinic.

Results:
Using our arc-sequencing tool, VMAT can be used to create highly conformal head-and-neck treatment plans. As compared with traditional fixed-field plans, VMAT was able to reduce the average parotid dose from 85.3 cGy to 73.6 cGy per fraction. Additionally, the average number of monitor units was reduced from 1058.3 to 502.3 per fraction. Initial delivery tests demonstrate that using VMAT complex head-and-neck deliveries can be completed in under 6 minutes.

Conclusion:
VMAT should serve as an important tool in the delivery of radiation therapy for head-and-neck carcinomas. By utilizing the dosimetric advantages of rotational IMRT, VMAT can provide more uniform target doses and reduced critical structure doses as compared with fixed field IMRT.

Conflict of Interest: Research partially sponsored by Elekta Corporation.