

## AbstractID: 11814 Title: MU Reduction in Different Aperture based Optimization Systems

**Purpose:** Depending on the different algorithms utilized in the direct aperture based optimization (DAO), the MU reduction may not be always guaranteed. The purpose of this study is to compare two commercially implemented DAO optimization methods, particularly investigating the difference in MU reduction.

**Materials and Methods:** The Prowess and Pinnacle treatment planning systems were used for this study. Five nasopharynx patients, who underwent IMRT with DAO-pinnacle plans, were randomly selected for this study. Using the Prowess treatment planning system, additional DAO-IMRT plans for these patients were created with the same treatment planning goals and the similar delivery parameters, including the number of beams and the number of total segments. Furthermore, the Prowess DAO-IMRT plans were recalculated in the Pinnacle system to eliminate difference in dose calculation algorithms. The IMRT plans were compared based on criteria of RTOG 0225 protocol, plan conformal indices, and homogeneity indices, and the total MUs.

**Results:** Both types of DAO-IMRT plans achieved similar planning goals and met with the requirement of RTOG 0225 protocol. The average total monitor unit in Prowess plan is much less than that of Pinnacle plans, 623 MU versus 1097 MU. Further analysis revealed that the most frequent segment size used in the pinnacle plans was in the range of 10 cm<sup>2</sup> to 40 cm<sup>2</sup> while the most frequent segment size in Prowess plans was in the range of 40 cm<sup>2</sup> to 200 cm<sup>2</sup>. The most frequent MU/segment size ratio for the pinnacle plans was peak at 2.0 compared to the peak of 0.08 for the prowess plans, indicating large percentage of total MUs attribute to the small size segments.

**Conclusions:** While achieving similar IMRT plan quality using similar delivery parameters in DAO IMRT plans, the level of MU reduction can be significantly varied between the different DAO optimization algorithms.