AbstractID: 13923 Title: Automated IMRT plan generation for prostate cancer

Purpose: Inter-clinician variability can result in large inconsistencies in IMRT plan quality. This manifests itself as delays in the process due to wasted effort and/or suboptimal plans with respect to target coverage, normal tissue sparing, or both. The purpose of this work is to assess the performance of an automated IMRT planning (autoplanning) routine for prostate cancer.

Methods: Autoplanning routines were created in the Philips Pinnacle treatment planning system (TPS). The implementation of the autoplanning routines relied on Pinnacle 'scripts,' which are assemblies of internal commands stored as text files. Scripts can be called at any time on new patient files. When invoked on a new patient, the autoplanning routine creates various target and normal tissue planning structures, sets the beams and dose prescription, and loads customized IMRT objectives to start the optimization. The target objectives are based on prescription dose, while OAR objectives are determined from a model that takes into account geometric properties of the target and OARs to predict mean doses based on prior cases. To determine its clinical utility, the autoplanning script was compared to five retrospective plans. The prior and autoplanned cases were normalized by equalizing PTV coverage at the prescription dose; the comparison metrics focused on the target dose homogeneity and OAR sparing.

Results: The script takes less than 90 seconds to run. The optimization time is case dependent, taking from 10-20 minutes until the initial solution converges. In the five comparison plans, one autoplanned solution bettered the clinically approved plan without intervention, while the remaining cases requiring minimal efforts (10 min – 3 hrs of refinement) to meet or exceed the clinically approved plans.

Conclusion: Autoplanning shows great potential in setting the basis for IMRT plans which meet the quality of manually developed plans with minimal or no intervention.