

AbstractID: 11189 Title: Evaluation of a New Dynamic Arc IMRT Optimisation

Purpose: The quality and accuracy of delivery of both prostate and esophagus plans generated using of a new dynamic arc optimization algorithm (SmartArc) within the Pinnacle TPS have been evaluated and compared with standard step-and-shoot (SS) techniques. **Method and Materials:** Two types of single-arc plans have been evaluated, one that is delivered using a constant dose-rate (CDR) and gantry speed, and one that is delivered using both a variable dose-rate and gantry speed (VMAT). The former can be delivered on most linear accelerators; the latter requires an accelerator that has been licensed for VMAT treatments. Prostate plans were all optimized following the UK CHHIP trial protocol, which has three PTV dose levels. Esophagus plans were optimized following a local protocol. In both cases plans were created for Varian accelerators equipped with a 120-leaf MLC. The delivery of plans was evaluated using Delta-4 (ScandiDos). **Results:** In all prostate cases plans met the target coverage criteria. The CDR arc plans tended to give the highest hot-spot. For the prostate plans the CDR arc plans and SS plans gave approximately equivalent rectal and bladder DVHs, with the arc-plan femoral head DVHs being better. The VMAT plans gave improved DVHs for all outlined organs-at-risk for prostate plans. For esophagus plans, the CDR arc plans struggled to meet the target coverage criteria, whereas the VMAT plans gave acceptable coverage and improved organ-at-risk sparing. In all cases the measured quality assurance results were good with no significant differences between the different delivery methods. For the VMAT plans delivery time was 75-90 seconds and 2.5-3.0 minutes for the CDR-arc plans. **Conclusion:** The Pinnacle SmartArc optimizer provides a very useful tool for generating accurately deliverable IMRT plans on a wide range of accelerators. **Conflict of Interest:** This work was performed in collaboration with Philips Radiation Oncology Systems