Utilization of Pinnacle Auto-planning and Sun Nuclear’s Plan IQ to Improve Efficiency

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Introduction

• The ACR recommends the use of specific goals and requirements of the treatment plan, including the specific dose constraints for the target(s) and nearby critical structure(s), should be documented.
• Can Plan IQ generate custom OAR constraints per patient anatomy, document them, and be used to improve plan quality?
• Will the ability to predict DVH outcomes using feasibility curves lead to increased OAR sparing?

Method

• 10 prostate cases treated on GU005 arm1 previously manually planned were re-optimized using (AP) and Sun Nuclear’s Plan IQ feasibility tool.
• The “generic” AP technique designed at University Hospitals (UH) was loaded then sent to Plan IQ.
• Feasibility is calculated with UH’s AP technique objectives. (Fig. 1)
• Patient specific OAR constants are set at a value of f > 0.2, represented as grey dotted line in Fig. 2 (F=feasibility)
• Dose objectives are modified and sent back and reimported into AP. (Fig. 3)
• The AP was only optimized on once after Plan IQ objectives were uploaded.

Results

• The Plan IQ feasibility predicted OAR constraint at a f value ~ 0.2 could be used as dose constraints for nearby critical structure(s).
• Combining AP with Plan IQ increased the AP efficiency by starting the optimization process with dose objectives near ideal values.
• On average the AP with Plan IQ constraints reduced optimization time by 3.5 hours.
• The plans produced with AP and Plan IQ constraints produced better Bladder and Rectal DVH’s with equal PTV coverage and homogeneity. (Fig. 4 and 5)

Conclusion

Pinnacle AP combined with Plan IQ produced superior plans than manually planned or AP with “generic” constraints on a faster timeline.

References