

AbstractID: 7390 Title: Development of a toolkit for dose verification and comparison between treatment planning systems

Purpose: To develop a generalized software toolkit for comprehensive dosimetric analysis and comparison between treatment planning systems.

Method and Materials: A toolkit was developed for the purpose of manipulating the 3D dose matrix generated by the CrossPlan treatment planning system (TPS) for a dual micro-multileaf collimator (mMLC) and the Pinnacle³ TPS. The toolkit can convert 3D dose matrices calculated by CrossPlan and export it to Pinnacle³. Two different trials based on the same patient anatomy and beam arrangement were planned and compared between the two TPS. The dose matrices by both CrossPlan and Pinnacle³ TPS were evaluated and analyzed. The comparison parameters included isodose overlay, dose profiles, gamma analysis, dose volume histogram and 3D dose difference. In addition, the RIT dose analysis tools were used to evaluate the isodose overlay, gamma analysis, dose profiles and dose difference between the two TPS. This application was extended to other TPS including Monte Carlo (EGS and MCNP).

Results: The toolkit was effective in converting the 3D dose matrix calculated by CrossPlan and subsequently exporting it to Pinnacle³. The 50%, 70% and 90% isodose lines show good agreement and the dose profiles match closely. The gamma analysis showed a good agreement, with only 2% of the gamma value exceeding the pass/fail threshold (gamma=1). The maximum dose difference was less than 11 % at the penumbra of the field edge and the mean dose difference was less than 1%.

Conclusion: A toolkit has been developed for processing the conversion and exportation of 3D dose matrices generated by a TPS. The Pinnacle³ and CrossPlan TPS were used to demonstrate the utilization of the toolkit. Overall, the comparison based on various dosimetric indices showed good agreement between the Pinnacle and CrossPlan TPS.