

AbstractID: 4852 Title: Investigating Using IMRT Convert Parameter Settings to Improve the Agreement Between Planned and Delivered Dose Distributions

Purpose: To improve the IMRT quality assurance process.

Method and Materials: The linear accelerator used in this study was a Varian model 21EX with a 120 multi-leaf collimator. IMRT planning was conducted on an ADAC Pinnacle³, v6.2b, P³IMRT treatment planning system. Fluence measurements were analyzed using a MapCHECKTM unit consisting of 445 N-type diodes. Coplanar dose composites from thirty-two converted IMRT plans were analyzed using an ANOVA-TM v.3.0.0.2 software package. The software, containing design of experiments (DOE) techniques, utilizes analysis-of-variance methods and orthogonal array designs for conducting efficient experimentation.

Results: From the ADAC Pinnacle³ convert parameters which were selected for this study, only the minimize tongue and groove parameter had a notable contribution toward influencing the percent agreement between the planned and the delivered dose distributions, (rho = 5.50%). Statistically, the calculated value "rho" indicates a parameter's unique contribution toward changing the percent agreement; the bigger the rho, the bigger the parameter's contribution. Field size, which was considered to be an uncontrolled noise factor, was found to be a significant noise factor influencing the agreement output, (rho = 70.10%). Beam energy, also an uncontrolled noise factor, was found to have a smaller contribution influencing the agreement output, (rho = 6.09%)

Conclusions: Changing the convert parameters cannot be used to significantly improve the IMRT quality assurance process. While the convert parameters do affect treatment plan dosimetric results and delivery times, they will not significantly affect the outcome of the IMRT QA results. DOE techniques can be very useful when analyzing the contributions from experimental factors.