

AbstractID: 5470 Title: Dosimetry Comparison of the Newly Implemented Multi-Criteria Optimization Tool for IMRT Planning

Purpose: To apply a biological model based algorithm for acquiring optimized IMRT planning solutions. This interactive planning tool will help users to select the best available plans in the IMRT solution space.

Method and Materials: IMRT often is a time consuming iterative optimization process between evaluation of the dose distribution and redefinition of the object function. An IMRT planning optimization tool (Multi-Criteria Optimization, MCO™) has been introduced for non-clinical evaluation to acquire the best available solutions. Based on a Pareto's solution concept, this tool could search the solution space and offer users a limited set of deliverable IMRT plans. With this interactive process, users can set the target and critical structures dose constraints with the biological model (EUD) to obtain the best solution. We used Pinnacle system as the benchmark to compare the dosimetric gain from the MCO algorithm, DVH indicated excellent sparing with better PTV coverage is achievable from the MCO process in KonRad system.

Results: Dosimetric findings are summarized as 1) MCO optimization testing shows that much better dose distribution can be achieved compared to the current planning results (Fig. 1 and Fig. 2). Due to the confined solution space, the optimal results are easily achievable. 2) MCO with Pareto's approach is durable in the solution searching process. It is interactive with the graphical interface which the dose distribution along with the DVH can be compared simultaneously (Fig. 3). 3) IMRT dose optimization and summary based on the MCO methodology are very conceivable. With pre-calculated IMRT solutions, final results help users to select the best available plan from the solution domain in real time (Fig. 4).

Conclusion: From this interactive MCO planning tool, we can calculate the best IMRT results in a very reasonable time frame. Human factors for determining an acceptable plan can be dramatically reduced.