

## **Optimization of Importance Factors in Inverse Planning**

Inverse planning starts with a prescribed dose (or DVHs) and obtains the solution by optimizing an objective function. A set of importance factors (IFs) is often incorporated in the function to parameterize tradeoff strategies in different anatomical structures. Whereas the general formalism remains the same, different sets of IFs characterize plans of obviously different flavor and critically influence the final plan. The determination of IFs has been a “guessing” game based on empirical knowledge. The influence of these parameters is not known until the plan optimization is completed. In this work, a method to estimate these parameters is proposed and an iterative algorithm is described to determine the parameters numerically. The treatment plan selection is done in two steps. First, a set of initial IFs are chosen and the corresponding beam profiles are optimized under the guidance of a quadratic objective function using an iterative algorithm. The “optimal” plan is then evaluated by an additional DVH based scoring function. The importance factors are adjusted accordingly to improve the score of the plan. For every variation in the IFs, the beam parameters need to be re-optimized. This process continues in an iterative fashion until the DVH score function is saturated. The algorithm was applied to two clinical cases and the results demonstrated that it has the potential to improve significantly the existing method of inverse planning. It was noticed that near the final solution the plan became insensitive to small variations of the IFs.

