AbstractID: 6856 Title: Segmental Inverse Planning (SIP) that Starts with a Definition of Allowable Fields

This paper describes a new method of inverse planning that starts by defining field segments using simple rules. The planning approach employs a standard RTP system to determine, for equally weighted segments, dose to the voxels of all targets and critical structures. This information is then extracted and used along with multiple-point dose volume constraints to obtain a feasible solution by deriving new weights for the segments. A back-projection algorithm is used for optimization. Weights are sent back to the RTP system for dose analysis and monitor unit calculation. The SIP method has been tested to determine if a reasonable set of segments can be defined for a complex head/neck case. The target for this case was invaginated by two critical structures and included two internal boost regions requiring higher dose. Dose distributions, DVHs, number of segments and total monitor units are compared for the SIP method and a commercially available simulated annealing algorithm. The SIP optimization process assigned 48 non-zero weights to the 99 segments initially defined for nine gantry angles. Dose volume histograms for the two planning approaches were indistinguishable. The total monitor units for the simulated annealing (NOMOS with MIMiC) were a factor of 10 higher than the SIP method. This study demonstrates that it is easy to devise segments for complex IMRT cases. Advantages of this method are: simple verification and QA, reduced number of segments and monitor units, no restrictions on collimator rotation or resolution in direction of leaf travel, and no interpreter is needed.