AbstractID: 8255 Title: Region-of-Interest Adjoint Functions as an Initial Guess for Iterative Inverse Treatment Planning

A central requirement for the delivery of IMRT is the optimization of the source field in terms of beam directions and intensities. Least-squares minimization is a well established approach for this optimization (1). Based on a convex objective function, this scheme offers a global minimum but does not guarantee a unique final solution. Hence, numerous combinations of fluence patterns can yield similar dose distributions, and the final solution may be dependent on the initial selection of beam weights.

Whole-organ adjoint functions are quantities that provide the sensitivity of the dose in a patient organ to each possible beam. These functions are readily obtained from beam dose distributions that are computed by conventional techniques; adjoint transport is not required. In this investigation, information from whole-organ adjoints is exploited to develop an initial guess of beam weights and to update these weights within an iterative least-squares minimization scheme. Recovery and use of adjoint information is illustrated. Optimization results are discussed for initial guesses formulated with and without adjoint information. The utility of adjoint-based initial guesses for improving either the convergence of the algorithm or the final dose results is discussed.