AbstractID: 10329 Title: A novel method for balancing focal treatment based on biological images with a traditional IMRT.

Purpose: To develop a method for creating IMRT plans which balances the goal of automatically incorporating information from spatially varying biological images with the goal of using traditional treatment planning prescriptions with well quantified outcomes.

Method and Materials: A novel method for re-optimizing a traditional IMRT plan to incorporate information from a three-dimensional biological image was developed which mathematically includes the goals of making the dosage at every location in the target increase proportionally to the biological image intensity at that position as well as the goal of making the minimum and maximum target dose in the re-optimized plan equal to the minimum and maximum target dose in the traditional IMRT plan. The method includes the novel aspect of averaging the biological plan and the traditional plan interactively, so a clinician may select the best alternative balancing the traditional plan and the biological plan. The methods were implemented in a prototype version of CORVUS. The novel methods were applied to a lung cancer scenario using biological information from a PET scan using a Siemens MLC.

Results: Images were produced showing the isodose lines, histograms, statistics, and segmentation of a traditional IMRT plan. Similarly images were then produced after applying the proposed re-optimization method to incorporate biological information from a PET scan. Finally, a series of images were produced showing that the method allows user controlled balancing of the traditional IMRT plan and the corresponding biological plan.

Conclusion: The proposed method enables a user to automatically re-optimize a traditional IMRT plan with the goal of delivering dosage which increases in proportion to the intensity of a biological image and to tradeoff between the traditional plan and the biological plan in real-time.