

AbstractID: 4900 Title: An Automatic Field-Matching Technique to Treat Multiple Targets with a Single IMRT Plan

Purpose: To treat multiple targets with a single IMRT plan with automatic field matching and different sets of angles for each target. In the treatment of head-and-neck (HN) malignancies with IMRT for example, the traditional approach is to deliver 7-9 IMRT fields matched with a static half-beam blocked supraclavicular field. However, significant cold and hot spots are frequently observed near the field junction. We have developed a technique to generate a single IMRT plan that eliminates the need for beam matching and reduces excess irradiation of normal tissue.

Method and Materials: Direct aperture optimization (DAO) [1, 2] is an inverse planning technique where the MLC delivery constraints are incorporated into the plan optimization. By defining the initial apertures prior to optimization, the IMRT fields are limited in the search space for the MLC leaves, which served as a seeding solution. The fields are restricted so as to prevent them from exceeding the beam's eye view of their assigned targets. With this approach a single IMRT plan can be generated for multiple targets with different sets of gantry angles and automatic field matching.

Results: Using DAO and defining the initial MLC aperture technique can produce a single IMRT plan for multiple targets without field matching. In the case of HN, 7 to 9 fields were assigned to the primary tumor, upper neck, and a portion of the lower neck nodes. An anterior and a posterior field were assigned to the mediastinum and a portion of the lower neck nodes. The resulting single isocenter IMRT plans were delivered without the need to junction fields.

Conclusions: By using different beam arrangements, a single IMRT HN plan can be generated to treat multiple targets with needing to match fields.