

AbstractID: 4957 Title: Differential Smoothing IMRT Planning for Head and Neck Cancer Patients with Mediastinal Involvement

Purpose: Head and neck cancer patients with mediastinal involvement present a planning challenge. The superior fields are ideal for IMRT but possible interplay effects between leaf and mediastinal motion makes IMRT less desirable for the inferior fields. A new, differential smoothing IMRT technique is compared to matched and extended field IMRT plans.

Materials and Methods: The differential smoothing IMRT technique treated the superior portion of the target with 7 fixed, low smoothing rate (LSR) beams while the inferior portion was treated by 3-4 highly smoothed, fixed beams with an overlap region. All beams existed in a single IMRT plan and were optimized simultaneously. This technique was used to plan treatments for three head and neck cancer patients with mediastinal involvement. These patients were also planned using two alternative techniques: (1) A matched field technique, with conformal radiation therapy used for the inferior portion, and an LSR IMRT plan used for the superior portion; (2) An extended field LSR IMRT plan treating the full extent of the disease. The plans were compared dosimetrically.

Results: The differential smoothing technique provided homogenous, continuous coverage throughout the target volume while the matched field plan demonstrated discontinuous coverage in the match region. The extended field IMRT plan had coverage comparable to the differential smoothing plan. However, patient and leaf motion could compromise coverage in practice. The average MLC leaf opening in the inferior differentially smoothed beams was 1.5-2 times greater than the average opening in any of the LSR beams (1.55cm for LSR beams versus 3.04cm for highly smoothed beams) thereby potentially reducing the impact of patient motion. Lung DVH's were similar for all three techniques.

Conclusion: The differential smoothing technique offers continuous, more homogenous coverage than the matched field method and is probably less susceptible to patient motion than the extended field technique.