

AbstractID: 1759 Title: Improving IMRT delivery efficiency using intensity limits during inverse planning

Inverse planning has the potential to generate progressively more modulated intensity patterns as the available degrees of freedom increase. Additional modulation typically results in a more optimal plan, although the clinical rewards may be small. Increasing modulation clearly decreases delivery efficiency, and these plans also may have heightened sensitivity to geometrical uncertainties. Constraining the maximum intensity in each beam creates a surrogate which limits modulation without directly including beam intensity smoothing into the cost function. To study the benefit of the maximum intensity constraint, sinus, head/neck, and lung IMRT cases were studied by reoptimizing each case with many different intensity constraints. Resulting DVHs, plan evaluation metrics, and monitor units (after SMLC leaf sequencing) were evaluated with respect to the intensity constraints, as well as to the beam intensity map variation (used to quantify the modulation of each beam). In all cases, it was possible to reduce the MUs required for delivery without significantly affecting the quality of the plan DVHs. The number of MUs required for delivery of the plans decreased by as much as 37%. Limiting the maximum intensity in IMRT plans results in clinically equivalent plans and reduces intensity map variation, as well as the number of monitor units required for delivery.

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