

**Purpose:** To efficiently identify and calculate significant tradeoffs between structures in IMRT plans and to present these relationships in a manner beneficial for decision making.

**Methods:** A lexicographic ordering (LO) approach to IMRT, where physicians categorize treatment goals by importance, partitions the treatment planning decisions into a multi-stage treatment planning model. However, since the objectives optimized in the different stages do not necessarily represent a strict prioritization, the impact of deviations from optimality in one stage may provide benefits in a later stage that are of interest to physicians. In order to identify significant benefits, we studied the tradeoffs in intermediate-risk prostate IMRT using an LO approach by examining the inter-stage interactions of the objective functions. Linear approximations of Equivalent Uniform Dose (EUD) that are convex combinations of mean dose and minimum or maximum dose were used as treatment plan evaluation criteria.

**Results:** Significant improvements to the treatment plan were found by examination of the inter-stage tradeoffs. For example, reducing the EUD to the PTV by less than 0.2 Gy from its maximum value allows the EUD to the rectum to be lowered by more than 3.8 Gy. For each stage, charts were created showing the tradeoff between relaxing the previous stage and the current stage benefits, allowing physicians to make better-informed planning decisions.

**Conclusions:** This work highlights the benefits of a LO approach to IMRT treatment planning. Highly advantageous alterations to current treatment plans can be easily missed without a form of efficient sensitivity analysis on the treatment planning models. LO implicitly restricts attention to a subset of the Pareto efficient frontier that the physicians have deemed most important by the nature of LO.