AbstractID: 4659 Title: Optimized Field Shaping Strategy for Image Guided Radiation Therapy Treatments

Purpose: Reducing normal tissue irradiation is one goal of image guided external beam radiation therapy treatments. One approach is to adjust the patient position based on daily imaging so that the target is localized and margins used for setup uncertainty can be reduced. The field shapes are generally determined at the time of simulation based on expansions of the clinical target volume. This work studies whether there are alternative field shaping strategies to reduce the volume of normal tissue in the field given that daily image guided position adjustments will be made.

Method and Materials: Daily port films were acquired during prostate treatments that used an endorectal balloon for both immobilization and localization of the prostate. The contour of the balloon on lateral films was used to represent the shape of a sensitive structure to be shielded from treatment. The effect of static optimized, static conformal, and adaptive blocking strategies on the area of balloon in the treatment field was studied assuming that a daily image guided shift was allowed before treatment.

Results: The daily port films of 9 patients were analyzed. The endorectal balloon allows localization of the anterior rectal wall and indicates a variation in shape from day to day.
For all patients there are optimal field shapes that include less balloon area in the field than a conformal field shape. Relative to the optimal field shape, conformal, average, and running average field shapes involved 63%, 20% and 22% more balloon in the field.

Conclusion: For targets of sensitive structures that have interfraction shape changes, image guidance enables non-conformal field shapes to provide better shielding than conformal fields. This blocking strategy may improve treatments without daily field shape adjustments.

Conflict of Interest (only if applicable):