AbstractID: 9335 Title: Fast Seed Localization On MR Images For Post-Prostate Implant Dosimetry

Purpose: Accurate and reliable post-prostate implant dosimetric analysis requires optimal identification of the seeds on CT and optimal description of soft tissues on MRI. We present a fast seed localization technique for MRI that is also robust from motion and other artifacts. The robustness of this technique was further investigated with clinical cases.

Methods and Materials: CT and 1.5T MR axial images of 4 patients were acquired four weeks post-implant were studied. Seed localization was first performed on CT images using either automatic seed detection or manual identification process. Several seeds in CT and seed voids in MR as well as anatomical landmarks were selected as control points. A thin-plate-spline deformable model was then constructed to map all the seeds from the CT to the MR. The robustness of this technique was further investigated by simulating various control point sets. The test started with the entire identifiable seed collections on both CT and MR images. The seeds forming the convex hull and 2 anatomical landmarks were then used as the control point set for TPS modeling. All seed positions were mapped from CT to MR following the TPS model. Seed position accuracy was examined. The process is repeated by continuously eliminating the control points to the last 3.

Results and Discussion: The seeds localized on CT images were successfully mapped to the MRI images with only about 8 control points. The mapping can be accomplished in less than 5 minutes. Most of the mis-alignments were with peripheral seed positions. The slice thickness also contributed to the inaccuracy in SI direction as some of the seed positions were rounded to the closest slice. Increase the number of anatomical landmarks may further improve the accuracy.

Conclusion: The fast mapping of seed locations from CT to MR facilitates a reliable post-implant dosimetric analysis.