AbstractID: 6953 Title: Evaluation of a Model Based Segmentation Algorithm for Automatic Contouring

Purpose: The purpose of this study was to quantitatively evaluate the commercially available Model Based Segmentation (MBS) tools in Pinnacle. The first specific aim was to compare the time required to contour structures manually verses the automatic MBS. The second specific aim was to evaluate the algorithm's ability to propagate GTV contours from the treatment planning dataset to CT images obtained during image-guided radiation therapy.

Method and Materials: The MBS algorithm was evaluated using the time required to generate the contours, a visual evaluation of the contour accuracy, and a quantitative analysis of the volumes. The quantitative evaluation of volumes was performed by comparing the calculated contour volume for both techniques. The propagation of contours was evaluated using the daily MVCT images of 8 lung cancer patients. For each patient, the GTV was manually contoured on the treatment planning CT image, and on all MVCT images. The treatment planning contours were used to create a new MBS model for each patient that was then propagated and adapted to each MVCT image. The mesh structures were then converted to contours and evaluated for accuracy.

Results: The study showed that using MBS can save a significant amount of time on many structures, but that the rectum, bladder, and orbits took longer to contour with MBS. It was also found that the MBS tools could successfully propagate contours from the treatment plan. Without MBS, 45 to 120 minutes were spent manually contouring the GTV on each MVCT dataset. In contrast, the time required to perform the propagation of contours to +20 MVCT datasets was less than 5 minutes.

Conclusion: Model-Based Segmentation is an efficient alternative to manual contouring. It can be especially helpful for IGRT applications. With the MBS tools, it is possible to rapidly contour and measure tumor response to treatment.