AbstractID: 5121 Title: Evaluation of auto-segmentation tools for the target definition for the treatment of lung cancer

Purpose: With the advent of more sophisticated image devices in the treatment room, image guided radiotherapy (IGRT) and adaptive radiotherapy (ART) have become distinct possibilities. IGRT and ART techniques in their various stages have been implemented in clinics. One of the ART techniques using the daily acquired CT images involves re-planning due to the target shape variation during the treatment. Lung cancer volumes of some cases are observed to undergo significant changes where re-planning is a necessity. To be able to define target efficiently can help the treatment flow significantly. This study evaluates various auto or semi-auto contouring tools either commercially available or under development for their accuracy and ease of use.

Method and Materials: Three methods are included in the study. Two are commercially available (Focal,CMS): auto threshold (of gray level); and auto Segmentation where gray level, the edges and prior shape information are used. The third method is the ITK-SNAP program that uses a powerful level set(snake) segmentation algorithm to segment anatomical structures in three dimensions.

Results: Ten image sets from helical and cone beam CTs are included in the study. The acceptable contours are defined as those with distance to agreement to those drawn by radiation oncologists less than 3 mm. For target volume surrounded by normal lung, the percentage slices of contours that do not need manual adjustment are 41-62%, 23-39%, 62-78% for threshold, auto segmentation and SNAP respectively. For cone beam CT, these numbers are approximately 10% lower. SNAP can also be used for target volume with no clear boundary, although the percentage success is much lower.

Conclusion: More sophisticated auto-segmentation tools need to be available routinely with more flexibility for users to adjust algorithm parameters in order for them to be useful for routine clinical ART purposes.

Conflict of Interest (only if applicable): None