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Abstract

Standardized Contouring of Proximal Bronchial Tree during Lung SBRT

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Abstract

Objectives: SBRT for early stage NSCLC requires extensive contouring of normal structures. There are published guidelines for contouring. However, a significant intra-and inter-variability in contour delineation exists between treating physicians. Development of a standard contouring method for normal structures would improve consistency in dose reporting. In this work we present an evaluation of a novel open-source chest imaging platform (CIP) for delineation of proximal bronchial tree for Lung SBRT.

Methods: All the images obtained as a part of a national Lung SBRT Study at our institution was utilized. The average CT was used for dose calculation and normal tissue delineation. All contours were studied by an expert peer review process. The average CT was visualized using an open-source platform called 3D Slicer. Using a modified airway inspector algorithm, multiple fiducials (2-3) were placed along the air way (at the inferior and superior extent of the proximal tree), and a contour was auto-generated. The resulting contouring was expanded by 3mm to include the airway wall, and smoothed to remove the spiculation on the contour surface. The auto-generated contours were compared to the original manual contours using standard metrics (Dice Similarity, and Hausdorff distance metric).

Results: Auto-generation of the proximal tree contour took less than a minute to perform, after fiducials were manually placed along the airway. An initial comparison of the post-processed auto-generated contour to the manually delineated one revealed similar volumes (average Dice Similarity Coefficient > 0.8, and average Hausdorff Distance < 3mm).

Conclusions: The technique presented here, shows promise as a tool to aid in the design of standardized normal tissue contouring for routine treatment planning.

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