

AbstractID: 11566 Title: A Retrospective Study Evaluating Various Lung Volumes for Use in Radiotherapy Planning of Lung Cancer: Averaged, Expiration, Free Breathing, Inspiration, MIP or Mean Position

Purpose: Dose volume histogram (DVH) parameters of the lung have been reported to be risk factors for radiation pneumonitis. We evaluated different lung volumes using 4DCTs to determine the optimal data sets for lung contouring and to develop a model to convert the DVH parameters between datasets.

Methods and Materials: A retrospective analysis was performed on 10 patients' 4DCT and fast helical free breathing scans. The lungs were automatically contoured on the averaged (AVG_CT), end expiration (EE), end inspiration (EI), free breathing (FB), maximum intensity projection (MIP) and mean position (MP) images. Volumes and centers of mass were compared to those obtained with deformable image registration (AVG_def). AVG_def contours were created by averaging displacement vectors for each image pixel over the 4DCT, representing the averaged contour due to organ motion. To compare DVH parameters (V20, V12.5 and MLD), patients' plans were standardized as hypo-fractionated. A population-based model was tested for converting DVH parameters between datasets.

Results: A paired Student's t-test showed significant variation between AVG_def and other volumes. MP image volume was most statistically similar (0.479%). Centers of mass between image volumes showed little relevant variation. Marked volume effect was observed for dose-volume relationships. MP image DVH parameters were most statistically similar to those of the AVG_def (< 1%). An average percentage change of 3.95% was observed between V20 of EI and AVG_def volumes. A model to convert from one DVH parameter to another was effective when comparing different volumes.

Conclusion: There was a marked variation between the volumes and DVH parameters obtained from EI, MIP and EE images and those of AVG_def. The most statistically similar image, in terms of volume and DVH analysis, was the MP. A model can be used, with caution, in converting the DVH parameters from one image to another.

Conflict of Interest: None.