

AbstractID: 4692 Title: Implementation and Evaluation of Automatic Contour Propagation in 4DCT of Lung

Purpose: To implement and evaluate automatic contour propagation in 4DCT of lung

Method and Material: 4DCT of lung cancer patients was acquired and GTV contoured in each of 10 respiratory phases. Demons-based deformable registration was performed to find the volumetric mapping from the exhale reference phase to each other phase. Contours were propagated using volumetric methods. Usually, the GTV is contoured on one reference phase (end-exhale for example) of the 4D-CT which is copied and edited on the others phases. This is a very important, but time consuming task that is inconvenient for every day clinical use. Using a deformation field computed between 4D-CT phases could accelerate the contouring process. The reference GTV contour would be deformed from one phase to another and the clinician would have to do only small adjustments. The contouring time spent would be significantly reduced. The question is if deformable registration could be used as a semi-automatic contouring tool. We compared differences between GTV reported with and without deformation from one 4D-CT phases to another. Three metrics were used to assess the quality of the contour propagation: the volume intersection and two volume differences.

Results: Volume intersections between manual and automatic contouring were generally between about 85 and 90 per cent, while volume differences were generally between 5 and 15 per cent. Differences between manual and automatic results were correlated with the variability of manual GTV volumes delineation between phases.

Conclusions: Deformable registration is a viable option for contour propagation, and may be used to assist the clinician in defining the GTV for large 4DCT data sets.

Conflict of Interest: This research was supported by Elekta Oncology Systems and Varian Medical Systems