AbstractID: 12948 Title: A Graphical Tool for Assessing Margin Definition from Daily Deformations

Purpose: Estimating the proper margins for the planned target volume (PTV) could be a challenging task in cases where the organ undergoes significant changes during the course of radiotherapy treatment. This is practically the case in stomach lymphoma, where the stomach can change significantly from day to day. A common practice is to add a constant 1-2cm margin isotropically around the tumor volume based on planning CT scan. This might lead to some portions of stomach being under dosed or surrounding normal structures over-dosed. The purpose of this work is to develop a tool that utilizes information from daily images to aid localization of these deformations and guide estimations of proper margins. **Method and Materials:** In this work, the stomach volume for each treatment fraction was delineated manually over the course of 6 weeks of fractionated treatment using daily Tomotherapy Mega voltage CT (MVCT) images from three patients. A software tool was developed to aid tracking variations in shape during therapy and record estimates of the probability by which an organ spends at any particular place. Accordingly, plots of estimated tumor coverage and excess irradiated normal tissue volumes as a function of margin could be generated. **Results:** Estimated volume were created for these cases were 429.2±67.7, 383.0±66.6, and 294.1±27.7 cc. Plots of tumor coverage and excess irradiated volume were created for each ace. It was observed that with a margin of 1.5 cm over the original stomach, the entire union volume was covered. This margin resulted in about 500-800 cc of excess volume being irradiated for the three test cases. **Conclusions:** This work presented a new tool for visualization and quantification of daily deformations for isotropic and anisotropic margin definition guidance.