

AbstractID: 11631 Title: Comparison of Manual plus MI Registration to SWMI Registration Using MVCT for Head-and-Neck Cancer Patients

Purpose:

To measure the value of manual adjustment after MI (Mutual Information) image registration technique for head-and-neck cancer cases, we compared the result to those performed with Spatially Weighted Mutual Information (SWMI) measure.

Methods and Materials:

We chose 6 head-and-neck cancer patients treated with Helical Tomotherapy machine and retrieved 199 daily MVCT image sets. Each patient had three CTVs and total superior-inferior extent of CTVs was greater than 15cm. The daily images were manually aligned after automated registration with the MI software provided by Tomotherapy. Then, it was compared to the registration result of in-house image registration software using SWMI with a Gaussian-shaped weight. Gaussian-shaped weight function was set to be centered in the primary CTV. And the variance of the Gaussian for each direction was set to cover CTVs and the critical organs. Each patient had the same variance of the Gaussian setup through a whole treatment course. Our in-house image registration software was implemented to receive DICOM and DICOM-RT from various planning systems. Since the Tomotherapy machine without a robotic couch cannot deliver yaw and pitch corrections, only roll was considered among the rotational transformation.

Results and Discussion:

Manual registration is not accurate enough if there is organ deformation. Fifty nine treatments among 199 treatments for 6 head-and-neck cancer patients showed the difference from our automated SWMI registration by more than 3mm. Our PTVs were created from CTVs by adding a 3mm margin. The minimal dose of CTV was reduced by 52% in maximum. SWMI incorporated with the Gaussian-shaped weight shows better target coverage for all 199 cases. The main advantage of the automated SWMI is not relying on the user's expertise of visual image matching.

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