NI-50. SEGMENTATION OF METASTATIC LESIONS IN LARGE-SCALE REGISTRIES: COMPARISON OF EXPERT MANUAL SEGMENTATION VS. SEMI-AUTOMATED METHODS

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To better understand the outcomes after stereotactic radiosurgery (SRS) for brain metastases, we have created a registry that archives MRI studies alongside clinical data in this population. To consider outcomes quantitatively, each metastatic lesion must be segmented to define a 3D volume. In large populations, lesion segmentation is time consuming (and expensive when this requires an experienced Radiation Oncologist or Neurosurgeon) to manually segment each lesion slice by slice. We sought to determine whether semi-automated segmentation using the Growth-Cut toolbox in 3DSlicer (Egger et al. 2013) provides contours equivalent to those created by physicians using manual segmentation methods. A subset of 40 lesions that had undergone manual segmentation for SRS planning were selected to compare with semi-automated segmentation methods. Using the 3DSlicer Growth-Cut toolbox, a novice member of the team partially outlined the lesion tumor and non-tumor tissues. The toolbox then propagated lesion boundaries and created a complete 3D volume. Dice Coefficient (DC), Hausdorff Distance (HD), and Modified Hausdorff Distance (MHD), were used to establish volume similarity between Growth Cut toolbox output and manual segmentation on metastatic lesions. Additionally, lesion volume, diffusion (ADC), and perfusion (rCBV) were analyzed to determine if segmentation discrepancies resulted in differences in imaging parameter estimates. There was strong similarity of the 3D volumes according to the DC (\( \mu = 0.77 \)), HD (\( \mu = 3.89 \)), and MHD (\( \mu = 0.85 \)). Imaging parameters between segmentation methods, agreed well for both diffusion (ADC \( R^2 = 0.94 \)), and perfusion (rCBV \( R^2 = 0.986 \)). Using 3DSlicer did not substantially decrease tracing time; however, it produced similar results by a novice to those of experts. This study supports the use of the Growth Cut toolbox when expert manual segmentation does not exist. This finding is particularly useful for large scale studies that would otherwise require significant clinician involvement for ROI generation.