Results: Thirty breast boost patients, 10 in each cavity visualization category, were included for analysis. A total of 150 CBCT images were analyzed by each observer. Registration to the ipsilateral breast/chest wall and lung interface as the target surrogate, and direct registration to the cavity resulted in a median RMS error of 0.1784 between observers. The Krippendorff’s alpha for direct cavity registration in C1, C2 and C3 patients in the left-right (LR), cranio-caudal (CC), and anterior-posterior (AP) directions were: 0.8, 0.84, 0.9; 0.81, 0.72, 0.55; and 0.78, 0.6, 0.52, respectively. The Krippendorff’s alpha for direct cavity registration in C1, C2 and C3 patients in the LR, CC, and AP directions were: 0.72, 0.64, 0.8; 0.86, 0.75; and 0.75, respectively. The ranksum difference between registration methods was \( p = 0.1538 \), with variation reported between cavity visualization categories (C1, \( p = 0.8903 \), C2, \( p = 0.0257 \), C3, \( p = 0.9450 \)).

Conclusions: Image registration to the ipsilateral breast/chest wall and lung interface for breast boost RT was more consistent than direct registration to the cavity, resulting in lower inter-observer variability for breast boost IGRT. Varying visibility of the post-operative tumour bed on CBCT images limits direct registration to the breast cavity.

VOLUMETRIC WHOLE BRAIN IRRADIATION EVALUATION
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Purpose: Whole brain radiotherapy (WBRT) has been effectively used for palliative treatment of brain metastases, and for prophylactic treatment in cancers shown to commonly metastasize to the brain. A retrospective investigation was completed to compare the traditional whole brain osseous-based field placement technique to a volumetric based technique with respect to clinical target volume (CTV) coverage, planning target volume (PTV) coverage, and the optic lens Dmax.

Methods and Materials: This study included 47 patients treated with field-based WBRT in an aqua plastic mask at the Simcoe Muskoka Regional Cancer Program between July 2012 and July 2013. On the 3D CT image, the CTV (brain) was contoured with a 5 mm penumbra margin and 5 mm shielding around the optic lens. The plan was then normalized using V95% ≤ 99% to PTV with a Dmax point dose < 115%. This contour-based plan was then compared to the original field-based plan. Descriptive statistics was used for analysis.

Results: The mean values for the field based plans and the contour based plans are as follows. CTV V95%: 99.35%, SD = 0.47% compared to 99.6%, SD = 0.08%; PTV V95%: 98.62%, SD = 0.82% compared to 99.73%, SD = 0.21%, optic lens Dmax: 3.66 GY, SD = 3.09 GY compared to 3.68 GY, SD = 0.78 GY.

Conclusions: This study demonstrates an increase in CTV V95% of 0.41% and PTV V95% of 1.11% with the volumetric based WBRT planning technique compared to the traditional osseous field-based technique. A contour-based WBRT approach ensures standardization in generating a plan and eliminates the inter-operator variability amongst the radiation oncologists, while maintaining comparable optic lens Dmax dose.