

# AbstractID: 9280 Title: Registration of On-Board Digital Tomosynthesis and planning CT for Partial Breast Irradiation patient setup verification with surgical clips

## **Purpose:**

This study examines the accuracy of On-Board Digital Tomosynthesis (OB-DTS) imaging by the localization of individual surgical clips and registration to planning CT instead of a reference-DTS (RDTS). Using planning CT instead of a RDTS for registration might decrease the uncertainty of the registration resulting from the added edge blurring of DTS and simplify the setup verification process.

## **Method and Materials:**

A solid water breast phantom containing four surgical clips was imaged with CT and OB-DTS modalities. The OB-DTS was acquired for a 40° lateral angle (kV source: 250°-290°). An open-source GPU based FDK filtered backprojection algorithm was used for reconstruction of DTS image sets. The centroids of all the clips were localized in the DTS image sets and locations were compared with the clip locations in CT image sets. Using a filtered cross-correlation algorithm, the OB-DTS was registered with the CT and RDTS image sets and the registration accuracy of OB-DTS was calculated.

## **Results:**

Clip centroids were found to be within 1 mm in DTS and CT image sets. The OB-DTS was registered with the CT within 1 mm ± 2 mm along the x-axis (direction of projection) and less than 1 mm ± 1 mm along the two orthogonal (y and z) axes with a maximum translation of ±1.4 cm in the orthogonal axes and ±4.7 cm along the x-axis. The OB-DTS was registered with the RDTS within 4 mm ± 11.5 mm along the x-axis, 1.4 mm ± 2.8 mm along the y-axis and 0.5 mm ± 0.7 mm along the z-axis, with a maximum translation of ±1.4 cm in the orthogonal axes and ±2.8 cm along the axis of propagation.

## **Conclusion:**

OB-DTS can be registered to CT with equal or better accuracy than when registered with RDTS and with greater translations along the propagation axis.