AbstractID: 8692 Title: Conversion of on-board Digital TomoSynthesis (DTS) to HU values

Purpose: To investigate a method to convert the pixel values of DTS images to HU values with reference HU values from CT images.

Methods and Materials: This study included CT and DTS images of two phantoms (Catphan and a chest phantom) and three patients (prostate, head-and-neck, and lung). Cone-beam radiograph projections were acquired to reconstruct the limited angle DTS images, which were expressed in arbitral pixel values after a Feldkamp-type technique. Regions of interest (ROIs) in the CT images were selected for low- and high-density areas, and HU values were measured in the ROIs. DTS pixel values were measured for the corresponding ROIs in the DTS images. A linear regression was performed using the DTS pixel values (D) as the dependent variable in terms of the HU (H) for each phantom and patient independently. The linear regression was applied to the DTS images in order to convert the DTS pixel values into HU values. DTS images expressed in HU values were compared to CT images.

Results: The method proposed in this study is simple and feasible to convert DTS images in HU values. However, the DTS image slices certainly contain different image contents than corresponding CT image slices. The out-of-plane objects smear into the plane of interested in DTS images and affect HU values of in-plane objects. Thus, HU values do not represent correct tissue materials due to underlying/overlaying tissues.

Conclusions: This method could be used to convert DTS images in HU values and useful to understand DTS images for positioning purpose. However, DTS images in HU values should not be used for planning purposes due to smearing effect of underlying/overlaying objects.