AbstractID: 3799 Title: Scatter Correction For Digital Tomosynthesis

Purpose: To investigate post acquisition scatter correction for digital tomosynthesis breast imaging.

Method and Materials: Images of a composite phantom that was fabricated for evaluating digital breast tomosynthesis and used in a previous contrast-detail (CD) study [Suryanarayanan et al., Acad Radiol 7: 1085-1097, 2000] were used to test the scatter correction method. These images were acquired using a prototype full-field digital mammography (FFDM) system (GE Medical Systems, Milwaukee, WI) without an anti-scatter grid. The phantom comprised of a centrally placed CD insert (MedOptics, Tucson, AZ), blocks of cluttered paraffin and polymethyl methacrylate (PMMA), and beeswax surrounding it to provide a total phantom thickness of 54 mm. A set of 7 projection images of the phantom were acquired over an angular range of $\pm$ 18^{o} at 6^{0} intervals at 26 kVp, MoMo, and 32 mAs/view. The projection data sets were corrected for scatter using the scatter correction technique described by Trotter et al. [Proc. SPIE, vol. 4682: 469-478, 2002] and processed with an adaptive noise filter. The projection images were then reconstructed using back-projection and iterative restoration methods using Tuned Aperture Computed Tomography (TACT) [Webber et al., J. Digit. Imaging, 13: 90-97, 2000] software (developed by R.L. Webber, Wake Forest University, NC). The contrast-to-noise (CNR) ratio, signal-to-noise ratio (SNR), and % contrast were computed for one of the targets (2.32 mm diameter and 0.24 mm depth).

Results: The uncorrected projection data set reconstructed with back-projection resulted in CNR = 3.0, SNR = 30.4, and % contrast = 11.1, while the scatter corrected and processed projection images yielded CNR = 10.2, SNR =60.7, and %contrast = 20.2

Conclusion: The results of this study indicate improved SNR, CNR, and % contrast after scatter correction in tomosynthesis. We are currently implementing and evaluating other scatter correction and reconstruction methods for digital tomosynthesis.