# AbstractID: 11384 Title: X-Ray Scatter Reduction in Tomosynthesis Imaging of the Breast

**Purpose:** To develop and test a novel x-ray scatter reduction algorithm for breast tomosynthesis.

**Method and Materials:** The x-ray scatter signal normalized by the primary signal in breast tomosynthesis projections has been shown to be a weak function of breast glandularity, size and x-ray energy. Based on this, we propose a software-based, post-acquisition method that uses pre-computed Monte Carlo estimates of the scatter field in projections of homogeneous, standard-shaped breasts and an automated image registration algorithm (based on thin plate splines interpolation) to estimate the scatter field in clinically acquired tomosynthesis projections. The estimated scatter field can then be subtracted from the acquired projections and the results reconstructed using any tomosynthesis reconstruction algorithm. Tests of the registration algorithm, of the similarity of the estimated field with the true scatter field, and of the applicability of the scatter field from homogeneous breast volumes to projections of breasts with realistic texture were performed. The impact of the scatter correction method on the visibility of lesions in simulated tomosynthesis images was determined.

**Results:** The registration algorithm was found to be successful at registering the “pre-estimated” images and the “acquired” images. The estimated scatter fields were found to be good approximations of the true scatter field (normalized mean absolute error = 9.8%). Objective metrics on the visibility of the simulated lesions after scatter correction were found to mostly increase considerably, although some reduction in signal difference-to-noise ratio (SDNR) was found (mean signal difference increase = 54%, mean contrast increase = 34%, mean SDNR decrease = 9%).

**Conclusion:** These results point to the feasibility of a scatter reduction method for breast tomosynthesis, which does not involve any increase in number of projections, dose and acquisition and reconstruction time. Further testing with clinical images is being performed.