AbstractID: 3879 Title: A scanning sampled measurement (SSM) technique for scatter measurement and correction in cone beam breast CT

Purpose: To implement and investigate a scanning sampled measurement (SSM) technique used to obtain sampled scatter measurement for scatter correction in cone beam breast CT.

Method: Breast phantom or specimen is mounted on the rotating stage in a stationary gantry experimental cone beam CT system. A slightly tilted 2-D array of 1.2-mm diameter lead beads, with the beads 1 cm apart from each other, was placed between the object and x-ray source. A series of projection images were acquired as the phantom is rotated (1 degree per projection view) and the lead beads array shifted by 1.2-mm from one projection view to the next. Image signals in the lead bead shadow were used to obtain sampled scatter measurements which are then interpolated to form an estimated scatter distribution. The image data in the lead bead shadows are restored by interpolating image data from the two adjacent projection views to form complete (lead bead free) projection images. The estimated scatter distribution is then subtracted from the corresponding restored projection image to obtain the scatter corrected projection images.

Results: Sampled scatter measurements were successfully made in each projection image and the accuracy of scatter measurements was verified with a larger beam blocker placed between the lead beads and x-ray source. The SPRs in the projection images of a breast phantom are found to range from 0.1 to 0.5. Using scatter distribution interpolated from scanning sampled measurements and restored projection image data, scatter correction was successfully performed on all projection images. The resulting scatter corrected projection image data resulted in more accurate reconstruction of the linear attenuation coefficients and reduced the cupping effects.

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