AbstractID: 13475 Title: Calcification visibility in cone beam breast CT: effects of under-sampling and limited angle scans

Purpose:
To investigate the effects of under-sampled and limited angle-sampled projections on microcalcification visibility in cone beam breast CT.

Materials and Methods:
Different sizes of calcium carbonate grains were embedded in a gelatin cylinder to simulate microcalcifications in dense breasts. The phantom was then imaged at 80 kVp with a bench-top CBCT system, which employs a-Si/CsI based flat panel detector with a pixel size of 194 microns operated in the non-binning mode. For scans with under-sampling technique, projections corresponding to 30, 50, 60, 75, 100, and 150 equally spaced views were acquired over 360 degrees with adjusted mAs per image to keep the total mAs the same. The resulting CBCT images were compared to those obtained with 300 projections, which have been considered adequate for breast imaging. For scans with limited angle sampling technique, an angular range of 60, 72, 90, and 120 degrees were chosen to acquire projections with an increased mAs per image while a reduced mAs per image was used to acquire projections for views outside this angular range to generate a complete projection image set with the same total mAs. Feldkamp algorithm with a ramp filter was used for image reconstruction. The reconstructed images were sequentially displayed on a review workstation and reviewed by a reader at two different times. The reader was asked to indicate the visible microcalcifications, of which the ratios were calculated over all readings.

Result:
The visibility ratio was found to increase with the size range of the calcifications with both scanning techniques. It was found that the number of projections had no significant effect on the calcification visibility. However, the visibility ratio increased with the angular range for high exposure projections.

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