AbstractID: 4683 Title: Visualization of micro-calcifications in a prototype breast CT scanner

Purpose: To evaluate the ability of a prototype breast CT scanner to detect micro-calcifications, and to understand the influence that tube potential and radiation dose have on this.

Method and Materials: Commercially available micro-calcifications (μCa) of various sizes (200 to 425 μm) were embedded inside a 12.7 mm polyethylene tube filled with gelatin (to simulate glandular tissue). The gelatin tube was then placed inside a 14 cm diameter adipose equivalent cylindrical phantom and scanned using various tube potentials (60 to 100 kVp) and tube currents. CT images were reconstructed with both Ramp and Shepp-Logan filters, with a reconstructed voxel size of about 320×320×200 μm. The μCa were then evaluated quantitatively using signal-to-noise ratio (SNR) metric, and subjective appraisals were made as well. A dedicated breast CT visualization workstation was used for subjective evaluation.

Results: Results for 250-280 mm μCa imaged at 80 kVp shown that the μCa are clearly visible when the rod is scanned by itself, but extremely difficult to locate when placed inside the 14 cm phantom. The visualization of the μCa improved overall for larger μCa, and overall visualization improves as the radiation levels are increased, as expected.

Conclusion: These initial results suggested that the pixel size may not be a critical factor when determining the ability of the prototype system to visual micro-calcifications, as the current objects scanned are only about 48% of the reconstructed voxel size. Maximum intensity projection (MIP) display for thick-slice imaging was found to be most useful for subjective viewing of micro-calcification clusters.