AbstractID: 11853 Title: Measuring breast density with dual energy mammography: a phantom study

Purpose: To investigate the feasibility of measuring breast density in phantoms with dual energy mammography.

Method and Materials: Glandular and adipose equivalent phantoms of uniform thickness were used for dual energy basis decomposition calibration. The dual energy mammography system used a tungsten anode x-ray tube with a 50 µm rhodium beam filter for low energy images and a 300 µm copper beam filter for high energy images. Three different phantom studies were used to evaluate the technique. The first study consisted of phantoms with thicknesses of 25-85 mm in 5 mm steps with a mean density of 28%. The second study consisted of step phantoms designed to more closely mimic the shape of a female breast with maximal thicknesses of 30-70 mm at a fixed density of 50%. The third study consisted of 40 mm thick phantoms of different sizes (62.5, 125, 250 cm^2) at a fixed density of 50% to assess the effect of breast size on density measurement.

Results: The RMS errors in breast density measurements were 0.4% for the uniform phantoms, 3.3% for the step phantoms, and 4.7% for the phantoms of different sizes.

Conclusion: The results of phantom studies indicate that dual energy mammography can be used to measure breast density with an RMS error of less than 5%. Dual energy mammography can potentially be implemented with minimal changes to the standard mammography exam.