AbstractID: 7230 Title: Coherent scatter imaging for mammography

Purpose: To develop a new screening tool for the detection of breast cancer by the wide-field collection of x-ray coherent scatter from the human breast, to potentially improve the diagnosis of breast cancer.

Method and Materials: Coherent scatter analysis is normally performed using a highly collimated narrow beam. This complicates adding coherent scatter analysis to screening mammography. A technique has been developed which allows broad field discrimination of coherent scatter using standard high ratio Bucky grids. Using the Kα line from a standard Mo tube, the coherent scattering angle (2θ) for normal breast tissue and cancer tissue would be 9 and 13 degrees, respectively. For the first step of work, pork and beef fat (2θ = 9 degrees) were used as a phantom for normal human breast tissue, while graphite (2θ = 12.16 degrees) was used as a phantom for breast cancer tissue. The coherent scatter images were recorded with CR plates. Tests were carried out with a 10:1 grid for a series of tilt angles and sample-to-grid distances.

Results: The intensity distribution showed that the coherent scatter from the graphite cancer phantom where observable above the fat background at certain grid tilt angles and sample-to-grid distances. Theoretical calculations for the intensity distributions were compared to measurements.

Conclusion: This work indicates promising potential for including coherent scatter analysis in screening mammography. The patient is not exposed to any additional x-ray radiation. Coherent scatter is normally present but not collected. This technology provides an entirely new basis for diagnosis, which may improve the sensitivity and specificity of mammography.