AbstractID: 8322 Title: Bismuth Shields vs. mAs Reduction for Decreased Radiation Dose to Breasts in CT Examinations

Purpose: Bismuth breast shields have been promoted as a means for selectively reducing the radiation dose to the breast by about 30% in CT studies, while maintaining image quality. A study was performed to compare image noise and CT number accuracy with the shields to an alternative dose reduction method of employing 30% less mAs.

Method and Materials: A humanoid thorax phantom with simulated breasts was imaged on a GE VCT scanner using: 1) a standard lung cancer screening protocol, 2) the same protocol but with a commercial bismuth breast shield, and 3) 30% less mAs without the shield. Regions-of-interest (ROIs) were placed in the images and the mean CT numbers and standard deviations of the CT numbers were compared.

Results: Relative to the mean CT numbers in images for the standard technique, use of the breast shield resulted in increases of about 9HU, 19HU, 6HU, and 57HU in ROIs in the heart, anterior left lung, posterior left lung, and right breast, respectively. Corresponding changes for 30% mAs reduction were 1HU, -3HU, -2HU, and 0HU. Ratios of the standard deviations of the CT numbers in the dose reduced images to those in the images using the standard technique for the above ROIs were 1.4, 1.2, 0.9, and 1.8 for the breast shield and 1.3, 1.0, 1.0, and 1.2 for 30% mAs reduction.

Conclusion: mAs-reduction is preferred over bismuth breast shields because: 1) mAs-reduction has much less effect on mean CT numbers, which is important for quantitative studies such as lung density and coronary calcification assessment, 2) noise in the mA-reduced images is less, and 3) the images do not suffer from streak artifacts arising from the shields. Additional comparisons in images of human subjects undergoing IRB-approved coronary calcification studies with the breast shield vs. 30% reduced mAs will be presented.