AbstractID: 1751 Title: How does the size of mass lesion affect detection performance in chest radiography?

Purpose: To investigate how lesion size affects the detection of simulated mass lesions performance in chest radiography.

Method: Images of a lesion were obtained by subtracting radiographs obtained with, and without, a spherical mass. The lesion was added to the center of 10 cm x 10 cm regions of digital chest radiograph, and used in 4 Alternate Forced Choice (4-AFC) experiments. We determined the lesion contrast required to achieve a 92% correct detection rate ($I_{92\%}$). The mass size was digitally manipulated to range from 0.8 to 12 mm, and was added to a range of anatomical backgrounds. Five experiments were performed using differing anatomical background regions encountered in chest radiography. In each of these experiments, the observer obtained $I_{92\%}$ from five randomized repeat measurements obtained at each of five lesion sizes. The results permit the generation of the curve of the threshold contrast as a function of lesion size (detail).

Results: In each of the five experiments performed with different anatomical chest regions, the slope of the contrast detail curve was *always* found to be positive, with slopes ranging from 0.06 to 0.24. The slope of the average contrast detail curve for all five experiments was 0.16, with a high coefficient of determination (r^2) value of 0.90. These positive slopes are in marked contrast to conventional contrast-detail curves in uniform backgrounds where the slope is generally -0.5.

Conclusions: We have observed *positive* slopes for contrast-detail curves in chest radiography, which indicates that larger lesions require more contrast for visualization.