

AbstractID: 3491 Title: Image contrast and lesion detection in chest radiography

Purpose: To assess the affects of varying image display contrast on lesion detection in chest radiography.

Method and Materials: We investigated the detection of simulated mass lesions in three anatomical regions of chest radiographs (apex, hilum, and sub-diaphragm). Three sizes of simulated lesion were investigated (2.5, 5.5 and 10 mm), which were randomly added to each selected anatomical region of adult radiographs with no known pathology. Detection performance was the lesion intensity ($I_{92\%}$) that produced a detection accuracy of 92% in 4 Alternate Forced Choice (4-AFC) experiments. We investigated how detection performance ($I_{92\%}$) varied as the display window width was varied by a factor of two (500 to 1000).

Results: In the apex and hilum, reducing display contrast by a factor of two reduced detection performance by approximately 20%, and this was true for all lesion sizes investigated. In the sub-diaphragm region, the results obtained depended on the lesion being detected. For the large 10 mm lesion, reducing the display contrast by a factor of two also resulted in a drop in detection performance of ~20%, whereas for the smallest (2.5 mm) lesion, display contrast had no significant effect on detection performance (<5%).

Conclusion: Changing the display contrast in chest radiography only has a modest effect on lesion detection. In the hilum and apex, the effect of image display on detection performance was the same for all lesion sizes. In the sub-diaphragm region, however, detection of small lesions was independent of image display contrast.