

AbstractID: 1778 Title: Effect of Wavelet Data Compression on Digital Mammograms: An Observer Performance Study

The effect of a wavelet-based compression method (JPEG 2000) on the detection of masses and clustered microcalcifications was evaluated in data compressed digital mammograms using a receiver operating characteristics (ROC) approach. Masses of sizes 3, 6, and 8 mm were analytically simulated and added to the clinical mammographic backgrounds. In addition, microcalcifications were extracted from a clinical mammogram and 'hybridized' with simulated microcalcifications and used in this study. Image compression conditions of 1:1, 15:1, and 30:1 were investigated. A set of 100 randomly selected backgrounds was used for each mass size, microcalcification cluster, and compression condition. Five observers participated in the experiments with the masses and four participated in the experiments involving the microcalcification cluster. Statistical analysis indicated no significant difference in Az scores for the masses under the compression conditions that were investigated. Significant difference in Az was obtained between 1:1 and 30:1 ($p < 0.0005$) and 15:1 and 30:1 ($p < 0.004$) compressed microcalcification images. A marginally insignificant difference in Az was obtained between the 1:1 and 15:1 compressed microcalcification data ($p < 0.053$). A general decrease in Az with increasing mass size was observed for all compression conditions investigated in this study. The results of this study suggests that JPEG 2000 image compression may not significantly impact the detection of subtle masses in digital mammographic backgrounds but it may impact the detection of microcalcifications beyond 15:1 compression under the conditions investigated in this study. We are exploring numerical observer models to compare model performance with experimental results.