

Abstract ID: 9194 Title: Preliminary robustness study of breast ultrasound computer-aided diagnosis system across different patient populations

Purpose: To determine the robustness of a breast ultrasound computer-aided diagnosis system (CADx) when it is used across different patient populations. **Method and Materials:** A sonographic database consisting of 433 lesions (127 malignant, 306 benign) from patients in the United States was used in the training of our breast ultrasound CADx system. A second sonographic database consisting of 456 lesions (145 malignant, 311 benign) was obtained from a separate patient population in Asia and used to test the trained classifier. Four sonographic features were extracted for each lesion (shape, margin sharpness, posterior acoustic behavior, and texture). These features were used to train a Bayesian neural network classifier. Both round-robin and independent testing were used to evaluate the classifier with the two databases. Performance was assessed by calculating the area under the ROC curve (AUC) for each test. **Results:** The AUC of the independent test was 0.80 while the AUCs for the round-robin tests were 0.87 and 0.88 for the Asian and American databases, respectively. The difference between the independent test AUC and the round-robin AUC for the Asian database was statistically significant (p -value=0.02). **Conclusion:** This work indicates that the breast ultrasound CADx system is moderately robust across different patient populations. The statistically significant difference between the AUCs of the Asian database along with the similarity of the round-robin AUCs indicate that while the sonographic features used by the system are useful in both databases, their relative importance differs. This motivates the future exploration of optimal features to improve overall performance of the CADx system. **Conflict of Interest:** Research supported in part by NIH. Some authors receive royalties, research funding, and/or are stockholders in Holologic.