

AbstractID: 2759 Title: Computerized classification of non-biopsied lesions seen on breast ultrasound

Purpose: To investigate the performance of a computerized lesion classification scheme in a realistic testing protocol resembling clinical practice. Computerized classification of breast lesions has generally been tested on lesions of biopsy-proven pathology. In that fashion, the known pathology serves as the truth in the performance evaluation of the computer. In practice, however, many patients are never sent to biopsy because their lesions are deemed to be most likely benign. In order for a computerized classification scheme to be useful and its results believable to the radiologists, it needs to be able to classify those lesions correctly.

Materials and Methods: We investigated the performance of our computerized lesion segmentation and classification scheme. There were 42 images of 11 cancerous lesions, 114 images of 30 biopsy-proven benign lesions (including both cystic and solid lesions), and 243 images of 57 lesions that to date have not been sent to biopsy (including suspected cysts, benign solid lesions, and other benign breast disease).

The computer was trained on the biopsy-proven set and we performed stepwise feature selection to obtain a 4-feature subset that best distinguished malignant from biopsy-proven benign lesions. The computer scheme was tested on the non-biopsy cases, and the ability to distinguish these from the cancers in the training set was assessed.

Results: The area under the ROC curve (A_z value) was 0.96 for the training of the scheme on biopsy-proven pathologies in the distinction between cancers and benign lesions. The A_z value was 0.93 for testing in the distinction between cancers and non-biopsy-proven benign lesions.

Conclusion: Our computerized classification scheme shows promising performance in a testing protocol that is more representative of its intended use in clinical practice than the typical testing on lesions with biopsy-proven pathology only.

COI: grants: USPHS and U.S. Army. Shareholder: R2 Technology (last author)