

AbstractID: 10335 Title: Quantitative Image Analysis for Prognosis in Newly Diagnosed Breast Cancer Patients with Sonographically Normal Appearing Lymph Nodes

Purpose: To investigate whether a computerized quantitative image analysis (QIA) system for diagnostic breast ultrasound can predict whether a breast cancer lesion has metastasized in patients with sonographically normal appearing axillary lymph nodes. **Method and Materials:** This study used a database of sonographic images of breast cancers in patients who presented with a single cancerous lesion and axillary lymph nodes that appeared normal on diagnostic breast ultrasound. The dataset contained images of 50 patients. In 20 patients, the breast cancer had metastasized and in 30 patients the cancer remained localized at the time of surgery. The truth regarding disease grade/pathology was obtained from the final breast surgery and lymphadenectomy. Features including both lesion and parenchymal characteristics were calculated for each lesion. A leave-one-case-out analysis was performed and each iteration stepwise feature selection was combined with the training of an LDA classifier for the task of distinguishing between cancerous lesions that metastasized and ones that remained localized. **Results:** In the leave-one-case-out analysis, the most frequently selected combination consisted of 3 features. In this set, a single feature pertained to the lesion itself and the other 2 features described a difference between the lesion and the surrounding parenchyma. The features were the lesion echogenicity, the difference in echogenicity, and the difference in entropy. The LDA classifier yielded an area under the ROC curve (AUC value) of 0.80 (standard error 0.06) for the task of distinguishing between metastasized breast cancer index lesions and localized breast cancers. **Conclusion:** The QIA scheme obtained promising performance in this preliminary study and shows potential to diagnose metastatic disease. It is important to note that this study was performed using images only of patients for whom pre-surgery imaging studies suggested that the breast cancer had remained localized.

Conflict of Interest: Grants NIH and DOE. Stockholder, grant, royalties Hologic.