

AbstractID: 8548 Title: Classification of Breast Carcinoma Subtypes using Computer-Extracted Morphological and Kinetic Features in DCE-MRI

Classification of Breast Carcinoma Subtypes using Computer-Extracted Morphological and Kinetic Features in DCE-MRI

Purpose: To assess the performance of computer-extracted morphological and kinetic features in differentiating different types of breast lesions, specifically ductal carcinoma in situ (DCIS) and invasive ductal carcinoma (IDC), in DCE-MRI.

Materials and Methods: Breast MR images were obtained with a T1-weighted SPGR sequence using Gd-DTPA on a 1.5T GE MRI scanner. Each case has one precontrast and five postcontrast series at intervals of 68 seconds, and each series contains 60 coronal slices. The database contains 83 benign breast lesions and 98 malignant breast lesions including 24 DCIS, 32 IDC, 18 combined DCIS/IDC, 10 invasive lobular carcinoma (ILC) and 14 non-categorizable lesions. All lesions were verified pathologically. Only pure DCIS and IDC lesions were used. Each lesion was segmented and its characteristic kinetic curve was extracted using the fuzzy c-means method. Twenty-nine features including textural, morphological, kinetic, and variance kinetic features were extracted and stepwise linear discriminant analysis using a Wilks lambda cost function was used for feature selection. The selected features were merged using round-robin Bayesian neural network and the classification performance was evaluated using receiver-operating characteristics (ROC) analysis.

Results: Distinguishing DCIS lesions from IDC lesions using selected features gave an AUC value of 0.95. AUC values of 0.85 and 0.87 were obtained in differentiating between DCIS and benign lesions, and between IDC and benign lesions with merged features, respectively.

Conclusions: Computer-aided diagnosis for breast MRI can be extended from malignant vs. benign classification to distinguishing different subcategories of breast carcinomas, in particular DCIS and IDC.