Computer-aided interpretation of dynamic magnetic resonance imaging reflects histopathology of invasive breast cancer.

OBJECTIVE: To perform a semiautomated software-based comparison of invasive breast carcinoma dynamic enhancement patterns in MR mammography with histological prognostic factors considering whole lesion volumes.

MATERIAL AND METHODS: A total of 128 patients with 145 invasive breast carcinomas underwent dynamic MR mammography. Kinetic features from the invasive breast lesions were obtained using commercially available software to automatically assess volume enhancement characteristics of a manually chosen lesion. Findings were compared with histological factors determining tumour aggressiveness (lymph node status, LN; oestrogen/progesterone receptor (ER/PR) status; HER-2/neu status; tumour grade) by using nonparametric rank tests and binary logistic regression analysis (BLRA).

RESULTS: Volume enhancement characteristics were significantly influenced by LN, ER/PR and HER-2/neu status (P< 0.05). BLRA implied that total lesion and plateau voxel volume were independent predictors of ER/PR and HER-2/neu status. Strongest initial enhancement predicted negative ER/PR, and time to peak of the most suspect curve was inversely correlated with positive LN status. On the other hand, no statistical significance could be observed between histological tumour grading and kinetic features.
CONCLUSION: Histopathological criteria associated with poor prognosis lead to significantly more aggressive dynamic enhancement patterns in MR mammography. In this study, higher lesion volumes as well as higher and earlier initial enhancement were independent covariates predicting higher tumour aggressiveness.