

## Detection of invasive breast cancer: Increased specificity with high-resolution 3.0T MRI angiography

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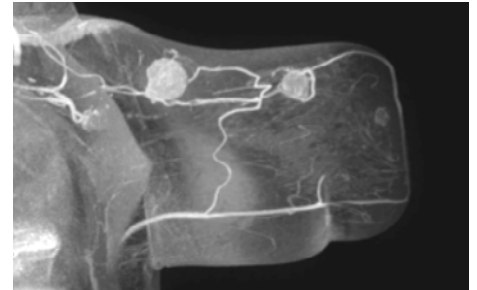
**Introduction:** Magnetic resonance imaging (MRI) of the breast has become a well-established method for detection of invasive breast carcinoma. With a sensitivity approaching 100%, specificity is only moderate with values ranging from 40 to 95%. Clinically valuable advancements in MR imaging of the breast will be based on improvements of overall specificity. Recently published studies have suggested that measurement of the overall breast vascularity could be used as a sign of malignancy. Vascular maps by using the maximum intensity projection (MIP) from fat suppressed contrast-enhanced MR images, can be used for non-invasive assessment of the breast vascularisation as a whole.

**Purpose:** This study was designed to assess the diagnostic accuracy of 3.0T MR imaging of the breast for breast cancer detection according to the morphologic and kinetic criteria formulated in the BI-RADS MRI lexicon, and furthermore, to estimate the effect of breast vascular mapping using 3.0T MR angiography MIPS of the breast on the overall sensitivity and specificity.

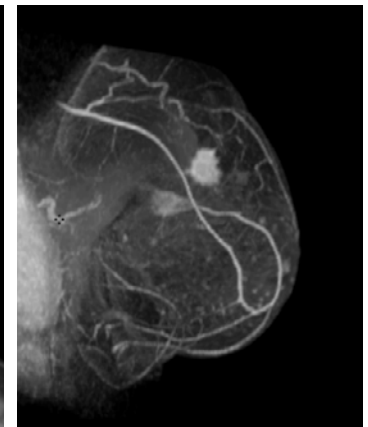
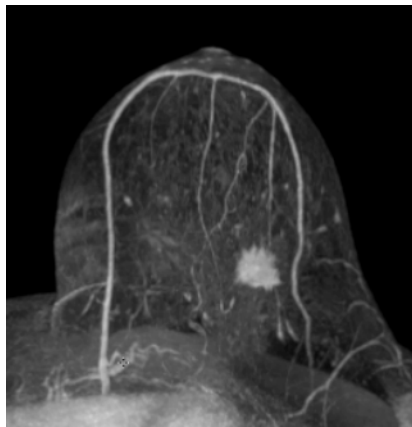
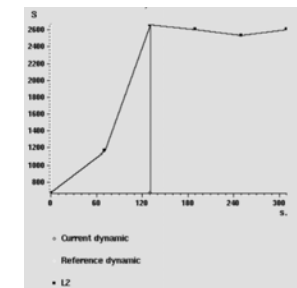
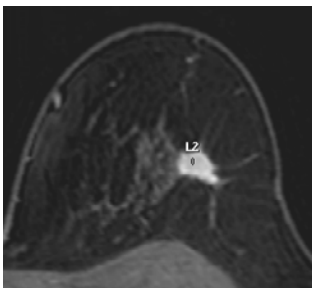
**Materials and Methods:** 54 patients suspected of having breast cancer were prospectively enrolled in the study and underwent 3.0T MRI of the breast. MR images were evaluated according to the MRI-BIRADS lexicon criteria. Lesions size, number of lesions and localization in the breast, were systematically assessed. High resolution contrast-enhanced fat-saturated T1-weighted images were used to obtain maximum intensity projections (MIPS). Breast vascularisation was assessed according to the method of Sardanelli et al. This score is based on the number of vessels seen and the length and conspicuity of the vessels. Ranging from 0, indicating absent or very low breast vascularity, to 3, indicating high breast vascularity. Finally, the diagnostic accuracy of 3.0T MRI of the breast was calculated by comparing MRI to histopathology.

### Results:

Histopathologic analysis of 54 lesions revealed 24 (44%) malignant lesions and 30 (56%) benign lesions. Correlation with the MRI-BIRADS classification revealed all 23 (100%) BIRADS 2 lesions were benign; 6/7 (86%) of the BIRADS 3 lesions were benign and 1/7 (14%) was malignant; 1/6 (17%) of the BIRADS 4 lesions was benign and 5/6 (83%) were malignant; and all 18 (100%) BIRADS 5 lesions were malignant. Based on morphologic and kinetic data MRI had a sensitivity of 100% (24/24) and a specificity of 76% (23/30). The use of the vascular score as an adjunct to MRI upgraded the specificity to 86% without affecting the sensitivity.



**Conclusion:** Combined analysis of lesion morphology and enhancement kinetics together with vascular mapping of the breast ultimately improved the specificity of breast MR imaging to 86%, without affecting sensitivity that was 100%.



3.0T MRI of the breast from a 49-year old female patient with invasive ductal breast cancer, showing a irregular spiculated lesion with a pathological enhancement curve, classified as BI-RADS 5. Maximum intensity projections revealing five vessels and a Sardanelli score of 3.