

Contrast-enhanced 1.5-T MR Imaging of the Breast: Association between Asymmetric Increase of Whole Breast Vascularity and Ipsilateral Cancer on a Series of 384 Studies

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Purpose: We estimated the diagnostic value of the breast vascular map asymmetry at MRI as a marker of ipsilateral breast tumors.

Methods and Material: IRB approval was obtained. From January 2004 to December 2005, 476 breast MR studies were performed with 0.1 mmol/kg of gadoterate meglumine (group I); from January 2007 to March 2009, 392 studies were performed with gadobenate dimeglumine at the same dose (group II). Of a total of 868 studies, 484 were excluded for: previous surgery (n=306); implants (n=53); neoadjuvant chemotherapy (n=41); unilateral exam (n=27); inappropriate menstrual phase (n=18); motion artifacts (n=17); bilateral cancer (n=9); interruption for claustrophobia (n=5); participation to other studies (n=5); lack of follow-up (n=3). For the remaining 384 patients (age 52±13 years) a dynamic study was performed (3D FLASH, TR/TE=11/4.76 ms, matrix 384×384 or 512×512). A radiology resident counted the number of vessels with a ≥2-mm diameter and ≥3-cm length on MIP images: a difference ≥2 in the number of these vessels between the two breasts was considered as asymmetry. Pathologic examination or follow-up served as a reference standard. Chi-square test was used.

Results: Pathology revealed: 120 invasive ductal carcinomas, 26 ductal carcinomas in situ (DCIS), 16 invasive lobular carcinomas, 11 other invasive carcinomas; 17 fibroadenomas, 4 atypical ductal hyperplasia, 18 other benign lesions. Breast vascular map asymmetry showed: overall sensitivity 71% (120/170), specificity 92% (196/214), accuracy 82% (316/384), positive predictive value 87% (120/138), and negative predictive value 80% (196/246); for group I, 76% (62/82), 93% (118/127), 86% (180/209), 87% (62/71), and 86% (118/138), respectively; for group II, 66% (58/88), 90% (78/87), 78% (136/175), 87% (58/67), and 72% (78/108), respectively. Figure 1 shows a true positive case. Overall sensitivity was 76% (109/143) for invasive cancers (42% for 5-9-mm in size, 54% for 10-14 mm, 77% for 15-19 mm, 90% for ≥20 mm), and 39% (10/26) for DCIS (P<0.001). Invasive cancers/DCIS ratio was 73/12 for group I and 74/14 for group II (P=0.742).

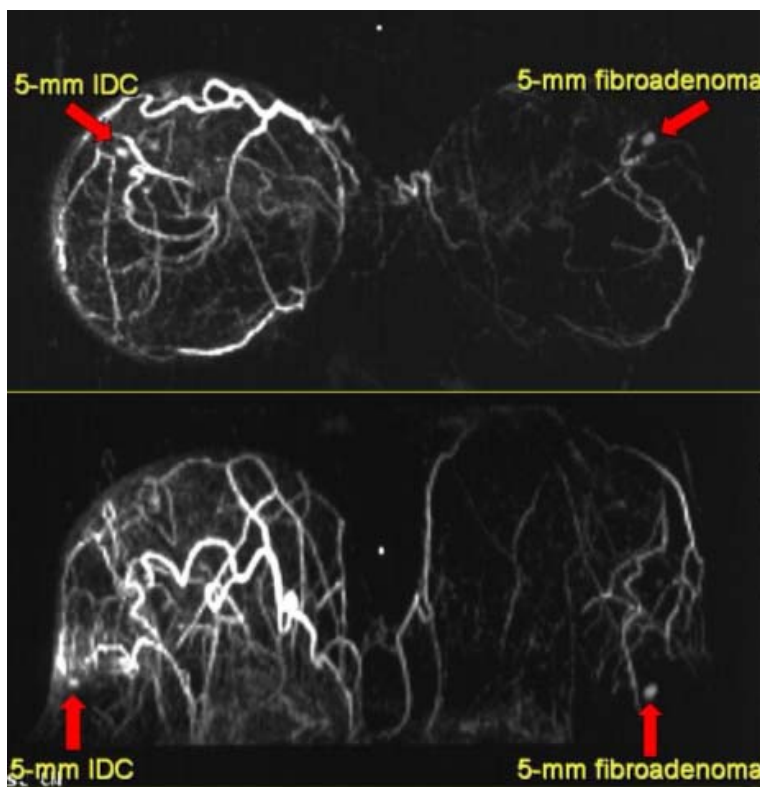


Figure 1. An example of a breast vascular map asymmetry ipsilateral to a 5-mm invasive ductal carcinoma.

Conclusion: Breast vascular map asymmetry was associated with ipsilateral cancer in 76% of invasive tumors, only in 39% of DCIS. For ≥20-mm tumors, a 90% association was found.