

Breast Magnetic Resonance Imaging

Management of an Enhancing Focus

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KEYWORDS

• Breast magnetic resonance imaging • Focus • Kinetics

KEY POINTS

- Managing a small enhancing lesion defined as a focus on breast magnetic resonance (MR) imaging remains a challenge because of lack of clear established guidelines.
- As the spatial resolution of breast MR imaging continues to improve, small lesions measuring 4 to 5 mm can be considered small masses and managed accordingly relying on morphologic characteristics.
- T2 signal intensity and interval change are potential important characteristics of an enhancing focus with predictive value for malignancy and warrant further investigation in a larger study.
- Kinetic analysis is likely not specific for malignancy and should not be used solely to guide management of an enhancing focus.

INTRODUCTION

The American College of Radiology (ACR) Breast Imaging Reporting and Data System (BI-RADS) breast magnetic resonance (MR) imaging lexicon defines a focus as a small isolated dot of enhancement, generally less than 5 mm, that is too small to apply definitive morphologic descriptors or region of interest (ROI) dynamic data.¹ No set criteria for appropriate management are available in the most recent MR imaging BI-RADS lexicon, which promotes the standardization of lesion descriptors and assessment categories based on the results of the ACR BI-RADS Committee.^{2,3}

Published studies regarding an enhancing focus identified on breast MR imaging are reviewed to develop a possible management strategy.

CLINICAL SIGNIFICANCE OF AN ENHANCING FOCUS

Although a focus commonly represents a benign cause, such as an intramammary lymph node, papilloma, small fibroadenoma, or fibrocystic change, malignancy has been reported.⁴⁻¹⁰ Published literature regarding the malignancy rate of an enhancing focus is variable, ranging from 0.6% to 23%.⁴⁻¹⁰

A study by Liberman and colleagues in 2006⁴ retrospectively studied 666 consecutive nonpalpable, mammographically occult lesions detected by MR imaging in 429 women who had diagnostic MR imaging-guided needle localization and surgical biopsy at Memorial Sloan Kettering Cancer Center during a 35-month period. Of the lesions,

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11.1% (74/666) measured 5 mm or less and could have been categorized as enhancing foci. Of these small lesions, 9.5% (7/74) yielded malignancy on subsequent MR imaging–guided biopsy (pathology of the 7 malignant lesions: 5 ductal carcinoma in situ [DCIS] and 2 invasive ductal carcinoma [IDC]). Excluding the 5-mm lesions, the malignancy rate of lesions measuring 4 mm or less was 2.7% (1/37, pathology: DCIS).

Weinstein and colleagues in 2010⁵ published an ACR Imaging Network–conducted, prospective multi-institutional MR imaging screening trial of the contralateral breast in women with recent diagnosis of breast cancer. There were 145 BI-RADS 3 lesions in 106 patients. Of 145 BI-RADS 3 lesions, there were 47 foci of enhancement (32.4%). The 1 patient who developed breast malignancy (DCIS) initially had an enhancing focus that was characterized as probably benign and recommended for short-term follow-up. The overall malignancy rate of foci was 2.1% (1/47).

Eby and colleagues in 2009⁶ evaluated lesions assessed as BI-RADS 3. Three hundred sixty-two lesions were assessed in 236 patients. The 362 lesions included 168 (46%) foci. Of 168 foci, a single focus of enhancement initially measuring 5 mm and characterized as probably benign showed enlargement on subsequent MR imaging examinations with MR imaging–guided vacuum-assisted biopsy yielding low-grade DCIS. The overall cancer yield of foci was very low, at 0.6% (1/168).

Higher malignancy rates were observed in more recent studies by Abe and colleagues in 2010,⁸ Jansen and colleagues in 2011,⁹ and Raza and colleagues in 2012.¹⁰ Their malignancy rates in foci ranged from 15% to 20.6%.⁷ In combining results of these and the previously mentioned 3 studies, the overall malignancy rate of an enhancing focus is 8.4% (39/467), with 21 invasive cancers and 14 DCIS (Table 1).

Based on published literature, it is clear that malignancy can present as an enhancing focus on breast MR imaging measuring 5 mm or less with most being clinically significant invasive cancers (see Table 1). To develop a strategy of managing these lesions, characteristics of an enhancing focus associated with malignancy from those associated with benignity are further evaluated.

CHARACTERISTICS OF FOCI: EXAMINATION INDICATION

Raza and colleagues in 2012¹⁰ retrospectively reviewed 565 lesions that underwent biopsy with MR guidance and identified 68 lesions measuring 5 mm or less in 61 patients. The malignancy rate of lesions measuring 5 mm or less was 20.6%. The highest prevalence of cancers was in the same quadrant as the newly diagnosed breast cancer, emphasizing the importance of the context in which breast lesions are identified and supporting management of additional indeterminate findings in patients with known cancer with a definitive tissue diagnosis rather than short-term follow-up.

CHARACTERISTICS OF FOCI: KINETIC ANALYSIS

Kinetic analysis was reviewed for its potential role in evaluating an enhancing focus. Specifically, the delayed enhancement pattern was analyzed, which has been reported to have high specificity and high positive predictive value for malignancy.¹¹

A study by Eby and colleagues in 2009⁶ investigated breast MR imaging BI-RADS 3 lesions. The 362 BI-RADS 3 lesions included 168 (46%) foci. Of those with kinetic analysis (275 of 362 lesions), 60% showed persistent enhancement, 17%

Table 1
Malignancy rates of an enhancing focus

Study	Number of Foci (≤5 mm)	Malignancy Rate, n/N (%)	DCIS	IDC	ILC	IDC/ILC Mixed
Liberman et al, ⁴ 2006	74	7/74 (9.5)	5	2		
Han et al, ⁷ 2008	21	4/21 (19)	NS	NS	NS	NS
Eby et al, ⁶ 2009	168	1/168 (0.6)	1			
Abe et al, ⁸ 2010	50	3/50 (15)	1	2		
Weinstein et al, ⁵ 2010	47	1/47 (2.1)	1	0	0	0
Jansen et al, ⁹ 2011	39	9/39 (23)	5	3		1
Raza et al, ¹⁰ 2012	68	14/68 (20.6)	1	9	2	2
Total	467	39/467 (8.4)	14	16	2	3

Abbreviation: NS, Not specified.

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