

MRI: Breast

Image quality in the multicenter setting can be greatly influenced by variances in acquisition protocols. These variances may be related not only to equipment manufacturer and model, but also technique.

The study may permit imaging per institutional standard-of-care. However, aligning image acquisition to established standards is essential for robust quality data.

The bilateral MRI Breast should be acquired on a 1.5T or 3.0T MRI scanner with a dedicated breast radiofrequency coil.

The patient should be scanned in prone position with an in-dwelling IV catheter for a single dose contrast agent injection (FDA-approved gadolinium-based contrast agent).

The MRI Breast examination should contain, at a minimum, the following series:

1. Localization scan
2. T2-weighted sequence
3. Pre & Post Contrast-enhanced T1-weighted series

Exam and Patient Preparation

Magnet Strength	1.5T or 3T	Low-field magnets are not suitable.
Coil	Multichannel dedicated breast coil	
FOV	The smallest FOV that encompasses all breast tissue.	For all sequences, select the smallest FOV and slice coverage that completely encompasses the breast tissue and axillary tail.
Patient Position	Prone	Breasts hang free in the recesses of the coil with light compression.
Contrast Injection	Dual-chamber power injector recommended Contrast Bolus = 0.1 mmol/kg Bolus Rate = 2 mL/s Saline Flush = 20 mL	Insertion of intravenous catheter in the hand or arm prior to the start of imaging.
Post T1-weighted Scan Delay	First image acquired within 60–90 seconds post contrast.	It is essential to obtain an image approximately 60–90 seconds after contrast material administration, as most breast cancers will show peak enhancement at this time.
Slice Plane	Axial/Coronal/Sagittal planes (orthogonal to area of interest)	Scan direction based on site preference.

Image Acquisition

Localization Scan	3-plane localization scan	
T2-weighted Sequence	Slice thickness < 5 mm Gap = 0 mm FOV per anatomy Resolution ≤ 1 mm in-plane (in phase and frequency directions)	Performed prior to contrast with fat saturation
Pre-Contrast T1-weighted Sequence	Slice thickness < 3.0 mm Gap = 0 mm FOV per anatomy Resolution < 1 mm in-plane (in phase and frequency directions)	<p>The T1-weighted sequence should be performed once pre-contrast and multiple times post-injection using identical sequence parameters.</p> <p>Transmit and receive gain settings should remain constant for pre-contrast and post-contrast T1-weighted imaging.</p> <p>Pre-contrast T1 images should be checked prior to contrast injection to confirm acceptable fat-suppression.</p> <p>Contrast injection will begin simultaneously with the start of image acquisition.</p>
Post-Contrast T1-weighted Sequence	Slice thickness < 3.0 mm Gap = 0 mm FOV per anatomy Resolution < 1 mm in-plane (in phase and frequency directions)	<p>Post-contrast imaging should continue for at least 8 minutes following contrast agent injection.</p> <p>Care should be taken to select the smallest FOV and slice coverage that completely encompasses both breasts and axilla.</p>

References

1. ACR Practice Parameter for the Performance and Interpretation of Contrast Enhanced Magnetic Resonance Imaging (MRI) of the Breast, Res. 34 – 2018. <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Contrast-Breast.pdf>, accessed February 17, 2021.