

ACR BI-RADS® Atlas 5 Edition Changes

The illustrated BI-RADS® Fifth Edition is an extension of the Fourth Edition of the BI-RADS® Atlas and is the culmination of years of collaborative efforts between the subsection heads and their committees, the American College of Radiology, and, importantly, input from users of these lexicons. It is designed for everyday practice and should make it possible to issue unambiguous breast imaging reports and meaningfully evaluate our performance. The Fifth Edition, like its predecessor, includes sections on mammography, ultrasound and magnetic resonance imaging but now includes a new section on follow-up and outcome monitoring.

Because of the extensive updates in the Fifth Edition, the following table has been developed to aid those familiar with the Fourth Edition by organizing and summarizing the major revisions in a side-by-side comparison. The most significant changes are presented below; however, minor changes have been omitted. Note that findings from the lexicon sections are presented as: *Finding/Sub-finding/Descriptor*. To purchase your new Fifth Edition BI-RADS® Atlas, visit acr.org/birads.

Section	2003 BI-RADS® Atlas (4 th Edition)	2013 BI-RADS® Atlas (5 th Edition)
General	582 pages	696 pages
	445 clinical images, 68 line drawings of clinical images	763 clinical images, the vast majority are new (no more line drawings of clinical images)
	Not in previous version	Revisions page provided in each section to describe future revisions
	Not in previous version	All modality sections reorganized to be consistent with each other, as applicable
	Not in previous version	All lexicon terms and definitions revised to be consistent across modalities, as applicable
	Not in previous version	BI-RADS Lexicon Overview table for each modality that summarizes breast tissue and findings terms
	Not in previous version	Report Organization standardized across all modalities, as applicable
	Breast Tissue descriptors had numeric BI-RADS values (e.g., 1, 2, 3, 4) for all modalities	Breast Tissue descriptors are no longer given numeric BI-RADS values to prevent confusion with numeric BI-RADS assessment categories
	Assessment Category language varied among modalities	Assessment Category language standardized across all modalities (except MRI does not allow for 4A, B or C)
	Assessment Categories included management recommendations	Management recommendations separated from Assessment Categories (to allow for the occasions where discordance between assessment and management is necessary)
	Frequently Asked Questions (FAQs) previously available only on ACR website	Each modality section, as well as Follow-up and Outcome Monitoring section, includes FAQs in the Guidance subsection
	Lexicon Classification Forms only available for Ultrasound and MRI; forms were also incomplete and did not always precisely match text or Data Dictionary	Lexicon Classification Forms available for all modalities and include breast tissue terms and descriptions (as well as findings and assessment categories); terms in forms precisely match that in text and Data Dictionary
	No electronic version	eBook version available (spring 2014)
	Not applicable	In electronic version, all sections are cross linked as applicable; all references are either linked to articles in the public domain or abstracts in PubMed

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Mammography	<p>1. The breast is almost entirely fat (<25% glandular)</p> <p>2. There are scattered fibroglandular densities (approximately 25% - 50% glandular)</p> <p>3. The breast tissue is heterogeneously dense, which could obscure detection of small masses (approximately 51% - 75% glandular)</p> <p>4. The breast tissue is extremely dense. This may lower the sensitivity of mammography (>75% glandular)</p>	<p>a. The breasts are almost entirely fatty</p> <p>b. There are scattered areas of fibroglandular density</p> <p>c. The breasts are heterogeneously dense, which may obscure small masses</p> <p>d. The breasts are extremely dense, which lowers the sensitivity of mammography (Quartiles have been eliminated)</p>
	Clinical images (mostly screen-film) and line drawings	No more line drawings; all clinical images were obtained on digital equipment
	Masses/Shape/Lobular	Masses/Shape/Lobular eliminated (to prevent confusion with Masses/Margin/Microlobulated)
	Calcifications/Typically Benign/Lucent-Centered Calcifications	Calcifications/Typically Benign/Lucent-Centered eliminated (incorporating it into Calcifications/Typically Benign/Rim; "lucent-centered" eliminated to simplify reporting)
	Calcifications/Typically Benign/Eggshell or Rim Calcifications	Calcifications/Typically Benign/Rim ("eggshell" eliminated to simplify reporting)
	Calcifications/Intermediate Concern, Suspicious Calcifications Calcifications/Higher Probability Malignancy (2 categories)	Calcifications/Suspicious Morphology (a single category replaces previous 2 categories since clinical studies in the intervening time showed small differences in the likelihood of malignancy)
	Special Cases/Global Asymmetry Special Cases/Focal Asymmetry	Asymmetries/Asymmetry Asymmetries/Global Asymmetry Asymmetries/Focal Asymmetry Asymmetries/Developing Asymmetry (expanded and grouped under separate category)
	Special Cases/Intramammary Lymph Node	Intramammary Lymph Node (separate category)
	Special Cases/Asymmetric Tubular Structure-Solitary Dilated Duct	Solitary Dilated Duct (separate category)
	Associated Findings/Skin Lesion	Skin Lesion (separate category)
	Location of Lesion/Depth (only recommended using "anterior," "middle," or "posterior" to describe the depth from the nipple)	Location of Lesion/Depth Location of Lesion/Distance From the Nipple (the distance of the lesion from the nipple should be provided in addition to depth to provide a more precise indication of its depth)
	Radiopaque markers mentioned briefly but not explained	Radiopaque markers - more complete guidance on use
	Not in previous version	Category 3: Probably Benign should not be used for mammography screening; it should only be used after imaging workup of screen-detected finding
	Not in previous version	Categories 4 and 5 should not be used for mammography screening; only after full diagnostic imaging work-up
	Partial list of mammography projection codes	Updated and complete list of mammography and stereotactic breast biopsy projection codes, e.g., Craniocaudal exaggerated medially [XCCM], Caudocranial (from below) [FB], Inferomedial-to-superolateral oblique [SIO], Step-oblique view - 15 degree, etc [MLO15, etc], Stereo scout [...SC], Prefire+ [...PRF+], etc.

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Ultrasound	General Considerations not in previous version	New subsection on General Considerations that includes anatomy, tissue composition, image quality, labeling/measurement and documentation
	Masses/Lesion Boundary	Masses/Lesion Boundary eliminated (since the presence of an echogenic transition zone [echogenic rim] may be seen with malignancies and abscesses, its presence should be noted; because the absence of an echogenic transition zone is quite common and is now considered to be of no diagnostic significance, the descriptor “abrupt interface” is no longer necessary)
	Posterior Acoustic Features	Posterior Features (name change)
	Surrounding Tissue/Duct Changes Surrounding Tissue/Cooper’s Ligament Changes Surrounding Tissue/Edema Surrounding Tissue/Architectural Distortion Surrounding Tissue/Skin Thickening Surrounding Tissue/Skin Retraction/Irregularity	Associated Features/Architectural Distortion Associated Features/Duct Changes Associated Features/Skin Changes/Skin Thickening Associated Features/Skin Changes/Skin Retraction Associated Features/Edema (Cooper ligament changes now covered by Associated Features/Architectural Distortion)
	Calcifications/Macrocalcifications	Calcifications/Macrocalcifications eliminated
	Not in previous version	Calcifications/Intraductal (high-frequency, high-resolution transducers in current use can depict intraductal calcifications well, particularly if they are superficial)
	Not in previous version	Associated Features/Elasticity Assessment
	Not in previous version	Special Cases/Simple Cyst Special Cases/Vascular Abnormalities/AVMs (Arteriovenous malformations/pseudoaneurysms) Special Cases/Vascular Abnormalities/Mondor Disease Special Cases/Postsurgical Fluid Collection Special Cases/Fat Necrosis
	Vascularity/Not Present or Not Assessed Vascularity/Present in Lesion Vascularity/Present Immediately Adjacent to Lesion Vascularity/Diffusely Increased Vascularity in Surrounding Tissue	Associated Features/Vascularity/Absent Associated Features/Vascularity/Internal Vascularity Associated Features/Vascularity/Vessels in Rim
Magnetic Resonance Imaging	Some of the new content was included in previous Technical Issues subsection	New subsection on Clinical Information and Acquisition Parameters
	Previously breast composition was only discussed in the Report Organization subsection	Amount of Fibroglandular Tissue (FGT) added to lexicon and now includes images a. Almost entirely fat b. Scattered fibroglandular tissue c. Heterogeneous fibroglandular tissue d. Extreme fibroglandular tissue
	Not in previous version	Background Parenchymal Enhancement (BPE)/Level (e.g., minimal, mild, moderate, marked)
	Non-Mass-Like Enhancement/Symmetric or Asymmetric	Background Parenchymal Enhancement (BPE)/Symmetric or Asymmetric [removed from Non-Mass-Like Enhancement finding (2003 Edition) and added to BPE (2013 Edition)]
	Focus-Foci	Focus (Foci eliminated from the Focus-Foci finding as it was used to describe several such tiny dots separated widely by normal tissue and is a pattern of BPE that can be diffuse or focal)

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	Mass/Shape/Lobular	Mass/Shape/Lobular eliminated (The descriptor Mass/Shape/Oval includes lobulated)
	Mass/Margin/Smooth	Mass/Margin/Circumscribed (name change)
	Mass/Margin/Irregular Mass/Margin/Spiculated	Mass/Margin/Not Circumscribed/Irregular Mass/Margin/Not Circumscribed/Spiculated (distinction made between Circumscribed and Not Circumscribed)
	Mass/Mass Enhancement/Homogeneous Mass/Mass Enhancement/Heterogeneous Mass/Mass Enhancement/Rim Enhancement Mass/Mass Enhancement/Dark Internal Septations	Masses/Internal Enhancement Characteristics/Homogeneous Masses/Internal Enhancement Characteristics/Heterogeneous Masses/Internal Enhancement Characteristics/Rim Enhancement Masses/Internal Enhancement Characteristics/Dark Internal Septations (findings name revisions)
	Mass/Mass Enhancement/Enhancing Internal Septation Mass/Mass Enhancement/Central Enhancement	Mass/Mass Enhancement/Enhancing Internal Septation and Mass/Mass Enhancement/Central Enhancement eliminated (due to underuse)
	Non-Mass-Like Enhancement/Distribution Modifiers/Ductal	Non-Mass-Like Enhancement/Distribution Modifiers/Ductal eliminated (due to underuse)
	Non-Mass-Like Enhancement/Internal Enhancement/Stippled, Punctate	Non-Mass-Like Enhancement/Internal Enhancement/Stippled, Punctate eliminated (what used to be called stippled enhancement now is recognized to be a pattern of BPE)
	Non-Mass-Like Enhancement/Internal Enhancement/Reticular, Dendritic	Non-Mass-Like Enhancement/Internal Enhancement/Reticular, Dendritic eliminated (due to underuse)
	Not in previous version	Non-Mass Enhancement/Internal Enhancement Patterns/Clustered Ring
	Not in previous version	Intramammary Lymph Node (separate finding category)
	Not in previous version	Skin Lesion (separate finding category)
	Associated Findings/Nipple Retraction or Inversion	Associated Findings/Nipple Retraction
	Associated Findings/Pre-Contrast High Duct Signal	Associated Findings/Pre-Contrast High Duct Signal eliminated
	Associated Findings/Skin Invasion	Associated Findings/Skin Invasion/Direct Invasion Associated Findings/Skin Invasion/Inflammatory Cancer (2 new descriptors added)
	Associated Findings/Edema	Associated Findings/Edema eliminated
	Associated Findings/Lymphadenopathy	Associated Findings/Lymphadenopathy eliminated
	Not in previous version	Associated Findings/Axillary Adenopathy
	Not in previous version	Associated Findings/Chest Wall Invasion
	Associated Findings/Hematoma-Blood	Associated Findings/Hematoma-Blood eliminated (addressed in Non-Enhancing Finding/Postoperative Collections (Hematoma/Seroma) and Fat-Containing Lesions/Postoperative Seroma-Hematoma with Fat)
	Associated Findings/Abnormal Signal Void	Associated Findings/Abnormal Signal Void eliminated (addressed in Non-Enhancing Findings/Signal Void from Foreign Bodies, Clips, etc.)
	Associated Findings/Cyst	Associated Findings/Cyst eliminated (addressed in Non-Enhancing Findings/Cyst)

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	Not in previous version	Associated Findings/Architectural Distortion
	Not in previous version	Fat-Containing Lesions/Lymph Nodes/Normal Fat-Containing Lesions/Lymph Nodes/Abnormal Fat-Containing Lesions/Fat Necrosis Fat-Containing Lesions/Hamartoma Fat-Containing Lesions/Postoperative Seroma, Hematoma with Fat
	Kinetic Curve Assessment/Initial Rise/Slow Kinetic Curve Assessment/Initial Rise/Medium Kinetic Curve Assessment/Initial Rise/Rapid	Kinetic Curve Assessment/Initial Phase/Slow Kinetic Curve Assessment/Initial Phase/Medium Kinetic Curve Assessment/Initial Phase/Fast (Rapid changed to Fast)
	Not in previous version	New subsection on Implant Assessment
	Not in previous version	Implants/Implant Material and Lumen Type/Saline Implants/Implant Material and Lumen Type/Silicone/intact Implants/Implant Material and Lumen Type/Silicone/Ruptured Implants/Implant Material and Lumen Type/Other Implant Material Implants/Implant Material and Lumen Type/Lumen Type Implants/Implant Location/Retroglandular Implants/Implant Location/Retropectoral Implants/Abnormal Implant Contour/Focal Bulge Implants/Intracapsular Silicone Findings/Radial Folds Implants/Intracapsular Silicone Findings/Subcapsular Line Implants/Intracapsular Silicone Findings/Keyhole Sign (Teardrop, Noose) Implants/Intracapsular Silicone Findings/Linguine Sign Implants/Extracapsular Silicone/Breast Implants/Extracapsular Silicone/Lymph Nodes Implants/Water Droplets Implants/Peri-implant Fluid
Illustrated Cases (4th edition only)	Guidance on integrating findings into a combined report when using two or more imaging techniques.	Section deleted - this information is now integrated into the Guidance sections of each modality lexicon and discussed further in the Follow-Up and Outcome Monitoring section
Follow-up and Outcome Monitoring	Previously applied to mammography only and was embedded in Mammography section	Expanded into a stand-alone section; now applies to mammography, ultrasound and MRI due to the more widespread use of all three modalities for both screening and diagnostic examinations; harmonizes methodology to facilitate cross-modality comparisons
	Not in previous version	Category 3: If Probably Benign is used for mammography screening, it should be assessed as a positive exam in the medical audit (because additional imaging is recommended before the next routine screening)
	In previous version, "desirable goals" were only available for mammography and were not broken out by screening and diagnostic	Updated and referenced medical audit data benchmarks for screening mammography, diagnostic mammography, breast ultrasound and breast MRI, as available.

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	<p>Definition of standard images for normal screening ultrasound was not in previous version</p>	<p>See page 8: "At screening US, usually performed with a handheld transducer, the operator (whether the interpreting physician or an appropriately trained breast imaging sonographer) records only a small set of images that are representative of the entire breast. In the recent ACR Imaging Network trial of screening breast US, for a negative examination, this was defined as at least five images per breast, one for each quadrant and one for the retroareolar area. This definition is also applicable to routine clinical practice for all normal (negative and benign) screening US examinations, and is recommended in this edition of BI-RADS®. When a potentially abnormal finding is identified during real-time scanning by the sonographer and/or physician or depicted in one or more of the screening images from an automated breast US unit, the decision may be made to further scan the patient to clarify the significance of this finding and/or to record one or more additional (diagnostic) images to demonstrate the complete set of sonographic features of the finding for short-term follow-up or biopsy purposes. These additional images, similar to those obtained at diagnostic breast US examination, usually involve paired images of the finding with perpendicular transducer orientation, often with and without caliper measurements and sometimes using additional sonographic techniques such as Doppler, compound, harmonic, and elastographic imaging. Thus, identical to screening mammography, the production of additional (diagnostic) images to further evaluate a finding depicted on the standard images provides an objective and reproducible rule that defines the positive screening US examination, because this involves action before next screening."</p>
	<p>Since previous versions only included follow-up and outcome monitoring for mammography, no discussion was available to clarify what images constituted a screening ultrasound examination.</p>	<p>See page 61: "Each breast imaging facility should indicate in its policy and procedure manual what standard images should be recorded for normal (BI-RADS® category 1 or 2) screening examinations. Furthermore, the screening breast US report should indicate whether standard or standard plus additional (diagnostic) images were recorded. This will allow for objective and reproducible auditing, especially if screening breast US reports are created using a computerized reporting system, which would prospectively capture data on whether additional images were recorded, hence permitting auditing of additional-image examinations as screening-positive and diagnostic-positive/negative depending on the final assessment rendered."</p>
	<p>Audits of screening ultrasound not in previous version</p>	<p>See page 63: "At service screening (screening in usual clinical practice), it will be much more time efficient to limit the frequency of recording fully documented images of benign-assessed findings, since these will be assessed as characteristically benign at real-time scanning and no further action is required prior to the next scheduled screening exam. For each characteristically benign finding that is described in the US report, consider recording only one representative image (instead of the standard negative image of that quadrant). Also note that it is not necessary to describe all characteristically benign findings in a screening US report. Indeed, in usual clinical practice (service screening), most interpreting physicians do not describe all characteristically benign findings at screening mammography. If a significant finding (one that will require either surveillance imaging or biopsy prior to the next scheduled screening exam) is identified during handheld scanning, return to it and record appropriate views, following the same procedure as for a diagnostic examination. This, in effect, converts the screening examination into a (recalled) diagnostic examination."</p>

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Data Dictionary	Previously embedded in Mammography section	Now in a stand-alone section
	Dictionary terms did not always match terms used in lexicon text	Carefully developed so all terms match those in lexicon text
	Included field names required for the Breast Cancer Surveillance Consortium as well as the ACR National Mammography Database	Outlines only those field names required for the ACR National Mammography Database since the Breast Cancer Surveillance Consortium no longer reports new data
	Data Dictionary only available as hardcopy or PDF	Data Dictionary available to licensees as downloadable file in various formats (e.g., Excel, PDF, etc.)
Appendix: Sample Lay Letters	Only available on ACR website	Updated and new to Atlas