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BI-RADS v2025: Key Updates and Implications for Breast Imaging Practice

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Abstract

BI-RADS v2025 updates the established BI-RADS framework to reflect contemporary breast imaging practice across mammography, ultrasound, MRI, and contrast-enhanced mammography (CEM). This review summarizes the principal cross-modality and modality-specific changes introduced in the new Manual and discusses their implications for interpretation, reporting, multidisciplinary communications, and audits, with an emphasis on new descriptor terminology, assessment clarifications, and modality comparisons. Key cross-modality updates include structured clinical indication categories, revised and standardized report organization, harmonized terminology, refined morphologic descriptors, refined assessment categories (e.g., clarification of BI-RADS categories 0 and 6; introduction of BI-RADS 4 subclassification for breast MRI to mirror other modalities), structured lesion localization, tissue composition assessment, lymph node reporting, and expanded audit methodology. Modality-specific changes include refined mammographic characterization for digital breast tomosynthesis, revised calcification terminology, recognition of nonmass lesions and perilesional echogenic features for ultrasound, introduction of enhancement and T2-related descriptors for MRI, and formal incorporation of CEM into the BI-RADS reporting framework. Overall, BI-RADS v2025 preserves the core principles of prior editions of structured reporting, evidence-based assessment categories, and linkage between imaging findings and management recommendations while improving reporting consistency and reproducibility, cross-modality correlation, and auditability and performance monitoring across the full spectrum of breast imaging modalities.

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HIGHLIGHTS

• BI-RADS v2025 updates the established BI-RADS framework to reflect contemporary breast imaging practice.

• Key cross-modality changes include refinements in terminology, reporting structure, assessment categories, lesion localization, tissue composition assessment, and nodal assessment.

• Modality-specific refinements include DBT-related mammographic changes, nonmass lesions on ultrasound, T2-related descriptors on MRI, and formal incorporation of CEM.

Introduction

BI-RADS, developed by the American College of Radiology, was originally designed to standardize breast imaging lexicon, reduce variability in breast imaging reports, and link breast imaging findings to management recommendations [1]. These principles have remained consistent across BI-RADS editions [2–7]. However, the increasing complexity of breast imaging, driven by the widespread adoption of digital breast tomosynthesis (DBT), contrast-enhanced mammography (CEM) [10, 11], and technologic advances across imaging modalities [8, 9], as well as evolving therapeutic strategies for breast cancer [12, 13, 14], has required an update of the system [15].

In this context, BI-RADS v2025 [2, 16] updates the established BI-RADS framework through a structured Manual that incorporates revised reporting elements, descriptor terminology, and assessment clarifications, targeting contemporary breast imaging practice. These updates include standardized reporting structure, descriptor standardization, and refined assessment categories across mammography, ultrasound, breast MRI, and CEM [17–20], with the aim of improving reporting consistency, multidisciplinary communication, and audit and performance monitoring [21]. However, their impact on clinical practice remains to be fully defined.

The purpose of this review is to summarize and discuss the key cross-modality and modality-specific updates introduced in BI-RADS v2025, with an emphasis on new terminology, modality comparisons, reporting consistency, multidisciplinary communications, and audits.

Key Cross-Modality Updates in BI-RADS v2025

Cross-modality changes address structure, descriptor terminology, assessment categories, tissue composition, lesion localization, and lymph node assessment. Although some changes primarily refine terminology, others have practical implications for reporting, multidisciplinary communications, and audits. **Table 1** summarizes the main updates.

Reporting Structure and Clinical Indications

The BI-RADS v2025 Manual adds greater standardization of report organization across imaging modalities through a shared general reported structure (**Fig. 1**) that is adapted to the specific imaging modality. Compared with prior editions, the descriptions of tissue composition and of technique and acquisition parameters are more explicitly incorporated as dedicated reporting components across

modalities, while the comparison with prior examinations is positioned earlier in the report, preceding the description of technique and acquisition parameters.

A key update is the introduction of standardized categories for clinical indications, distinguishing among asymptomatic screening, diagnostic workup, and evaluation in the setting of known breast cancer; optional subcategories provide further specification of the clinical setting. These categories define the clinical context in which the imaging findings are interpreted and reported. In addition, definitions of positive and negative examinations differ across indication categories, with direct implications for audits.

Assessment Categories

The overall structure of BI-RADS assessment categories remains unchanged. However, several clarifications have practical implications for the categories' application across imaging modalities.

Category 0 (incomplete) is subdivided into two scenarios: need for additional imaging evaluation and need for comparison with prior examinations. This distinction aims to improve appropriate use of the "incomplete" category and reduce variability in reporting. Importantly, category 0 should not be used when a finding is already suspicious; in such cases, a definitive assessment (BI-RADS category 4 or 5) should be assigned without delay.

Subclassification of category 4 (categories 4A, 4B, and 4C) is explicitly introduced for breast MRI, aligning MRI assessment with mammography and ultrasound. This refinement reflects the substantial increase in breast MRI evidence accumulated since publication of the previous BI-RADS Atlas. Studies [22–24] have reported malignancy rates consistent with BI-RADS thresholds, with PPVs for MRI-based biopsy recommendations ranging from 2.5%–14.2% for category 4A, 21.4%–41.2% for category 4B, and 77.2%–83.3% for category 4C. Although this update does not modify management recommendations, it may improve communication of malignancy risk and support audit and performance monitoring.

Category 6 is consistently defined across imaging modalities as appropriate for biopsy-proven malignancy prior to definitive local therapy. This definition includes patients undergoing neoadjuvant systemic treatment in whom imaging is used to monitor response, even in those with complete imaging response. The BI-RADS v2025 Manual specifies that the timing and type of definitive treatment (not necessarily surgical excision) are determined by the multidisciplinary clinical team. Emerging management strategies, such as minimally invasive ablation techniques (e.g., cryoablation) [25] and active surveillance for selected cases of low-risk ductal carcinoma in situ (DCIS) [26-28], are not

currently incorporated into the BI-RADS framework, as they are not yet supported by sufficient long-term outcome data. For breast MRI, BI-RADS v2025 also clarifies the use of category 6 in the presence of additional contiguous or closely adjacent findings with similar morphology when these do not alter management. In such cases, these findings may be included within category 6, with reporting focused on the findings' extent and spatial relationship to the known malignancy, without assignment of separate categories (**Fig. 2)**.

Tissue Composition

Tissue composition remains a standardized component of breast imaging assessment across modalities. For mammography and CEM, breast density remains a core reporting element with established implications for cancer risk and sensitivity [29,30]. For breast MRI, fibroglandular tissue (FGT) continues to provide a standardized estimate of parenchymal volume.

A relevant addition is the introduction of the glandular tissue component (GTC) for ultrasound, defined as the relative proportion of glandular tissue corresponding to terminal ductal lobular units (TDLUs) within FGT [31]. Whereas mammographic breast density and MRI FGT reflect the overall amount of FGT within the breast, GTC provides a sonographic assessment of tissue composition by distinguishing relatively isoechoic glandular tissue from hyperechoic fibrous tissue (**Fig. 3A**) [10]. After whole-breast scanning, GTC is qualitatively assessed as the proportion of isoechoic glandular tissue relative to total FGT (isoechoic and hyperechoic components combined) and categorized into four groups (minimal, mild, moderate, and marked) (**Fig. 3B-E**) [32]. For reporting purposes these groups may also be simplified into low or high categories [10]**.** A recent study found associations of higher GTC with increased abnormal interpretation rates at supplemental screening ultrasound and with higher breast cancer risk [33].

Mass Shape and Margin Descriptors

The descriptor “lobulated” has been reintroduced, replacing the previously used term “lobular” to improve descriptive clarity while avoiding potential histopathologic ambiguity. A lobulated mass, characterized by an undulating or scalloped contour, generally suggests benignity but conveys a slightly higher level of suspicion than an oval mass [6]. However, the final BI-RADS assessment is not determined by shape alone and depends on the combination of margin, internal features, associated findings, and clinical context.

Margin assessment has also been simplified. The descriptor "microlobulated" has been removed from mammography, MRI, and CEM lexicons, whereas it remains included in the ultrasound lexicon. Findings previously described as microlobulated are now categorized as having indistinct margins. This change reflects an effort to standardize terminology across modalities, with the aim of improving reporting consistency in lesion characterization and reducing interobserver variability.

Lesion Location

Lesion localization is now described using a structured and consistent reporting sequence across imaging modalities. Lesion location is described using laterality first, followed by quadrant and/or clock-face position, and then by distance from the nipple (measured in whole centimeters) and/or lesion depth. In DBT, reporting the slice number is recommended to facilitate accurate reidentification. In ultrasound, lesion location is additionally described in relation to breast tissue layers, including skin, subcutaneous fat, FGT, retroglandular fat, and the underlying pectoralis major muscle (**Fig. 4)**. When appropriate, inclusion of both lesion position (quadrant and/or clock-face) and tissue layer may facilitate correlation with findings identified on mammography, CEM, or MRI. This standardized approach supports more consistent lesion localization across modalities, supports reproducibility during follow-up, facilitates image-guided procedures, and improves communication with the surgical team.

Lymph Node Assessment

Lymph nodes are now introduced as a distinct reporting category across imaging modalities, reflecting the increasing clinical relevance of nodal assessment in breast cancer staging and management. Assessment is primarily based on morphologic features rather than nodal size alone, including cortical thickening, loss of fatty hilum, round or irregular morphology, interval change, and abnormal vascularity [34-37] (**Fig. 5A-E**). This approach acknowledges that size alone is not a reliable indicator of malignancy, as metastatic involvement may occur even in subcentimeter nodes when suspicious morphologic features are present [37].

A relevant addition in the current edition is the explicit integration of regional nodal anatomy according to TNM staging [38]. Lymph node assessment now incorporates a systematic classification of nodal basins including intramammary, axillary (levels I–III), internal mammary, and supraclavicular stations. Definition of axillary levels using the pectoralis minor muscle as an anatomic landmark further standardizes nodal localization and reporting (**Fig. 5F**) [37]. Across modalities, radiologists are expected

to report the presence of lymph nodes in these regional nodal stations and to classify them as normal or abnormal according to morphologic features [37].

This structured approach supports more consistent reporting and closer integration with clinical management including surgical planning, radiation therapy guidance, and monitoring of neoadjuvant treatment response [37]. In clinical practice, suspicious nodal findings typically prompt targeted ultrasound and image-guided biopsy in the appropriate clinical setting [39,40].

Node-RADS has been proposed as a structured system for nodal assessment in oncologic imaging [41,42]; however, it is not incorporated into BI-RADS v2025, and its role in breast imaging remains limited.

Mammography

BI-RADS v2025 integrates digital mammography (DM), DBT, and synthetic mammography (SM) within a unified framework, reflecting the widespread adoption of DBT in contemporary breast imaging practice. Although DBT has been widely used in clinical practice for more than a decade, its explicit and systematic incorporation into the BI-RADS framework represents a formal alignment of the lexicon with current imaging practice. In practice, this integration has implications not only for lesion detection but also for how findings are classified and reported [43]. **Table 2** provides a summary of the main mammography-specific updates and their clinical implications.

Masses

Mass definition and characterization have been refined in the context of DBT. A lesion may be classified as a mass when all defining features are demonstrated on a single DBT projection, even if the finding is not visible on both DM views.

The updated Manual also clarifies margin assessment. When margins appear obscured on DM but circumscribed on DBT, the lesion should be classified as circumscribed, acknowledging the superior ability of DBT to reduce tissue overlap and improve margin definition [8]. This approach may reduce unnecessary recalls and additional imaging prompted by equivocal findings on DM.

Although circumscribed fat-containing masses are typically benign, BI-RADS v2025 highlights that the presence of fat alone does not exclude malignancy considering that malignant lesions may

contain fat due to fat entrapment. Lesion assessment should integrate margin characteristics and other imaging features to avoid underestimation of suspicious findings.

Calcifications

Terminology for typically benign calcifications has been simplified, whereas terminology for suspicious calcifications places greater emphasis on morphology-driven risk stratification.

Among typically benign calcifications, the descriptor "coarse" is retained as the overarching category, replacing previously used terms such as "popcorn-like" and "dystrophic," which are no longer included in the lexicon. Similarly, the term "punctate" has been removed, with small round calcifications now uniformly described as "round" regardless of size. In addition, the term "milk of calcium" has been replaced by the term "layering," shifting emphasis from presumed cause to morphologic appearance. While calcifications described as "vascular" remain benign, their association with cardiovascular risk is increasingly recognized and may be reported in clinical practice [44,45]. Overall, these terminology refinements aim to simplify and standardize calcification reporting while maintaining diagnostic specificity. **Figure 6** provides representative examples.

For calcifications with suspicious morphology, BI-RADS v2025 introduces an updated table correlating morphology with PPV, highlighting substantially higher malignancy risk for fine pleomorphic and fine linear or branching calcifications than for amorphous or coarse heterogeneous patterns [46-50]. Conversely, the table correlating calcification distribution with malignancy risk has been removed, reflecting a shift toward morphology-driven risk stratification. This update reinforces a morphology-based approach, although distribution patterns and clinical context may still contribute to interpretation in selected cases.

Architectural Distortion

Although architectural distortion is not substantially redefined in BI-RADS v2025, the widespread integration of DBT into clinical practice has significantly influenced its detection and interpretation [8]. Compared with DM, DBT improves sensitivity for architectural distortion but is associated with lower PPV due to more frequent detection of subtle distortions related to benign conditions such as radial scars, postsurgical changes, or stromal fibrosis [51-53]. As a result, architectural distortion detected on DBT, even in the absence of an ultrasound correlate, requires careful correlation

with clinical history and additional imaging findings to balance early cancer detection against avoidance of unnecessary biopsies [52-54].

Asymmetries

The descriptor "developing asymmetry" has been removed to maintain consistency within the lexicon, as temporal change is no longer embedded in descriptor terminology. However, the clinical relevance of a new or increasing asymmetry remains unchanged and should be explicitly considered during interpretation. In practice, interval change remains an important determinant of suspicion, even if the finding is no longer incorporated into standardized descriptor terminology.

Dilated Ducts

Dilated ducts, defined as tubular or branching structures measuring more than 5 mm from the nipple, are subclassified into solitary and multiple ducts, reflecting differences in associated malignancy risk. Multiple dilated ducts are typically benign and do not require further evaluation in the absence of clinical symptoms or suspicious imaging features [55].

A solitary dilated duct is now considered less suspicious than in previous BI-RADS editions, which generally categorized the finding as BI-RADS category 4A. Accumulating evidence [56-58] has suggested that a true solitary dilated duct in an asymptomatic patient, without associated suspicious imaging features, is associated with a low likelihood of malignancy and may be appropriately classified as a benign finding (BI-RADS category 2) [55-59]. This more conservative approach may reduce unnecessary workup, particularly in asymptomatic patients.

Ultrasound

Ultrasound is increasingly incorporated as an integral component of the breast imaging workflow, particularly in women with dense breast tissue or increased breast cancer risk [60-63]. Both hand-held ultrasound (HHUS) and automated whole-breast ultrasound (ABUS) are recognized as credible techniques for supplemental screening. HHUS allows real-time correlation with mammographic findings, whereas ABUS provides standardized volumetric acquisition with improved reproducibility. Coronal reconstructions from 3D ultrasound acquisition may facilitate detection of architectural

distortion [64]. This evolution reflects the expanding role of ultrasound in both screening and diagnostic settings. **Table 2** summarizes principal ultrasound-specific updates and their clinical implications.

Masses

Ultrasound characterization of masses has been refined, particularly in relation to echo pattern and posterior acoustic features.

The prior term "complex cystic and solid lesions" has been replaced by the term "mixed solid and cystic breast lesions," emphasizing that the solid component primarily determines diagnostic assessment and management. These lesions include both solid and cystic components and encompass a broad spectrum of entities, from benign conditions such as fibrocystic changes or papilloma to malignant tumors [65]. In practice, this refinement reinforces the need to base management on the solid component rather than on overall lesion appearance. **Figure 7** shows representative cases.

In addition, the removal of the descriptor "combined pattern" for posterior acoustic features reflects a more pragmatic approach, prioritizing shadowing even when coexisting with enhancement. This simplification aims to improve reporting consistency and practical interpretation.

Nonmass Lesions

Nonmass lesions are formally introduced as a distinct ultrasound finding. These lesions are defined as discrete abnormalities visible in three dimensions that differ from surrounding tissue but lack a definable shape or margins [66,67]. Characterization is based on distribution, echotexture, and posterior acoustic features, with linear or segmental distribution, posterior shadowing, associated ductal changes, and calcifications considered strong predictors of malignancy [10,67]. Both in situ and invasive breast carcinomas may manifest as nonmass lesions, whereas benign fibrocystic change or asymmetric glandular tissue represent important mimickers [10].

Reported malignancy rates for nonmlass lesions on ultrasound range from approximately 10% to 54%, reflecting heterogeneity in definitions, populations, and imaging contexts [68]. Because the reported PPVs generally exceed the BI-RADS threshold for probably benign assessment, tissue sampling should be considered for such lesions, particularly when suspicious features are present, when another imaging modality shows a correlate, or when the finding is associated with relevant clinical symptoms [68,69]. **Figures 8** shows a representative case.

Perilesional Echogenic Features

The terms "echogenic pseudocapsule" and "echogenic rind" are newly introduced as associated ultrasound features that characterize the tissue surrounding a lesion. An echogenic pseudocapsule appears as a thin, uniform, and distinct echogenic line surrounding a circumscribed mass and is typically associated with benign lesions, reflecting compression of adjacent tissue [70-74]. In contrast, an echogenic rind appears as a thick irregular echogenic band that partially or completely surrounds a lesion and is more commonly associated with malignancy, likely reflecting desmoplastic reaction or peritumoral edema [75-77]; however, the finding may also be observed in certain benign conditions such as fat necrosis. This feature has high predictive value for malignancy and should be included in lesion size measurements [78,79]. **Figure 9** shows representative cases.

Differentiation between an echogenic rind and a thin regular echogenic pseudocapsule may improve lesion characterization, particularly in lesions with otherwise indeterminate morphology.

Calcifications

Ultrasound evaluation of calcifications is refined to support structured reporting. Calcifications are categorized as macrocalcifications or microcalcifications and described according to their anatomic context. Although mammography remains the primary modality for calcification assessment, ultrasound may identify associated masses or nonmass lesions and may provide biopsy guidance when a sonographic correlate is present or when stereotactic biopsy is unavailable or difficult to perform [80-83]. **Figure 10** provides a representative example.

MRI

The MRI updates in BI-RADS v2025 aim primarily to reduce ambiguity in lesion classification and to incorporate additional supportive imaging features while maintaining morphology as the cornerstone of lesion assessment. Overall, these changes do not substantially alter the diagnostic framework but rather refine lesion characterization and reporting. **Table 2** summarizes the major MRI-related refinements and clinical implications.

Acquisition Parameters

Contrast-enhanced MRI acquisition parameters are further clarified, with the early postcontrast phase defined as images acquired approximately 60–120 seconds after contrast media injection. Abbreviated MRI protocols are also recognized and typically include a precontrast T1-weighted sequence and a single postcontrast acquisition. DWI is acknowledged as a useful adjunct for lesion characterization, although the sequence is not currently incorporated into the BI-RADS lexicon [84]. These updates standardize acquisition terminology but have limited direct impact on lesion assessment.

Focus and Background Parenchymal Enhancement

The term "focus" has been removed from the lexicon, reflecting improved spatial resolution that allows most enhancing findings ≤5 mm to be classified as small masses or focal nonmass enhancement, thereby reducing ambiguity in lesion characterization. In practice, this refinement may reduce the use of indeterminate descriptors and encourages more definitive lesion classification.

Background parenchymal enhancement (BPE) has been refined to include the descriptor "no enhancement" within the minimal category, reflecting a broader spectrum of physiologic enhancement patterns.

Masses

The descriptor "thick rim enhancement" replaces the prior descriptor "rim enhancement," emphasizing the typically thick and irregular peripheral enhancement associated with suspicious lesions. The added qualifier "thick" helps differentiate this pattern from the thin pericystic enhancement seen in benign cysts. Evaluation of the inner contour is clinically relevant: a smooth inner margin (so-called "solar eclipse" appearance) favors benign pericystic enhancement, whereas an irregular inner contour is more suggestive of malignancy (**Fig. 11A,11B**).

The term "T2 signal intensity" has been introduced as a new optional mass descriptor. This feature is categorized as hyperintense or not hyperintense based on subjective evaluation relative to lymph node intensity. Markedly increased T2 signal intensity (i.e., uniformly bright, resembling a lymph node) may favor a benign interpretation in appropriate morphologic contexts such as circumscribed oval or lobulated masses with homogeneous internal enhancement or hypointense internal septations, for which the

likelihood of malignancy is low [85] (**Fig. 11C,11D**). However, T2 signal intensity remains an adjunct feature and should not override morphologic assessment.

Peritumoral Edema

Peritumoral edema has been introduced as an associated feature and is defined as T2-hyperintense signal within the tissue surrounding a suspicious lesion (**Fig. 11E**). When extensive, this finding may correlate with an increased risk of nodal metastasis [86], although it may also be observed after biopsy procedures. This feature may provide additional prognostic information but remains nonspecific and should be interpreted in the appropriate clinical context.

Contrast-Enhanced Mammography

BI-RADS v2025 incorporates CEM into the core reporting framework, standardizing the description of both morphologic and enhancement-related findings. This integration reflects the expanding role of CEM in clinical practice.

Although no major conceptual changes have been introduced, the modality's formal inclusion in BI-RADS v2025 consolidates CEM as part of routine breast imaging assessment [87] rather than merely a complementary technique.

CEM combines morphologic assessment on low-energy images with functional information on recombined images, for which contrast enhancement reflects tumor angiogenesis. Enhancement descriptors are aligned with MRI terminology including removal of the descriptor "multiple regions" for nonmass enhancement and replacement of the term "invasion" with the term "involvement" for nipple and skin findings. Morphologic features follow conventional mammographic criteria, including adoption of the morphology descriptor "lobulated" and removal of the margin descriptor "microlobulated."

Together, these refinements support more standardized reporting across imaging modalities. **Table 2** summarizes the CEM-related updates.

Audit and Performance Monitoring

Beyond standardization of terminology and reporting structure, BI-RADS v2025 strengthens the role of audit and performance monitoring. Standardized definitions of positive and negative

examinations, together with predefined ascertainment intervals, support more standardized correlations among imaging interpretations, cancer outcomes, and clinical management. These definitions clarify which examinations are counted as positive or negative for audit purposes within each clinical indication category. Audit calculations do not include temporary BI-RADS category 0 assessments issued while awaiting prior examinations or additional diagnostic evaluation. Rather, only the subsequent final assessment (BI-RADS categories 1–5) rendered after completion of the evaluation is used for audit purposes. The Manual introduces audit recommendations for specific clinical settings, such as preoperative breast MRI, that were previously not captured by standard audit metrics due to the predominance of BI-RADS category 6 assessments [88]. In this context, audit is more closely integrated into the reporting framework itself, supporting benchmarking, quality assurance, and continuous improvement in clinical practice.

Discussion

Rather than representing a conceptual departure from prior editions, BI-RADS v2025 preserves the established framework while refining its application to contemporary breast imaging through standardized report organization, more consistent descriptor terminology, updated assessment clarifications, adaptation to evolving technologies, and closer integration of audit and performance monitoring.

Standardization of descriptors across mammography, ultrasound, MRI, and CEM is a central feature of the updated system. The more unified lexicon is intended to improve reporting consistency and facilitate cross-modality correlation in clinical practice. Several updates illustrate this effort toward standardization, including reintroduction of the descriptor “lobulated”; removal of the margin descriptor “microlobulated” from mammography, MRI, and CEM lexicons; and formal recognition of nonmass lesions in ultrasound. Simplification of terminology further reduces redundancy and promotes more consistent reporting. For example, descriptors such as “popcorn-like” and “dystrophic” are now incorporated within the broader “coarse” calcification descriptor. Formal incorporation of CEM into the BI-RADS framework further extends standardized terminology across modalities. In practice, radiologists familiar with legacy descriptors may continue to recognize these patterns during interpretation, but use of the standardized BI-RADS terminology in the report is expected to improve consistency and auditability. Because the clinical meaning of BI-RADS assessment categories and management recommendations is preserved, these terminology updates are intended to support

communication with the multidisciplinary team without requiring referring clinicians to adopt a fundamentally new language.

The increasing emphasis on morphology-based assessment reflects an effort to align imaging interpretation with established predictors of malignancy. This approach is particularly evident in evaluation of suspicious calcifications [46-50] and lymph nodes [34-37], for morphologic characteristics are prioritized over distribution-based or size-based criteria, respectively. However, temporal change and clinical context remain relevant in selected scenarios.

The update also reflects the expanding evidence base accumulated over the last decade, particularly for breast MRI and DBT. MRI BI-RADS category 4 subclassification is supported by malignancy rates consistent with established BI-RADS thresholds [22-24], whereas widespread DBT adoption has substantially influenced mammographic interpretation [8, 43]. Although DBT improves lesion detection and margin assessment, the modality is also associated with increased architectural distortion detection and lower PPV, attributed to more frequent identification of subtle distortions related to benign conditions [51-53]. Consequently, careful correlation with clinical history and additional imaging findings remains essential to avoid unnecessary biopsies.

Several newly introduced ultrasound and MRI descriptors may further refine lesion characterization, although their clinical impact remains incompletely defined. Examples include the introduction of GTC, formal recognition of nonmass lesions and perilesional echogenic features in ultrasound, as well as the addition of adjunct MRI descriptors including T2 signal intensity and peritumoral edema. These features may improve lesion characterization and cross-modality correlation, although further validation and reproducibility data will be important.

Despite these refinements, BI-RADS v2025 preserves continuity with prior editions. Imaging descriptors continue to guide final assessment categories, and management recommendations remain based on established malignancy probability thresholds. As previously noted, the Manual does not currently incorporate emerging management paradigms such as cryoablation or active surveillance strategies for selected low-risk DCIS, reflecting the lack of sufficiently mature long-term outcome data to support integration into standardized BI-RADS pathways.

Conclusion

BI-RADS v2025 updates the BI-RADS framework to reflect contemporary breast imaging practice while preserving the core principles of structured reporting, evidence-based assessment

categories, and linkage between imaging findings and management recommendations. Key updates include harmonized terminology, refined morphologic descriptors, structured clinical indication categories, standardized nodal assessment, formal incorporation of CEM, and expanded audit methodology.

These refinements are intended to improve reporting consistency, reproducibility, cross-modality comparisons, multidisciplinary communications, and auditability across mammography, ultrasound, MRI, and CEM. The practical value of the updates will depend on consistent implementation, reproducibility of emerging descriptors, and continued validation in clinical practice. Consistent implementation will likely require education and local quality assurance efforts, particularly for the revised terminology and newly introduced descriptors.

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Table 1. Principal cross-modality updates introduced in BI-RADS v2025

Domain	Key Updates in BI-RADS v2025
Reporting structure and clinical indication	·Report organization standardized across imaging modalities ·Formal clinical indication categories introduced (screening, diagnostic workup, and evaluation of patients with known breast cancer) ·Comparison with prior examinations repositioned before technique and acquisition parameters ·Breast tissue composition and technique and acquisition parameters reported as dedicated sections
Tissue composition	·Breast density maintained for mammography and CEM; fibroglandular tissue (FGT) maintained for MRI ·Glandular tissue component introduced for ultrasound
Category 0	·Clarified distinction between two scenarios: need for additional imaging evaluation and need for comparison with prior examinations
Category 4	·MRI BI-RADS category 4 subclassified into categories 4A, 4B, and 4C (newly introduced for MRI)
Category 6	·Clarified category's use for biopsy-proven malignancy before definitive local therapy (usually surgery), including during neoadjuvant treatment monitoring (even in patients with complete imaging response), with timing and type of definitive treatment determined by the multidisciplinary team ·Clarified for breast MRI that category's use may include additional contiguous or closely adjacent findings with similar morphology when such findings are within 2 cm of the index malignancy, increase total disease extent by ≤2 cm, and are not expected to alter clinical management
Shape and margins	·Term "lobulated" reintroduced as a morphology descriptor across modalities ·Margin descriptor "microlobulated" removed from mammography, MRI, and CEM lexicons and replaced by descriptor "indistinct margins"
Lesion location	·Sequence for reporting lesion localization standardized across modalities: laterality first, followed by clock-face position and/or quadrant, and then nipple distance (in whole cm) and/or lesion depth ·Tissue-layer localization introduced for ultrasound
Lymph node assessment	·Lymph nodes introduced as a dedicated reporting category ·Morphology-based assessment and standardized regional nodal classification incorporated across modalities

Table 2. Key modality-specific BI-RADS v2025 updates and clinical implications

Category	Key BI-RADS v2025 Update	Clinical Implication
Mammography (DM, DBT, SM)		
Mass definition (DBT)	·A mass may be defined on a single DBT projection	·Supports mass characterization on DBT without requiring two-view DM confirmation
Margins (DM vs DBT)	·When margins are obscured on DM but circumscribed on DBT, classification should follow DBT appearance	·Supports reporting based on DBT margin assessment and may reduce unnecessary diagnostic workup
Fat-containing masses	·Malignant lesions may present as fat-containing masses due to fat entrapment, as better visualized on DBT	·The presence of fat alone does not exclude malignancy. Lesion assessment requires integration of other imaging features to avoid underestimation of suspicious findings.
Calcifications (benign)	·Simplified terminology: "punctate" replaced by "round"; "popcorn-like" and "dystrophic" incorporated into "coarse"; "milk of calcium" replaced by "layering" ·Vascular calcifications should be reported	·Improves consistency and reduces descriptive variability in calcification reporting. ·Vascular calcifications may be clinically relevant beyond breast imaging
Calcifications (suspicious)	·Updated morphology-based PPV table introduced ·Distribution-risk table removed	·Shifts risk assessment toward morphology rather than distribution
Architectural distortion	·DBT increases detection of architectural distortion, including subtle distortions related to benign conditions	·Increased detection sensitivity but lower PPV ·Requires careful correlation with clinical history and other imaging findings to balance early cancer detection against avoidance of unnecessary biopsies
Asymmetries	·Term "Developing asymmetry" removed from descriptor terminology	·Interval change remains an important determinant of suspicion, although the finding is no longer embedded in standardized descriptor terminology
Dilated ducts	·Introduction of term "multiple dilated ducts" (typically benign) · Solitary dilated ducts are considered less suspicious than in prior BI-RADS editions when identified in asymptomatic patients without associated suspicious imaging findings	·Reflects differences in associated malignancy risk ·May reduce unnecessary workup in selected asymptomatic patients
Ultrasound		
Mixed solid and cystic lesions	· Term "Complex cystic and solid lesions" replaced by term "mixed solid and cystic breast lesions" ·Solid component determines assessment	·Solid component directly influences biopsy recommendation and management
Posterior acoustic features	· Descriptor "combined pattern" removed · Descriptor "shadowing" prioritized when coexisting with enhancement	·Simplifies descriptor assignment and reporting of posterior acoustic features ·Prioritizes shadowing in risk assessment
Nonmass lesions	·Formally introduced as a distinct ultrasound finding visible in three dimensions, differing from surrounding tissue but lacking a definable shape or margins	·Requires description of distribution, echotexture, and posterior acoustic features ·Tissue sampling should be considered for true ultrasound nonmass lesions, particularly when suspicious features, cross-modality correlates, or relevant clinical symptoms are present.

Echogenic pseudocapsule	·Introduced as a thin uniform echogenic rim surrounding circumscribed masses, typically associated with benign circumscribed lesions	·Supports benign interpretation when no suspicious features are present
Echogenic rind	·Introduced as a thick irregular echogenic rim surrounding a lesion	·Associated with increased likelihood of malignancy ·Should be included in lesion size measurement
Calcifications	·Newly categorized into macrocalcifications and microcalcifications according to anatomic context (within or outside a mass or nonmass lesion; within a duct)	·Ultrasound may identify associated masses or nonmass lesions and may provide image guidance for biopsy when a sonographic correlate is present or stereotactic biopsy is not feasible
MRI		
Focus	·Removed from lexicon ·Small (≤5 mm) truly unique enhancing findings should now be classified as mass or nonmass enhancement ·Most small dots are benign	·Reduces ambiguity in characterization of small enhancing findings and promotes more standardized reporting
BPE	·Minimal BPE category expanded to include descriptor "no enhancement"	·Broadens representation of physiologic enhancement patterns and improves consistency in BPE assessment
Thick rim enhancement	· Term "thick rim enhancement" introduced, replacing term "rim enhancement"	·Improves characterization of suspicious enhancing lesions and distinction from benign pericystic enhancement
T2 signal intensity	·Introduced as an adjunct descriptor for mass lesion ·Categorized as T2 hyperintense or not hyperintense based on subjective evaluation relative to lymph node intensity	·Supports lesion characterization and interpretation but does not determine BI-RADS category
Peritumoral edema	·Introduced as an associated T2-hyperintense feature surrounding malignant lesions	·May provide additional prognostic information and support assessment of disease extent in appropriate clinical settings
CEM		
Integration into BI-RADS	·Formally incorporated into the BI-RADS reporting framework as a dedicated modality	·Standardizes CEM interpretation and reporting and supports modality's use as part of routine breast imaging assessment
Enhancement terminology (recombined images)	·Removal of descriptor "multiple regions" for nonmass enhancement ·Replacement of descriptor "invasion" with descriptor "involvement" for nipple and skin findings	·Aligns CEM enhancement terminology more closely with MRI terminology updates and reduces potential overinterpretation of imaging findings
Morphologic features (low-energy images)	·Adoption of morphology descriptor "lobulated" and removal of margin descriptor "microlobulated" ·Aligned with mammography lexicon updates	·Simplifies lesion characterization and improves reporting consistency

Note: CEM = contrast-enhanced mammography; DBT = digital breast tomosynthesis; DM = digital mammography; SM = synthetic mammography; BPE = background parenchymal enhancement.

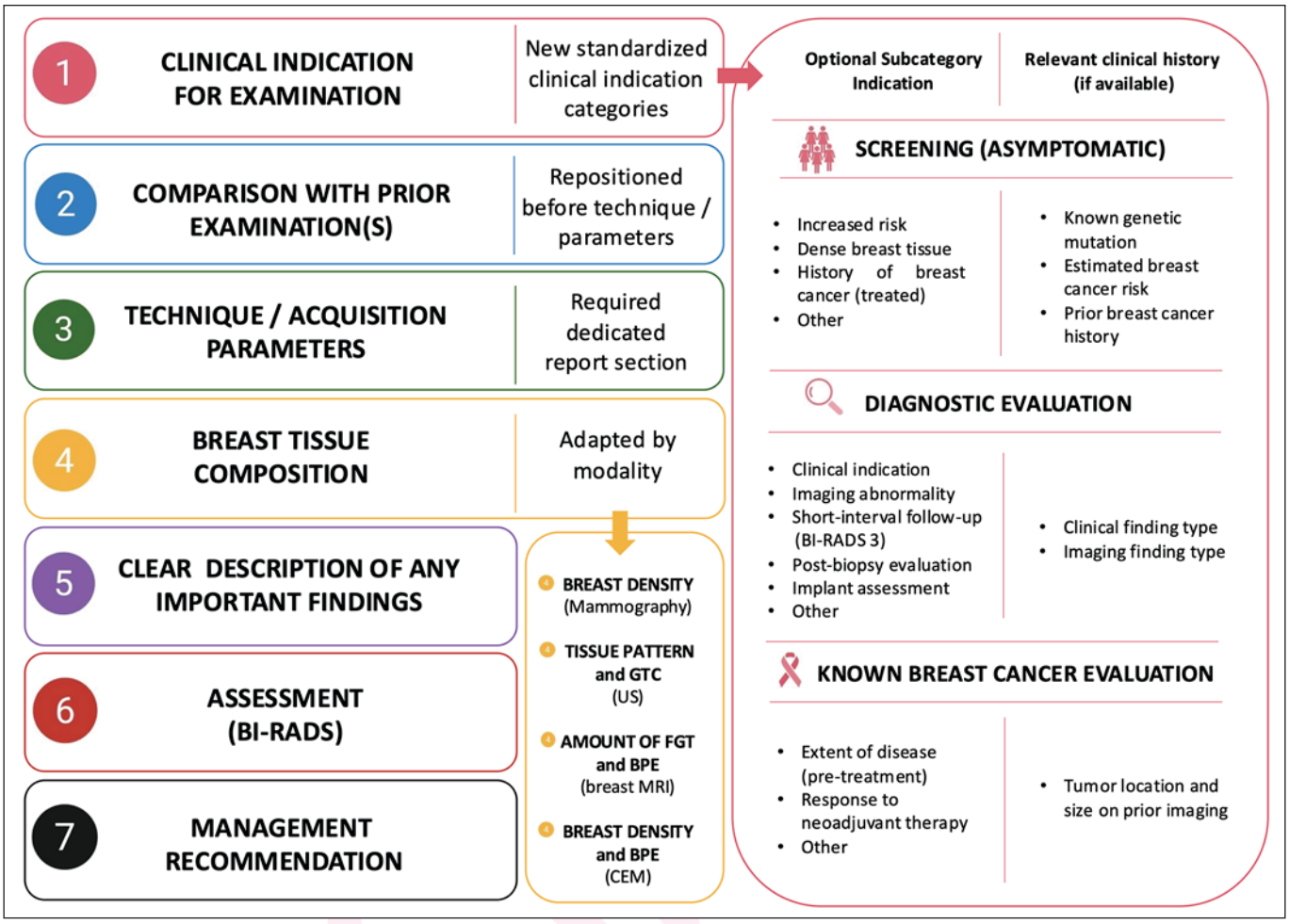


Figure 1. Standardized BI-RADS v2025 reporting structure across breast imaging modalities.

Standardized clinical indication categories define clinical context for imaging interpretation, reporting, and audit assessment. This portion of report also includes optional subcategories and relevant clinical history elements, for which representative examples are shown. Compared with prior editions, section for comparison with prior examinations is repositioned earlier in report, whereas sections for technique and acquisition parameters and for breast tissue composition are incorporated as dedicated reporting components that are adapted to each imaging modality. Tissue composition is represented by breast density in mammography; tissue pattern and glandular tissue component (GTC) in ultrasound; fibroglandular tissue (FGT) and background parenchymal enhancement (BPE) in breast MRI; and breast density and BPE in CEM. Created in BioRender. Cereser, L. (2026) https://BioRender.com/belvqhs

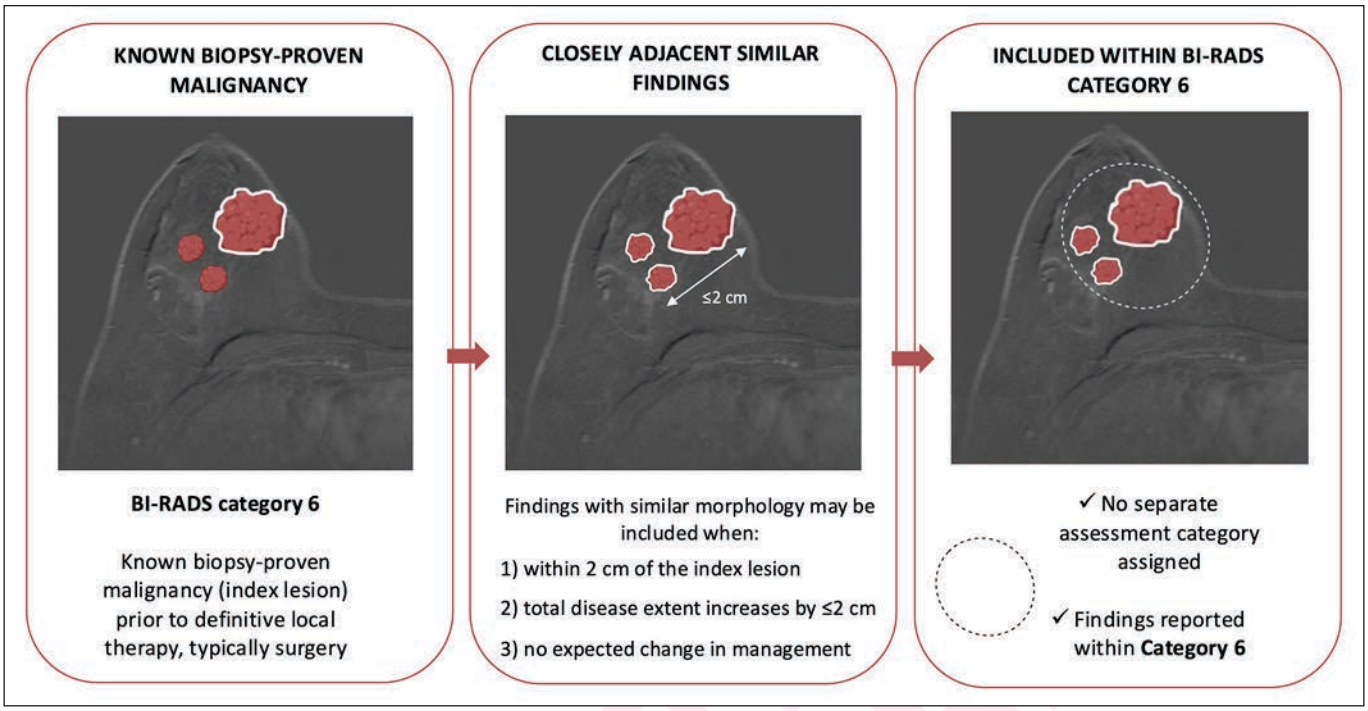
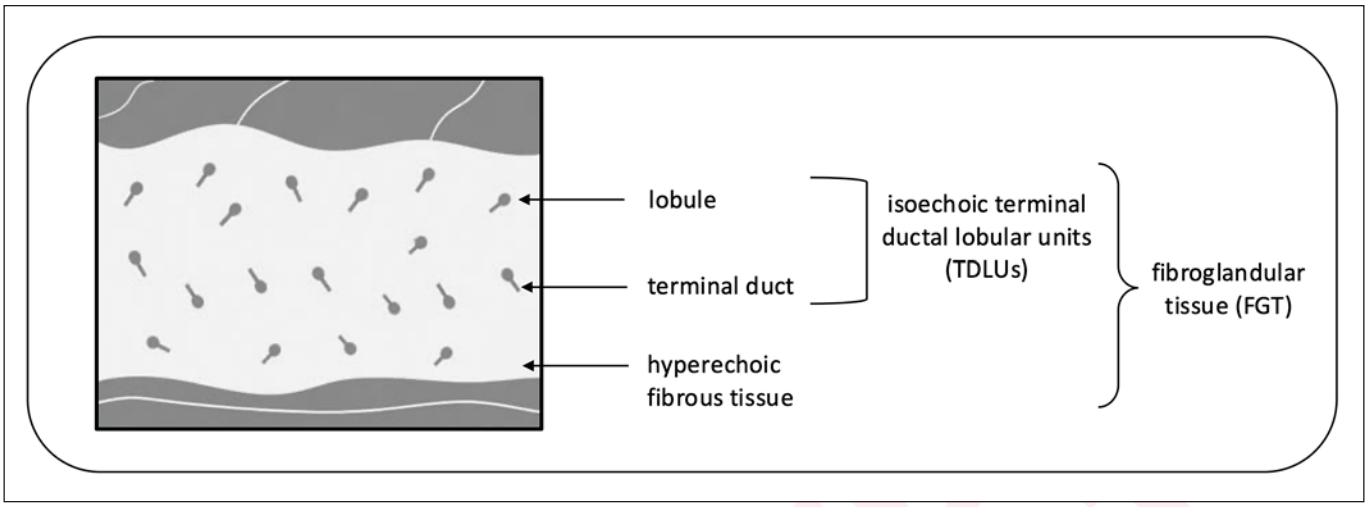


Figure 2. Schematic illustration of BI-RADS category 6 assessment in breast MRI according to BI-RADS v2025. BI-RADS category 6 may include contiguous or closely adjacent findings with similar morphology when such findings are located within 2 cm of index biopsy-proven malignancy, total disease extent does not increase by more than 2 cm, and no change in clinical management is expected. In these cases, separate assessment categories are not assigned, and reporting of category 6 focuses on overall disease extent and spatial relationship to known malignancy. Created in BioRender. Cereser, L. (2026) https://BioRender.com/belvqhs



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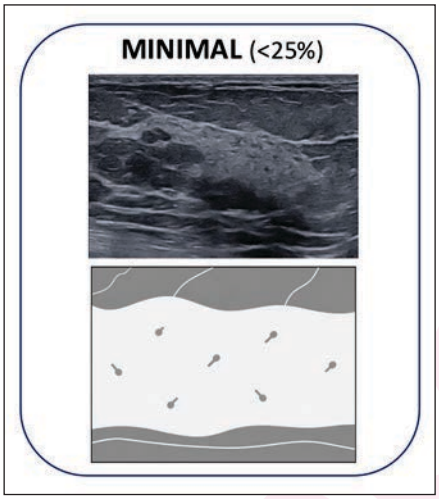

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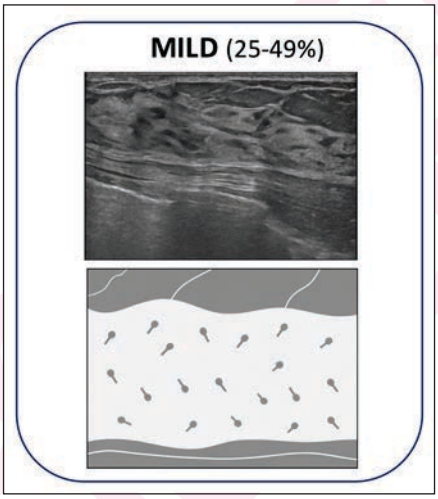

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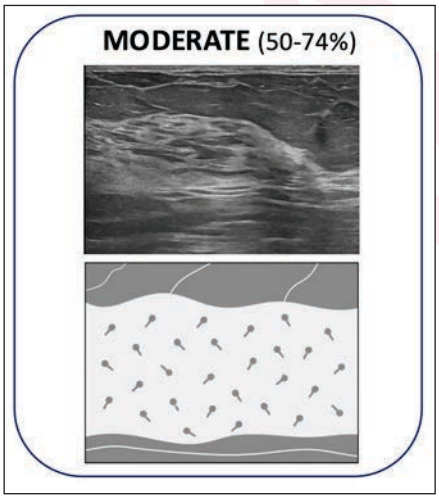

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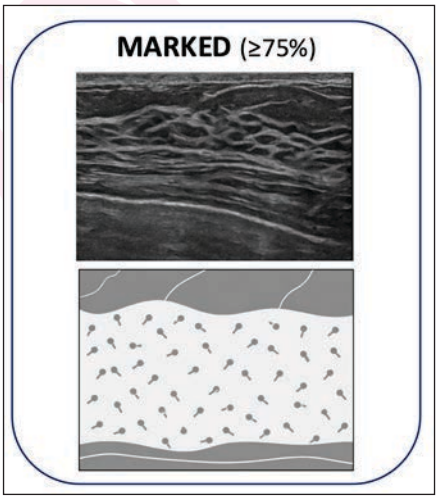


E

Figure 3. (A) Schematic illustrations of glandular tissue component (GTC), newly introduced in BI-RADS v2025 for breast ultrasound. GTC represents relative proportion of glandular tissue, corresponding to terminal ductal lobular units (TDLUs), within fibroglandular tissue (FGT). FGT is composed of hyperechoic fibrous tissue and isoechoic glandular tissue or TDLUs, in term comprising lobules and terminal ducts. (B-E) Four GTC categories based on varying glandular tissue proportions. Ultrasound image (top) and schematic representation (bottom) in 72-year-old patient (B) shows minimal (<25%) GTC. Ultrasound image (top) and schematic representation (bottom) in 83-year-old patient (C) shows mild (25-49%) GTC. Ultrasound image (top) and schematic representation (bottom) in 47-year-old patient (D) shows moderate (50-74%) GTC. Ultrasound image (top) and schematic representation (bottom) in 61-year-old patient (E) shows marked (≥75%) GTC. Created in BioRender. Cereser, L. (2026) https://BioRender.com/belvqhs

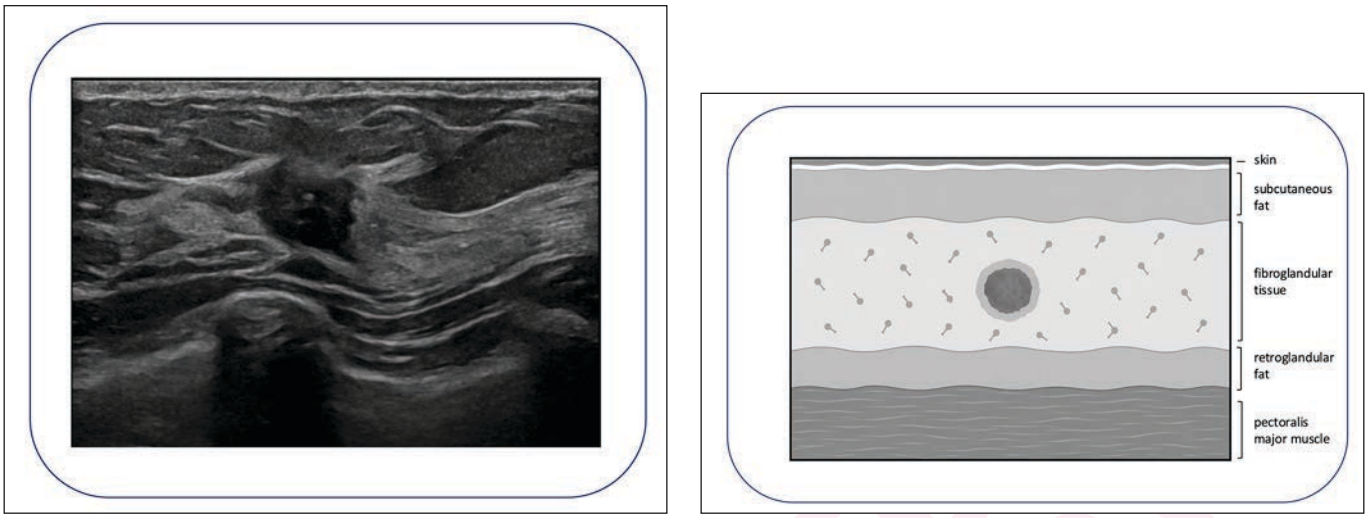


Figure 4. (A) Ultrasound image of breast in 49-year-old patient shows mass lesion. (B) Corresponding schematic drawing depicts tissue-layer localization of such lesion. In BI-RADS v2025, ultrasound lesion location is described relative to breast tissue layers including echogenic skin, isoechoic subcutaneous fat, echogenic fibroglandular tissue, isoechoic retroglandular fat, and underlying isoechoic pectoralis major muscle. This lesion, having irregular shape and indistinct margins, is located within fibroglandular tissue. Created in BioRender. Cereser, L. (2026) https://BioRender.com/belvqhs

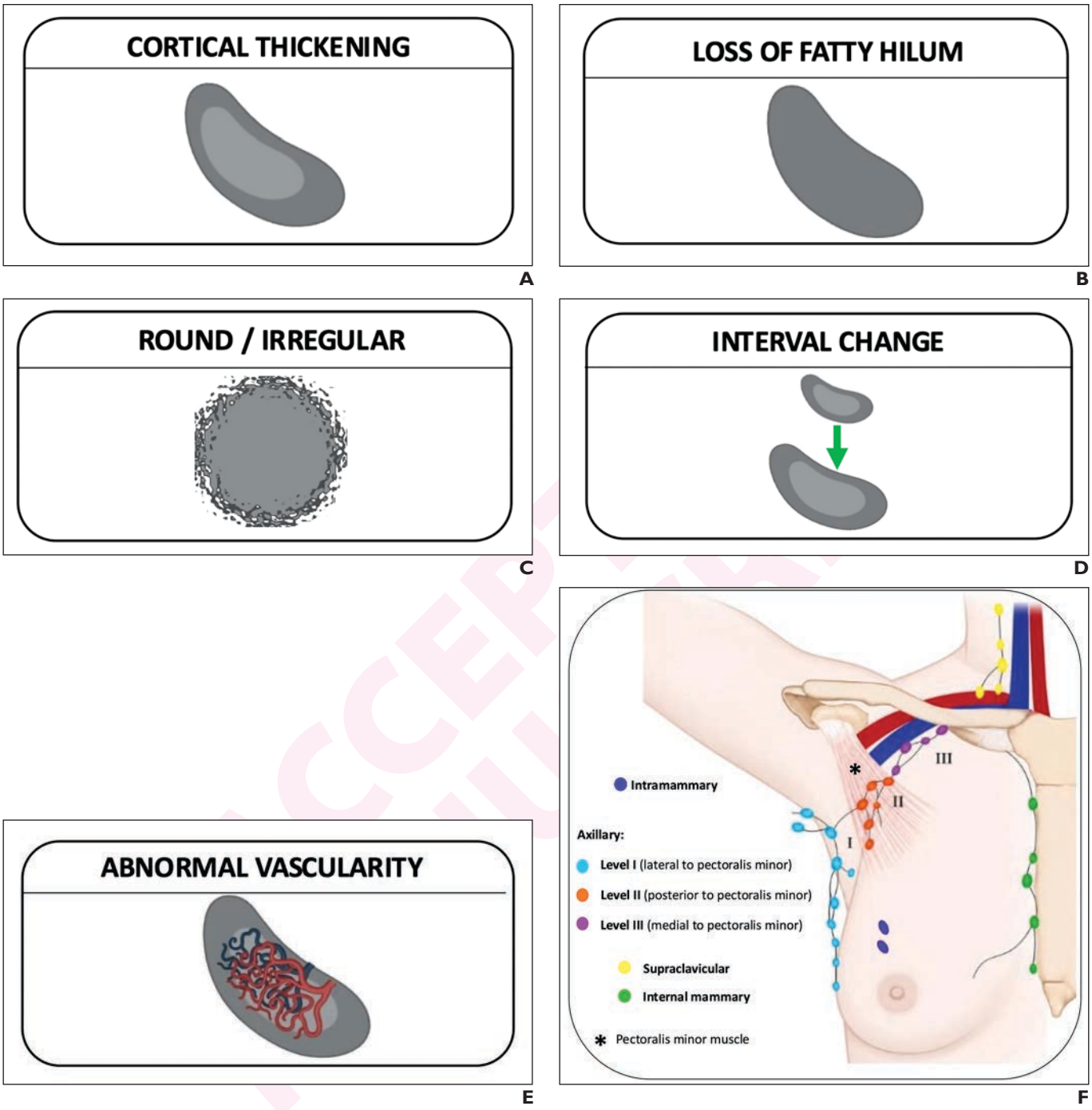


Figure 5. (A-E) Schematic illustration of morphologic features used for lymph node assessment in BI-RADS v2025. These features include cortical thickening (A), particularly if focal or asymmetric; loss of fatty hilum (B), defined as compression, displacement, or absence of fatty hilum; round or irregular morphology (C), possibly with indistinct or spiculated margins; interval change (D), defined as an increase in size or change in morphology or asymmetry based on comparisons over time or comparison with contralateral axilla; and abnormal vascularity (E), defined as a peripheral nonhilar vascular pattern on color Doppler ultrasound. (F) Regional nodal anatomy incorporated into BI-RADS v2025 according to TNM staging including intramammary, axillary level I–III, internal mammary, and supraclavicular lymph node stations. Axillary levels are defined relative to pectoralis minor muscle, which serves as anatomic landmark for standardized nodal localization and reporting. Created in BioRender. Cereser, L. (2026) https://BioRender.com/belvqhs

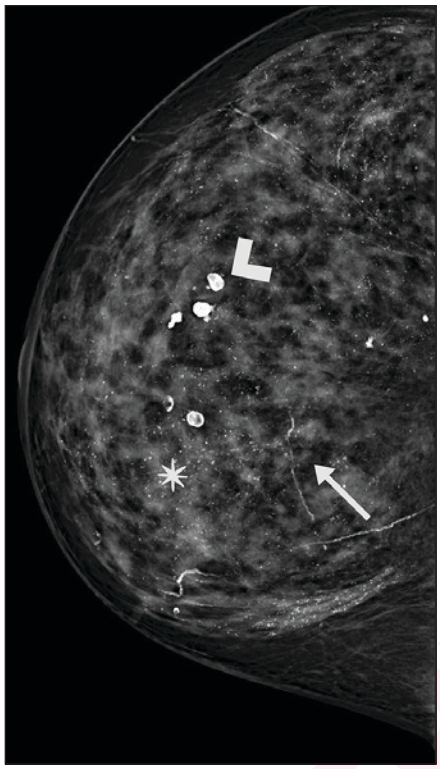
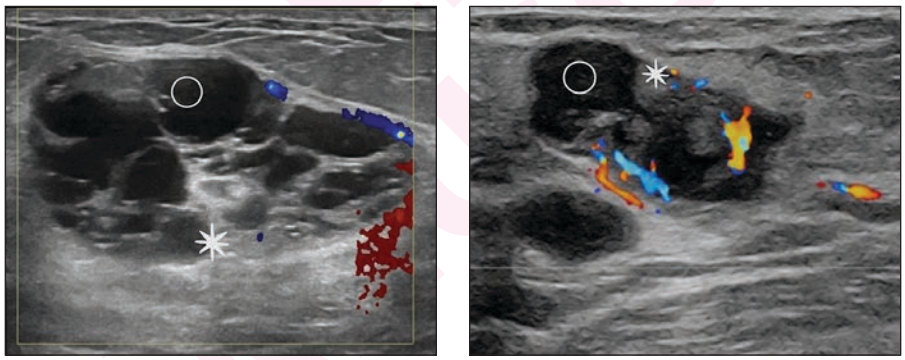
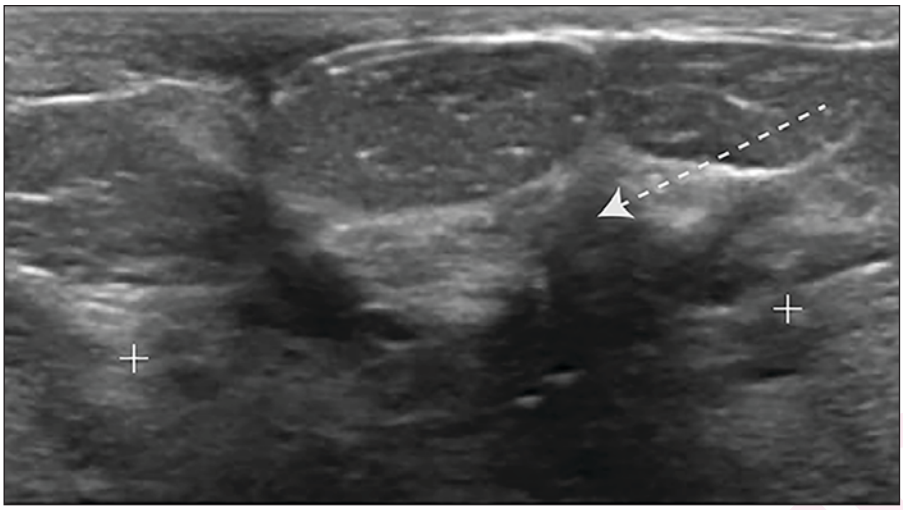


Figure 6. Simplified and standardized BI-RADS v2025 descriptors for benign calcifications in 67-year-old patient. Right craniocaudal mammogram shows coarse calcifications (arrowhead), round calcifications (asterisk), and vascular calcifications (arrow).

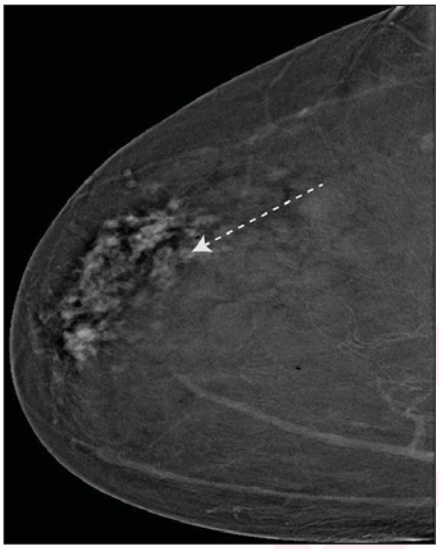


A B

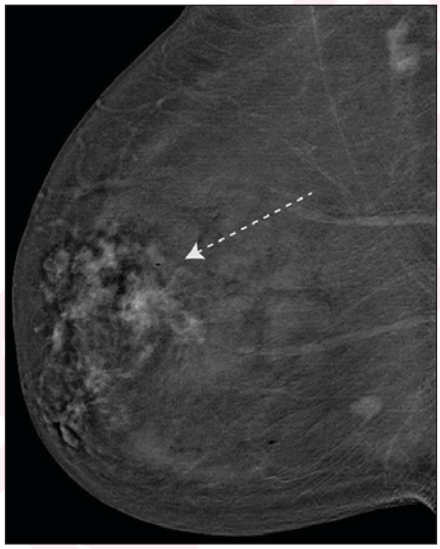
Figure 7. BI-RADS v2025 descriptors for mixed solid and cystic lesions on ultrasound in two different patients. (A) Ultrasound image in 30-year-old patient shows lesion (40x20 mm) with mixed solid (asterisk) and cystic (circle) components. Histologic assessment was consistent with benign fibrocystic change (B2). (B) Ultrasound image in 61-year-old patient shows mixed cystic and solid lesion (23x11 mm). Lesion is overall similar in appearance to lesion in (A) although has more prominent solid component (asterisk), indicating greater malignant potential. Histologic assessment was consistent with mucinous carcinoma (B5b), highlighting role of solid portion in driving assessment. Examples illustrate emphasis in BI-RADS v2025 on morphology-driven assessment whereby solid component of mixed lesions may contribute to risk stratification and biopsy decision-making. Histologic classification is reported according to UK B-coding system (B2: benign lesion with no evidence of malignancy; B5b: invasive breast carcinoma with stromal invasion).



A

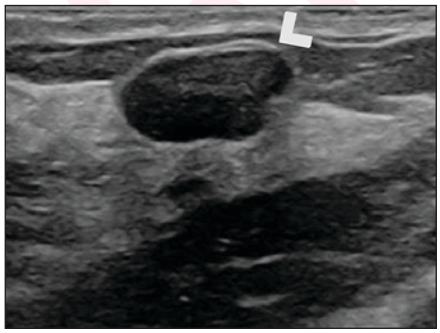


B

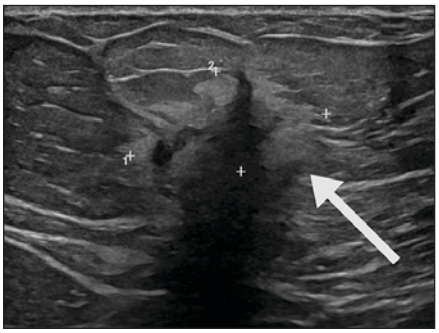


C

Figure 8. Cross-modality BI-RADS v2025 descriptors for nonmass lesions in 67-year-old patient. Ultrasound image performed for evaluation of palpable finding (A) shows heterogeneous nonmass lesion (dashed arrows) with posterior acoustic shadowing. Craniocaudal (B) and mediolateral oblique (C) recombined contrast-enhanced mammography (CEM) images show segmental enhancement (dashed arrows) involving nipple–areolar complex. Standardized terminology facilitates correlation of nonmass lesion on ultrasound with enhancement findings on CEM when available.



A



B

Figure 9. BI-RADS v2025 ultrasound descriptor of perilesional echogenic features in two different patients. (A) Ultrasound image in 66-year-old patient shows circumscribed mass (20x10 mm) surrounded by thin, continuous echogenic pseudocapsule (arrowhead), feature typically associated with benign lesions. Core biopsy indicated diagnosis of benign fibroadenoma (B2). (B) Ultrasound image in 72-year-old patient shows mass (30x25 mm) with surrounding irregular echogenic rind (arrow), feature associated with malignancy and reflecting peritumoral stromal reaction. Histopathologic assessment was consistent with grade-2 invasive carcinoma of no special type (B5b). Examples illustrate emphasis in BI-RADS v2025 on morphology-driven assessment whereby perilesional echogenic features may contribute to risk stratification and biopsy decision-making. Histologic classification is reported according to UK B-coding system (B2: benign lesion with no evidence of malignancy; B5b: invasive breast carcinoma with stromal invasion).

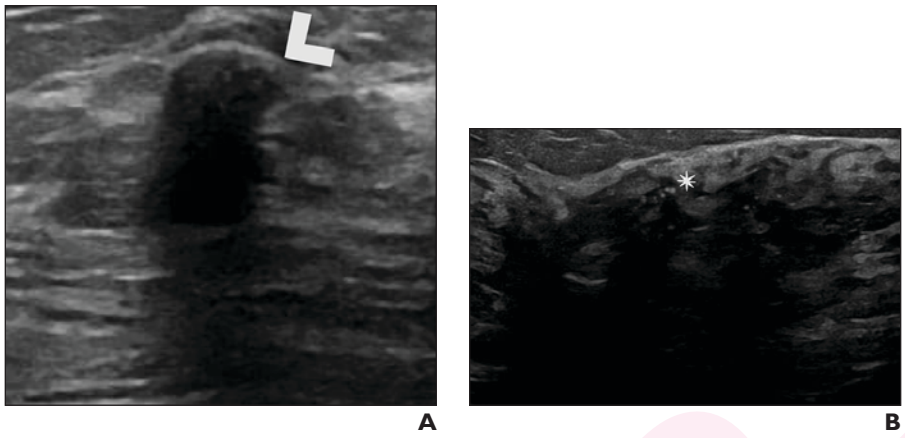


Figure 10. BI-RADS v2025 descriptors for calcifications on ultrasound in 67-year-old patient (same patient as in Fig. 6). (A) Ultrasound image shows coarse calcifications with posterior acoustic shadowing, consistent with macrocalcifications. (B) Ultrasound image shows microcalcifications (asterisk) located outside mass, highlighting their anatomic context. Application of standardized descriptors to calcifications on ultrasound facilitates multimodality correlation.

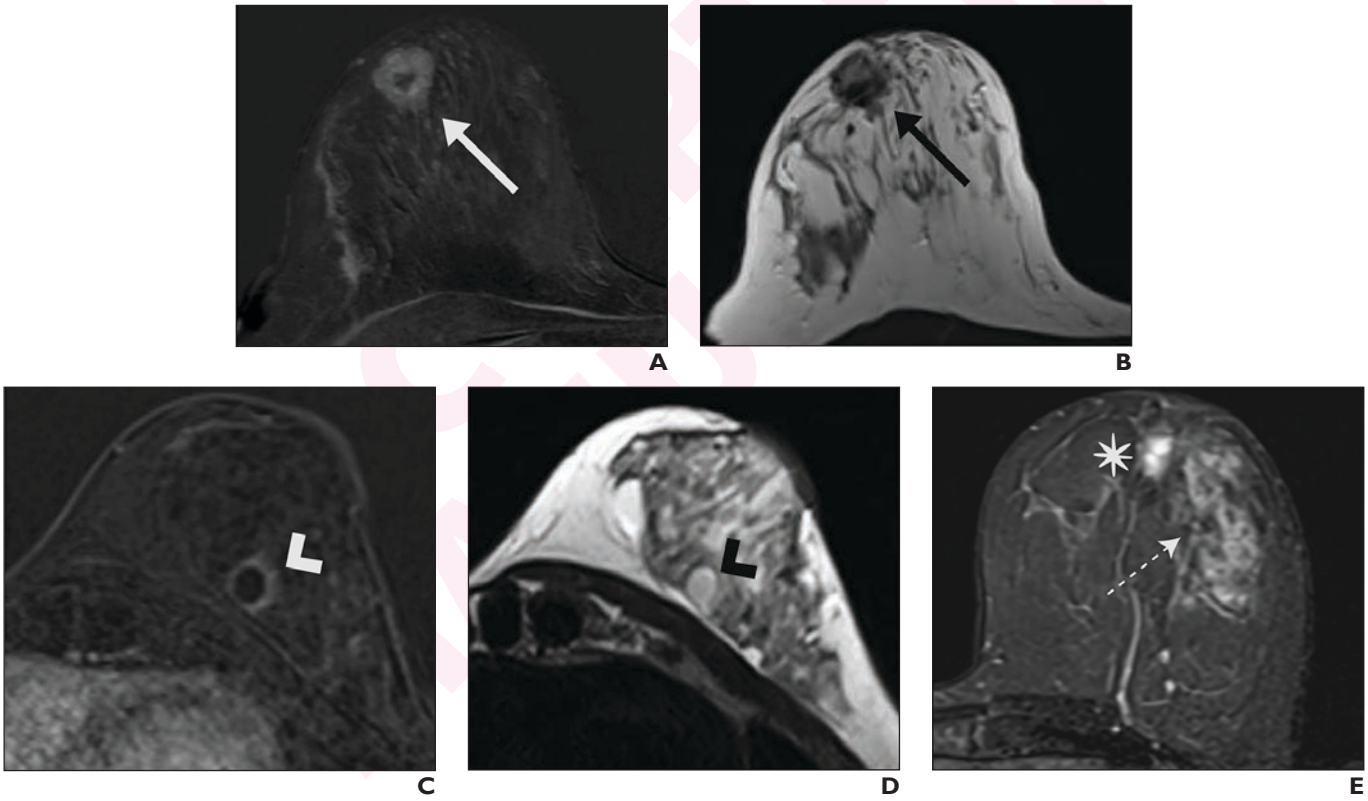


Figure 11. Integration of morphology and adjunct features using BI-RADS v2025 MRI descriptors in three different patients. (A,B) 36-year-old patient. Subtracted T1-weighted MR image (A) shows mass with thick irregular rim enhancement (white arrow), feature associated with malignancy. Corresponding T2-weighted non-fat-suppressed image (B) shows lesion as not hyperintense (black arrow), supporting suspicious interpretation in appropriate morphologic context. (C,D) 44-year-old patient. Subtracted T1-weighted MR image (C) shows lesion with thin, smooth rim enhancement (white arrowhead). Corresponding T2-weighted non-fat-suppressed image (D) shows marked hyperintensity (black arrowhead), consistent with benign cystic lesion. (E) 45-year-old patient. T2-weighted fat-suppressed image shows extensive peritumoral edema (dashed arrow) in tissue adjacent to necrotic mass (asterisk). These examples illustrate approach to breast MRI in BI-RADS v2025 whereby morphology remains primary determinant of assessment, while adjunct features such as T2 signal intensity and peritumoral edema provide supportive information for lesion characterization and staging.

AJR

Review Article

BI-RADS v2025: Key Updates and Implications for Breast Imaging Practice

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