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TECHNICAL NOTE

Standardized structured breast CEM report based on BI-RADS v2025: a technical note

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ABSTRACT

The Breast Imaging Reporting and Data System (BI-RADS) lexicon standardizes the interpretation and reporting of breast findings to ensure clear, precise, and consistent communication between radiologists and referring physicians. Until its fifth edition, the BI-RADS system covered only digital mammography (DM), ultrasound (US), and magnetic resonance imaging (MRI). BI-RADS v2025 incorporates a specific lexicon for contrast-enhanced mammography (CEM), a technique that combines mammography with intravenous iodinated contrast media to evaluate lesion vascularity. Greater contrast enhancement improves the detection and characterization of suspicious lesions – especially in dense breasts – offering a faster, more accessible alternative to MRI in certain clinical scenarios. Although BI-RADS provides descriptors, categories, and standardized language for interpreting breast imaging findings, it lacks a structured reporting template for complete report writing. Therefore, the implementation of proprietary or institutional formats is necessary to ensure document uniformity and quality. In radiology, the use of structured templates significantly impacts the quality, efficiency, and safety of reports. They standardize language and report structure, reduce variability among radiologists, and decrease the possibility of omitting relevant findings. By following a predefined format, reports become more comprehensive and consistent, especially in frequent studies or those requiring systematic evaluation of multiple structures. This technical note provides a template for creating a structured and standardized report based on the BI-RADS v2025 lexicon to optimize diagnostic clarity, reproducibility of findings, and appropriate decision-making. It consists of eighteen sections, that includes general information, clinical history, most relevant previous studies, specific descriptors for abnormal findings, and the corresponding category and recommendations.

Keywords: *Mammography. Contrast media. Diagnostic imaging. Computerized medical records systems. Breast Imaging Reporting and Data System.*

INTRODUCTION

In Mexico, breast cancer is the most common malignant neoplasm in women, with an incidence of 30.6 cases per 100,000 women between the ages of 40 and 69[1] and is the leading cause of cancer-related mortality with high incidences in Sonora, Sinaloa, Tamaulipas, Coahuila, Baja California, Nuevo León, and Mexico City[2]. While digital mammography (DM) is the gold standard for screening, factors such as high breast density (C and D categories) can reduce sensitivity as low as 31.3%[3]. The implementation of new imaging

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techniques, such as contrast-enhanced magnetic resonance imaging (CE-MRI) and contrast-enhanced mammography (CEM), helped increase the detection of lesions in women with this dense breasts, with sensitivity and specificity of 97% and 69% for CE-MRI and 95% and 78% for CEM, respectively[4,5]. Although CE-MRI has demonstrated greater sensitivity, factors such as accessibility and cost have led to CEM being increasingly used as an alternative for the detection and locoregional staging of breast cancer in women with dense breasts[3].

Since the Food and Drug Administration (FDA) approval in 2011, the use of CEM has increased, utilizing iodinated contrast media that allow visualize hypervascular areas resulting from tumor angiogenesis. It is based on the acquisition of low-energy (LE), high-energy (HE), and recombined (RC) images[6]. In 2022, the American College of Radiology (ACR) released a supplement to the ACR Breast Imaging Reporting and Data System (BI-RADS) mammography 2013 guidelines, which included the first version of the BI-RADS lexicon for CEM. In 2025, the section was formally established with the release of the first version of the chapter dedicated to CEM[7].

The structured radiology template is a practical tool to organizes information in a standardized, precise, efficient, and clinically relevant way. These features facilitate communication with referring physicians, improving the quality, clarity, and clinical utility of data. It also promotes the incorporation of quantitative measurements, the appropriate use of common terminology, and the reuse of information for research, quality management, and artificial intelligence[8]. This technical note introduces a structured, standardized template for reporting CEM breast findings based on BI-RADS v2025 lexicon.

THE IMPORTANCE OF STRUCTURED REPORTING

Standardized and organized language must be used to report breast findings. In radiology, reports are written as free-text prose or in standardized, structured formats that use templates[9]. Each format has its own characteristics; however, the standardized structured report stands out for its numerous advantages, including clarity, reduced use of acronyms, jargon, and circular reasoning, the ability to express the level of available evidence and the degree of accuracy and consistency of the information provided, and improved communication between radiologists and attending physicians[8].

A cross-sectional study in Mexico, including 71 (44.7%) radiologists and 88 (55.3%) attending physicians from various specialties with active clinical practice, assessed their preference for prose or standardized structured reports and identified the essential qualities of a radiology report. The study concluded that 74.6% of radiologists and 84.1% of attending physicians preferred the standardized structured report over a prose-written report, regardless of age, specialty, or professional experience. The most notable characteristics of this type of report were organization, comprehensibility, conciseness, readability, descriptiveness, and focus on the clinical context[9].

A standardized structured report facilitates interdisciplinary communication by systematically including the clinical indication, relevant findings, study quality, and recommendations for patient management, contributing to efficient and reliable decision-making[9]. Based on BI-RADS v2025, we developed a standardized, structured CEM report template. This report serves as a model that defines the minimum information and characteristics that must be included.

CEM INDICATIONS AND PROTOCOL

CEM is a vascular-based breast imaging method that uses iodinated contrast agents to depict angiogenesis. It may be considered for patients with contraindications to MRI. The main indications for CEM are asymptomatic screening, diagnostic work-up and diagnosis in current breast cancer[7]. The FDA has not approved CEM for screening; therefore, its use is off-label. This can be justified in patients with elevated risk, dense breasts, prior breast cancer with completed treatment, and cases where relevant history includes gene mutations, estimated cancer risk, or prior breast cancer.

For diagnostic work-up, CEM is indicated in patients with imaging findings or, follow-up in BI-RADS category 3, after biopsy, or for breast implant assessment. The clinical and imaging findings in these patients should be reported. If the indication is breast cancer diagnosis, CEM may be used to assess the extent of disease before treatment, and to evaluate response during or after neoadjuvant therapy. Before this examination, it is important to know the location and size of the malignant lesion on a previous imaging examination[7].

To perform CEM, informed consent must first be obtained. Antecubital venous access is established (preferably with a 20-gauge needle), and a non-ionic low-osmolar iodinated contrast agent (300-370 mg/mL) is administered at 1.5 mL/kg and a flow rate of 3 mL/s

with a power injector, followed by a 10 mL saline bolus[10,11]. Two minutes after administration, standard bilateral craniocaudal (CC) and mediolateral oblique (MLO) views are obtained using dual-energy imaging, acquiring LE (28-32 keV) and HE (> 33.2 keV) images, which are recombined to suppress normal breast tissue and enhance lesion conspicuity[11,12]. HE imaging reveals contrast agent uptake, but it is non-interpretable. Additional views may be obtained as needed, within a maximum of 10 minutes after completion of the contrast injection and before contrast washout[12]. The injection site must be checked for any signs of contrast extravasation, which occurs in 0.1% to 1.2% of patients[11].

STANDARDIZED STRUCTURED TEMPLATE COMPONENTS FOR BREAST CEM REPORT

The standardized structured template, based on BI-RADS terminology and descriptors established by the ACR BI-RADS system[7] is organized into sections for systematic recording of clinical and radiological information obtained from the patient (Table 1 and Supplementary Table 1). The format begins with general information (date, time, and location of the study), followed by the patient's name, sex, age, weight, and referring physician. The first section includes the full name of the study to be performed. The second section specifies the indication: screening (indicating if the patient has a higher-than-average risk and the reason for the increased risk), diagnosis in patients under follow-up, in those with a finding or history of breast cancer under follow-up, or in those with histopathologic confirmation of breast cancer, to evaluate the extent of the disease or the response to neoadjuvant chemotherapy.

The third section details the patient's medical history, including a personal history with histopathology results, time frame, genetic studies, and/or family history of cancer. The fourth section includes relevant information from previous imaging examinations, specifying the date and type (DM, US, CEM, CE-MRI), and whether images and reports are available. If this is the patient's first CEM examination, it is described as a "baseline exam."

The fifth section describes the technique and protocol: laterality and projections acquired must be indicated, mentioning if projections other than the conventional CC and MLO were obtained, and the name of the contrast medium used, the dose (mmol/kg) and volume (cc). It is essential to include complications and reactions, and to describe in detail the symptoms and medical management during the CEM examination.

The sixth section should indicate the artifacts identified. The BI-RADS manual does not describe each of these in detail. Since they can reduce the quality of the CEM examination and lead to interpretation errors, they must be mentioned. Common artifacts, described by Jochelson et al.[6] and Lorente-Ramos et al.[13], are grouped into three categories:

- *Related to the contrast medium*: splatter of contrast material on the skin, detector, or compression paddles, which can simulate lesions or calcifications. The technician injecting the contrast agent should not be the person who positions the patient and should wear gloves, removing them before positioning the patient. Another preventive measure is to clean the breasts and the detector before image acquisition[6,13]. Another artifact is the transient retention of contrast material in veins, which may persist due to early breast compression; this usually resolves spontaneously. The distribution and morphology of these findings should be considered to determine if they are true[6,13].
- *Related to the technique*: air trapped in skin folds or scars due to improper contact can produce black lines in the image[6,13]; the halo artifact (also known as rim, breast-in-breast, or scattered radiation), when uneven thickness of breast tissue and skin produces different radiation scattering, can result in a double-breast contour; negative enhancement (the eclipse or crescent sign) produced by cysts, calcifications, and hematomas appears darker than the surrounding tissue; misregistration artifact is caused by patient movement with metal or calcium; when the paddles are the incorrect size, the axillary line becomes visible, causing horizontal lines to appear. Other artifacts, such as aborted acquisition, miscalibration, and ghosting, can be resolved through equipment calibration and new image acquisition[6,13].
- *Related to the patient*: movement during the acquisition of LE and HE images results in a mild RC mismatch with fine black-and-white lines or breast margin loss, potentially obscuring findings (ripple artifact)[6,13]. To avoid this, the technician should instruct the patient to hold their breath and maximize compression. Superimposed structures, such as the skin, anatomical features (breast, hair, shoulder, chin, nose, ear, clothing, or antiperspirant, can simulate calcifications. These must be recognized and a new projection acquired with the artifact out of the beam's path. Other artifacts include breast implants and cardiac devices[6,13].

Table 1. Standardized structured breast CEM report template based on BI-RADS v2025[7]

Description	Patient information
Study date, time, and location:	
Patient name:	
Sex (woman/man):	
Age (years):	
Weight (kg):	
Referring physician:	
1. Requested imaging examination.	
2. Indication: screening, diagnostic work-up, or current breast cancer.	
3. Medical history: family and/or personal history of breast cancer, with emphasis on genetic mutations and histopathology report.	
4. Comparison to previous examinations: specify if this is a "baseline exam," including dates and types of previous studies, and whether comparison is based on the report or images.	
5. Examination technique: indicate laterality (right, left, bilateral), views (CC, MLO), name of contrast agent, dosage (mmol/kg), volume (in cc), and presence or absence of complications or contrast reaction.	
6. Artifacts that may affect interpretation: - Contrast agent-related artifacts: contamination and/or transient retention of contrast material in veins. - Patient-related artifacts: ripple, breast implants, cardiac devices, and/or superimposed structures. - Technical artifacts: air trapping, skin-line, axillary line, halo, ghosting, misregistration, miscalibration, and/or aborted acquisition.	
7. General description of breast composition: - Breast density: (A) almost entirely fatty, (B) scattered areas of fibroglandular density, (C) heterogeneously dense, which may obscure small masses, (D) extremely dense, which lowers the sensitivity of mammography. - Background parenchymal enhancement: level (minimal, mild, moderate, or marked) and symmetry (symmetric or asymmetric).	
8. Description of findings on LE images only: based on the BI-RADS lexicon for digital mammography: - Masses: shape (oval, lobulated, round, or irregular), margin (circumscribed, obscured, indistinct, or spiculated), and density (fat-containing, low, equal, or high density). - Calcifications: typically, benign (skin, vascular, coarse, large rod-like, round, rim, layering, suture), suspicious morphology (amorphous, coarse, heterogeneous, fine pleomorphic, fine linear, or fine linear-branching), and distribution (diffuse, regional, grouped, linear, segmental). - Architectural distortion. - Asymmetries: global asymmetry, asymmetry, and/or focal asymmetry - Lymph nodes: intramammary and/or axillary. - Skin lesions. - Dilated ducts: multiple or solitary. - Associated features: skin retraction, nipple retraction, skin thickening, and/or trabecular thickening. - Special cases: gynecomastia, implants, other forms of augmentation, and/or mastectomy.	
9. Description of findings on RC images only: - Mass enhancement: shape (oval, lobulated, round, or irregular), margin (circumscribed or non-circumscribed: indistinct or spiculated), internal enhancement pattern (homogeneous, heterogeneous, or rim). - Non-mass enhancement: distribution (diffuse, regional, focal, linear, or segmental), internal enhancement pattern (homogeneous, heterogeneous, or clumped). - Enhancing asymmetry: internal enhancement pattern (homogeneous or heterogeneous).	

(Continued)

Table 1. Standardized structured breast CEM report template based on BI-RADS v2025[7] *(continuation)*

Description	Patient information
10. Description of findings on LE images with associated enhancement on RC images: - LE findings: as detailed in section 8. - Internal enhancement pattern: as detailed in section 9. - Extent of enhancement: mammographic lesion partially enhances, completely enhances, enhancement extends beyond the mammographic lesion, or no enhancement of the mammographic lesion but enhancement in adjacent tissue.	
11. Lesion conspicuity: describe the degree of BPE as low, moderate, or high.	
12. Associated features: nipple retraction, nipple involvement, skin retraction, skin thickening, skin involvement, and axillary adenopathy.	
13. Location of the suspicious finding: side, clock-face and/or quadrant, and depth (anterior, middle, or posterior third and/or distance from nipple in cm).	
14. Additional imaging: perform a targeted US and describe findings according to the BI-RADS lexicon (preferably report both CEM and US if done on the same day), including elasticity assessment by one of the two methods: - E/B ratio: < 1 = benign, and ≥ 1 = suspicious for malignancy. - 5-point color scale: 1 = soft throughout, 2 = mixed soft and hard, 3 = hard but smaller on elastography than B-mode, 4 = hard and equal in size on elastography and B-mode, 5 = hard and larger on elastography than B-mode.	
15. Conclusion: summarizes the main findings.	
16. BI-RADS: assessment categories and likelihood of cancer based on findings. - Category 0: incomplete: need additional imaging evaluation or need prior mammograms for comparison (N/A). - Category 1: negative (essentially 0% likelihood of malignancy). - Category 2: benign (essentially 0% likelihood of malignancy). - Category 3: probably benign (≥ 0% but ≤ 2% likelihood of malignancy). - Category 4: suspicious (> 2% but < 95% likelihood of malignancy). - Category 5: highly suggestive of malignancy (≥ 95% likelihood of malignancy). - Category 6: known biopsy-proven malignancy (N/A).	
17. Management recommendations: - Category 0: recall for additional imaging or need for comparison of prior examination(s). - Category 1: routine annual mammography. - Category 2: routine annual mammography. - Category 3: short interval (6-month) follow-up or continued surveillance (12-month). - Category 4: tissue diagnosis. - Category 5: tissue diagnosis. - Category 6: clinical follow-up with a surgeon and/or oncologist, and definitive local therapy (usually surgery) when clinically appropriate.	
18. Credentials of the radiologist who interpreted the CEM.	

CEM: contrast-enhanced mammography; BI-RADS: Breast Imaging Reporting and Data System; CC: craniocaudal; MLO: mediolateral oblique; LE: low energy; RC: recombined; BPE: background parenchymal enhancement; E/B: elastography to B mode length; N/A: not available; US: ultrasound.

The seventh section describes breast composition. According to the BI-RADS lexicon, breast density is classified as follows[7]: (A) the breasts are almost entirely fatty, (B) there are scattered areas of fibroglandular density, (C) the breasts are heterogeneously dense, which may obscure small masses, and (D) the breasts

Table 2. Example of a standardized structured CEM report template based on BI-RADS v2025[7] for a benign case (Figure 1)

Description	Patient information
Study date, time, and location:	December 15, 2025. Tampico, Tamaulipas.
Patient's name:	SRSC.
Sex (woman/man):	Woman.
Age (years):	45.
Weight (kg):	80.
Referring physician:	To whom it may concern.
1. Requested imaging examination.	Contrast-enhanced mammography.
2. Indication: screening, diagnostic work-up, or current breast cancer.	Screening.
3. Medical history: family and/or personal history of breast cancer, with emphasis on genetic mutations, and histopathology report.	No relevant family or personal history.
4. Comparison to previous examinations: a "baseline exam" may be specified, including the dates and type of previous studies, and whether it is based on the report or the images.	Comparison is made with reports of previous studies (mammography and ultrasound) from June 2023, which concluded dense breasts (D) and bilateral simple cysts, BI-RADS 2; as well as studies from May 2024 that concluded dense breasts (D), bilateral simple cysts, and multiple bilateral hyperdense masses, BI-RADS 0.
5. Examination technique: indicate the laterality (right, left, bilateral) and views (CC, MLO), name of the contrast agent, dosage (mmol/kg), and volume (cc), and the presence or absence of complications or contrast reaction.	Bilateral CEM with CC and MLO projections. Administration of non-ionic water-soluble contrast agent (omnipaque 300 mg/mL), 1.5 mL/kg, 120 cc. No adverse events after contrast agent administration.
6. Artifacts that may affect interpretation: - Contrast agent-related artifacts: contamination and/or transient retention of contrast material in veins. - Patient-related artifacts: ripple, breast implants, cardiac devices, and/or superimposed structures. - Technical artifacts: air trapping, skin-line, axillary line, halo, ghosting, misregistration, miscalibration, and/or aborted acquisition.	Bilateral halo artifact observed in both CC and MLO views, bilateral air trapping in MLO.
7. General description of breast composition: - Breast density: (A) the breasts are almost entirely fatty, (B) there are scattered areas of fibroglandular density, (C) the breasts are heterogeneously dense, which may obscure small masses, (D) the breasts are extremely dense, which reduces mammography sensitivity. - Background parenchymal enhancement: level (minimal, mild, moderate, or marked), and symmetry (symmetric or asymmetric).	The breast composition is extremely dense (D). Moderate and symmetric background parenchymal enhancement.
8. Description of findings on LE images only: based on the BI-RADS lexicon for digital mammography: - Masses: shape (oval, lobulated, round, or irregular), margin (circumscribed, obscured, indistinct, or spiculated), and density (fat-containing, low density, equal density, high density). - Calcifications: typically, benign (skin, vascular, coarse, large rod-like, round, rim, layering, suture), suspicious morphology (amorphous, coarse, heterogeneous, fine pleomorphic, fine linear, or fine linear-branching), and distribution (diffuse, regional, grouped, linear, segmental). - Architectural distortion. - Asymmetries: global asymmetry, asymmetry, and/or focal asymmetry. - Lymph nodes: intramammary, and/or axillary. - Skin lesions. - Dilated ducts: multiple or solitary. - Associated features: skin retraction, nipple retraction, skin thickening, and/or trabecular thickening. - Special cases: gynecomastia, implants, other forms of augmentation, and/or mastectomy.	See section 9.

(Continued)

Table 2. Example of a standardized structured CEM report template based on BI-RADS v2025[7] for a benign case (Figure 1) *(continuation)*

Description	Patient information
9. Description of findings on RC images only: - Mass enhancement: shape (oval, lobulated, round, or irregular), margin (circumscribed, or non-circumscribed: indistinct, or spiculated), internal enhancement pattern (homogeneous, heterogeneous, or rim). - Non-mass enhancement: distribution (diffuse, regional, focal, linear, or segmental), internal enhancement pattern (homogeneous, heterogeneous, or clumped). - Enhancing asymmetry: internal enhancement pattern (homogeneous or heterogeneous).	An oval, circumscribed, equal density mass is observed, presenting homogeneous internal enhancement.
10. Description of findings on LE images with associated enhancement on RC images: - LE findings: as detailed in section 8. - Internal enhancement pattern: as detailed in section 9. - Extent of enhancement: mammographic lesion partially enhances, mammographic lesion completely enhances, enhancement extends beyond mammographic lesion, or no enhancement of the mammographic lesion but enhancement in adjacent tissue.	See section 9.
11. Lesion conspicuity: describe the degree of BPE as low, moderate, or high.	Moderate lesion conspicuity.
12. Associated features: nipple retraction, nipple involvement, skin retraction, skin thickening, skin involvement, and axillary adenopathy.	None.
13. Location of finding: side, clock-face and/or quadrant, and depth (anterior, middle, or posterior third and/or distance from nipple in cm).	Right breast, lower quadrants interline, middle third, 2 cm from the nipple.
14. Additional imaging: perform a targeted US and describe the findings according to the BI-RADS lexicon (it is preferable to report both the CEM and the ultrasound if performed on the same day), including elasticity assessment by one of the two methods: - E/B ratio: < 1 = benign; and ≥ 1 = suspicious for malignancy. - 5-point color scale: 1 = soft throughout, 2 = mixed soft and hard, 3 = hard but smaller on elastography than B-mode, 4 = hard and equal in size on elastography and B-mode, 5 = hard and larger on elastography than B-mode.	Using GE LOGIQ E9 equipment, an oval, parallel, lobulated, hypoechoic mass without vascularity on color Doppler is observed, measuring 9 × 5 × 6 mm, located at 6 o'clock, 2 cm from the nipple of the right breast. Elastogram shows intermediate stiffness, with a 5-point color scale score of 2 (mixed soft and hard).
15. Conclusion: summarizes the main findings of the examination	Hyperenhancing mass in the right breast.
16. BI-RADS: assessment categories and likelihood of cancer based on findings. - Category 0: incomplete: need additional imaging evaluation or need prior mammograms for comparison (N/A). - Category 1: negative (essentially 0% likelihood of malignancy). - Category 2: benign (essentially 0% likelihood of malignancy). - Category 3: probably benign (≥ 0% but ≤ 2% likelihood of malignancy). - Category 4: suspicious (> 2% but < 95% likelihood of malignancy). - Category 5: highly suggestive of malignancy (≥ 95% likelihood of malignancy). - Category 6: known biopsy-proven malignancy (N/A).	Category BI-RADS 3: probably benign (≥ 0% but ≤ 2% likelihood of malignancy).
17. Management recommendations: - Category 0: recall for additional imaging/ need comparison of prior examination(s). - Category 1: routine annual mammography. - Category 2: routine annual mammography. - Category 3: short interval (6-month) follow-up or continued surveillance (12-month). - Category 4: tissue diagnosis. - Category 5: tissue diagnosis. - Category 6: clinical follow-up with surgeon and/or oncologist, and definitive local therapy (usually surgery) when clinically appropriate.	Short interval (6-month) follow-up is recommended.
18. Credentials of the radiologist who interpreted the CEM	

CEM: contrast-enhanced mammography; BI-RADS: Breast Imaging Reporting and Data System; CC: craniocaudal; MLO: mediolateral oblique; LE: low energy; RC: recombined; BPE: background parenchymal enhancement; E/B: elastography to B-mode length. N/A: not available; US: ultrasound.

are extremely dense, which lowers DM sensitivity. Subsequently, background parenchymal enhancement (BPE) is described according to the level – minimal, mild, moderate, or marked – and whether it is symmetric or asymmetric.

The eighth section describes LE image findings using the BI-RADS lexicon for DM. For masses, describe the shape (oval, lobulated, round, or irregular), margin (circumscribed, obscured, indistinct, or spiculated), and density (fat-containing, low density, equal density, or high density). For calcifications, classify them as typically benign (skin, vascular, coarse, large rod-like, round, rim, layering, or suture) or as having suspicious morphology (amorphous, coarse heterogeneous, fine pleomorphic, or fine linear/fine linear-branching). In both cases, indicate the distribution pattern (diffuse, regional, grouped, linear, or segmental). Also, architectural distortion and asymmetries, such as dilated ducts (multiple or solitary), are described. Special cases, such as gynecomastia, implants, other forms of augmentation, or mastectomy, must be included. The size and location of the finding, specifying laterality, quadrant, and/or clock face, depth, and/or distance from the nipple, should be mentioned.

The ninth section describes only RC image findings. It includes mass (shape, margin, internal enhancement pattern), non-mass enhancement (distribution, internal enhancement pattern), and enhancing asymmetry (internal enhancement pattern). The tenth section describes LE image findings with associated RC image enhancement. It requires a detailed description of morphology (oval, lobulated, round, or irregular), internal enhancement patterns (homogeneous, heterogeneous, or rim), and the extent of enhancement (mammographic lesion partially enhances, mammographic lesion completely enhances, enhancement extends beyond the mammographic lesion or no enhancement of the mammographic lesion but enhancement in adjacent tissue).

The eleventh section provides a subjective description of the degree of enhancement of the lesion compared to normal BPE: low, moderate, or high. If the lesion has enhancement similar to or slightly greater than the BPE, it is classified as low; if the enhancement is much greater than the BPE, it is classified as high; and if the enhancement falls between low and high, it is classified as moderate. The twelfth section describes associated features: retraction, involvement, or thickening of the skin and nipple. Axillary adenopathies are included.

The thirteenth section describes the location of suspicious malignant findings: laterality (right, left, or both) and the clock-face or quadrant. Lesion depth is indicated using thirds (anterior, middle, or posterior) along with the distance from the nipple in centimeters.

Section fourteen describes, if it is possible to perform, a targeted ultrasound (US) for CEM findings using BI-RADS v2025 descriptors for US[7]. Elastography is included in the lexicon because it is available on many US units. The descriptors for elasticity assessment are categorized as soft, intermediate, or hard. Two methods for stiffness assessment are recommended: the elastography-to-B-mode length (E/B) ratio and the 5-point color scale (elasticity score). For the E/B ratio, a value under 1 is associated with benign findings, while a ratio of 1 or higher is suspicious for malignancy. For the 5-point color scale, the assessment is as follows: 1 = soft throughout; 2 = mixed soft and hard; 3 = hard but smaller on elastography than on B-mode; 4 = hard and equal in size on elastography and B-mode; 5 = hard and larger on elastography than on B-mode. A score of 3 or lower on the 5-point color scale is more commonly associated with benign findings, while a score of 4 or 5 is considered suspicious for malignancy. For the strain ratio (lesion-to-fat ratio), a region of interest (ROI) is compared with subcutaneous fat. BI-RADS v2025 does not include formal recommendations for reporting strain elastography, which evaluates tissue stiffness based on how much a lesion can be compressed, or shear wave elastography, which measures the speed at which acoustically generated shear waves travel through tissue. Their cutoff values are not standardized and can vary by vendor or be configured by the user[7].

The fifteenth section is the conclusion, where relevant information from each CEM is summarized and ordered from most to least important. The sixteenth section describes the BI-RADS category based on the most relevant finding, benign or malignant, with assessment categories and likelihood of cancer: Category 0: incomplete; Category 1: negative; Category 2: benign; Category 3: probably benign; Category 4: suspicious; Category 5: highly suggestive of malignancy; and Category 6: known biopsy-proven malignancy[7].

The seventeenth section contains management recommendations based on the assigned BI-RADS category: Category 0: recall for additional imaging or need comparison to prior examinations; Category 1: routine annual mammography; Category 2: routine annual mammography; Category 3: short-interval (6-month) follow-up or continued surveillance (12-month); Category 4: tissue diagnosis; Category 5: tissue diagnosis; Category 6: clinical follow-up with a surgeon and/or oncologist, and

Table 3. Example of a standardized structured CEM report template based on BI-RADS v2025[7] for a malignant case (Figure 2)

Description	Patient information
Study date, time, and location:	December 18, 2025. Tampico, Tamaulipas.
Patient name:	MAPG.
Sex (woman/man):	Woman.
Age (years):	72.
Weight (kg):	65.
Referring physician:	To whom it may concern.
1. Requested imaging examination.	Contrast-enhanced mammography.
2. Indication: screening, diagnostic work-up, or current breast cancer.	Diagnostic.
3. Medical history: family and/or personal history of breast cancer, with emphasis on genetic mutations, and histopathology report.	No relevant family or personal history.
4. Comparison to previous examinations: a "baseline exam" may be specified, including the dates and type of previous studies, and whether it is based on the report or the images.	Based on a report of a previous mammogram performed at another institution in October 2025, a focal asymmetry with thick, heterogeneous, and segmental calcifications was identified in the left breast, categorized as BI-RADS 4B.
5. Examination technique: indicate the laterality (right, left, bilateral) and views (CC, MLO), name of the contrast agent, dose (mmol/kg), volume (cc), and the presence or absence of complications/contrast reaction.	Bilateral CEM with CC and MLO projections. Administration of non-ionic water-soluble contrast agent (Omnipaque 300 mg I/mL), 1.5 ml/kg, 97 cc. No adverse events were reported during or after contrast agent administration.
6. Artifacts that may affect interpretation: - Contrast agent-related artifacts: contamination and/or transient retention of contrast material in veins. - Patient-related artifacts: ripple, breast implants, cardiac devices, and/or superimposed structures. - Technical artifacts: air trapping, skin-line, axillary line, halo, ghosting, misregistration, miscalibration, and/or aborted acquisition.	Air trapping and halo artifact are observed in both breasts, with a misregistration artifact due to calcifications in the left breast seen in CC and MLO views.
7. General description of breast composition: - Breast density: (A) the breasts are almost entirely fatty, (B) there are scattered areas of fibroglandular density, (C) the breasts are heterogeneously dense, which may obscure small masses, (D) the breasts are extremely dense, which reduces mammography sensitivity. - Background parenchymal enhancement: level (minimal, mild, moderate, or marked), and symmetry (symmetric or asymmetric).	The breast composition shows scattered areas of fibroglandular density (B). Minimal and symmetric background parenchymal enhancement.
8. Description of findings on LE images only: based on the BI-RADS lexicon for digital mammography: - Masses: shape (oval, lobulated, round, or irregular), margin (circumscribed, obscured, indistinct, or spiculated), and density (fat-containing, low density, equal density, high density). - Calcifications: typically, benign (skin, vascular, coarse, large rod-like, round, rim, layering, suture), suspicious morphology (amorphous, coarse, heterogeneous, fine pleomorphic, fine linear, or fine linear-branching), and distribution (diffuse, regional, grouped, linear, segmental). - Architectural distortion. - Asymmetries: global asymmetry, asymmetry, and/or focal asymmetry. - Lymph nodes: intramammary and/or axillary. - Skin lesions. - Dilated ducts: multiple or solitary. - Associated features: skin retraction, nipple retraction, skin thickening, and/or trabecular thickening. - Special cases: gynecomastia, implants, other forms of augmentation, and/or mastectomy.	See section 10.

(Continued)

Table 3. Example of a standardized structured CEM report template based on BI-RADS v2025[7] for a malignant case (Figure 2) *(continuation)*

Description	Patient information
9. Description of findings on RC images only: - Mass enhancement: shape (oval, lobulated, round, or irregular), margin (circumscribed, or non-circumscribed: indistinct, or spiculated), internal enhancement pattern (homogeneous, heterogeneous, or rim). - Non-mass enhancement: distribution (diffuse, regional, focal, linear, or segmental), internal enhancement pattern (homogeneous, heterogeneous, or clumped). - Enhancing asymmetry: internal enhancement pattern (homogeneous or heterogeneous).	See section 10.
10. Description of findings on LE images with associated enhancement on RC images: - LE findings: as detailed in section 8. - Internal enhancement pattern: as detailed in section 9. - Extent of enhancement: the mammographic lesion partially enhances, mammographic lesion completely enhances, enhancement extends beyond mammographic lesion, or no enhancement of the mammographic lesion but enhancement in adjacent tissue.	In LE images, asymmetry is observed in the CC projection, associated with round and linear segmental calcifications. In the RC images, at the site of the asymmetry observed in the LE image, a non-mass enhancement is noted, characterized by a segmental distribution and a clumped internal enhancement pattern.
11. Lesion conspicuity: describe the degree of BPE as low, moderate, or high.	Moderate lesion conspicuity.
12. Associated features: nipple retraction, nipple involvement, skin retraction, skin thickening, skin involvement, and axillary adenopathy.	None.
13. Location of finding: side, clock-face and/or quadrant, and depth (anterior, middle, or posterior third and/or distance from nipple in cm).	Left breast, outer upper quadrant, anterior third, 4 cm from the nipple.
14. Additional imaging: perform a targeted US and describe findings according to the BI-RADS lexicon (preferably report both CEM and US if done on the same day), including elasticity assessment by one of the two methods: - E/B ratio: < 1= benign; and ≥ 1 = suspicious for malignancy. - 5-point color scale: 1 = soft throughout, 2 = mixed soft and hard, 3 = hard but smaller on elastography than B-mode, 4 = hard and equal in size on elastography and B-mode, 5 = hard and larger on elastography than B-mode.	Using GE LOGIQ E9 equipment a non-mass lesion with calcifications, posterior shadowing, and internal vascularity on color Doppler is observed, measuring 21 × 21 mm, located in the outer upper quadrant of the left breast. Elastogram shows a hard pattern; the 5-point color scale score is 5 (hard and larger on elastography than B-mode).
15. Conclusion: summarizes the main findings of the examination.	Asymmetry associated with non-mass enhancement with round and linear segmental calcifications in the outer upper quadrant of the left breast.
16. BI-RADS: assessment categories and likelihood of cancer based on findings. - Category 0: incomplete: need additional imaging evaluation or need prior mammograms for comparison (N/A). - Category 1: negative (essentially 0% likelihood of malignancy). - Category 2: benign (essentially 0% likelihood of malignancy). - Category 3: probably benign (≥ 0% but ≤ 2% likelihood of malignancy). - Category 4: suspicious (> 2% but < 95% likelihood of malignancy). - Category 5: highly suggestive of malignancy (≥ 95% likelihood of malignancy). - Category 6: known biopsy-proven malignancy (N/A).	Category BI-RADS 4: suspicious (> 2% but < 95% likelihood of malignancy).
17. Management recommendations: - Category 0: recall for additional imaging/ need comparison of prior examination(s). - Category 1: routine annual mammography. - Category 2: routine annual mammography. - Category 3: short interval (6-month) follow-up or continued surveillance (12-month). - Category 4: tissue diagnosis. - Category 5: tissue diagnosis. - Category 6: clinical follow-up with surgeon and/or oncologist, and definitive local therapy (usually surgery) when clinically appropriate.	Tissue diagnosis is recommended.
18. Credentials of the radiologist who interpreted the CEM.	

CEM: contrast-enhanced mammography; BI-RADS: Breast Imaging Reporting and Data System; CC: craniocaudal; MLO: mediolateral oblique; LE: low energy; RC: recombined; BPE: background parenchymal enhancement; E/B: elastography to B-mode length; N/A: not available; US: ultrasound.

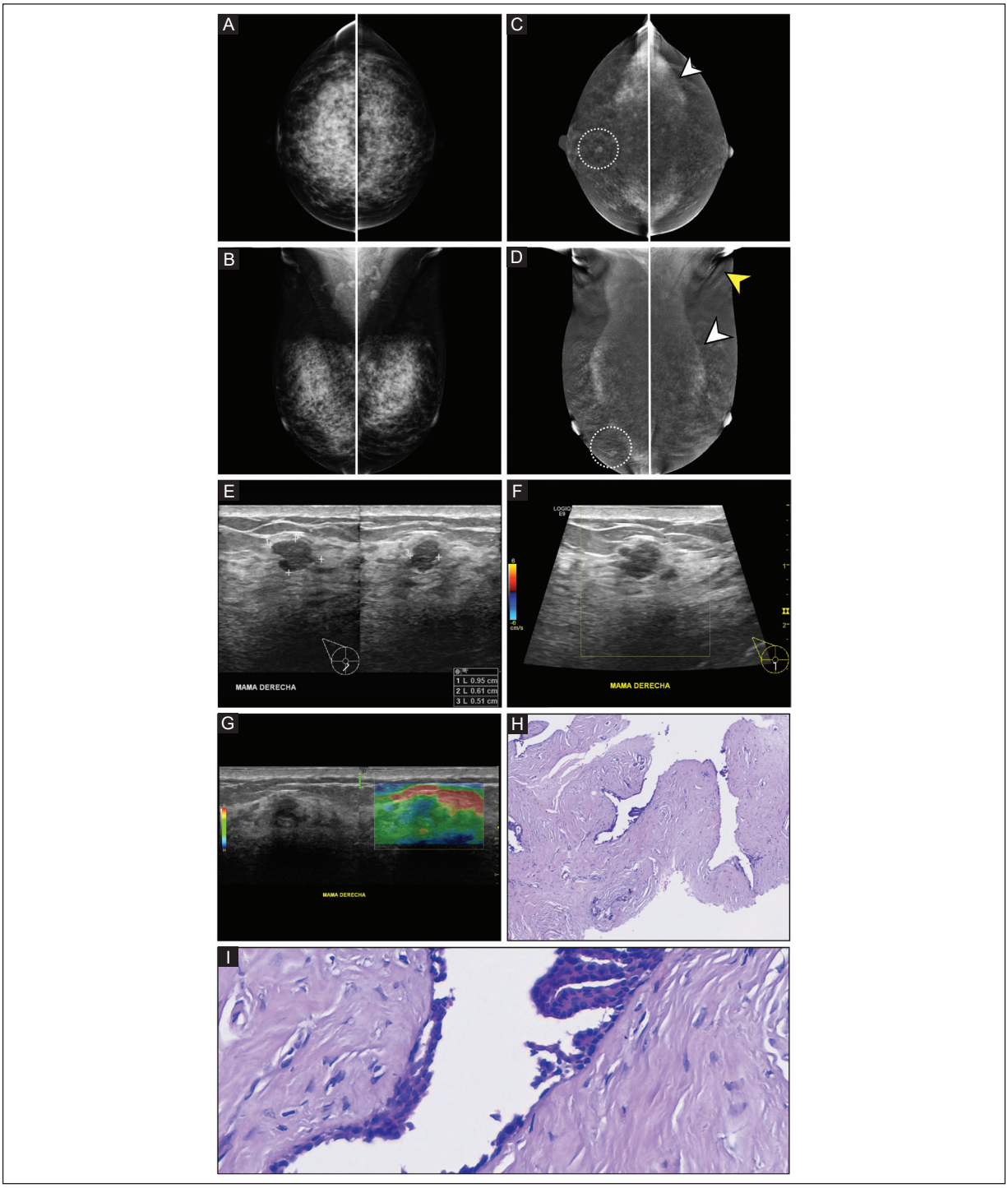

Figure 1. CEM of a 45-year-old asymptomatic woman who underwent screening due to high breast density. A hyperenhancing mass was found in the right breast, resulting in a BI-RADS category 3. **A-B**: CC and MLO LE views show an extremely dense breast (D), with no abnormalities. **C-D**: CC and MLO RC views show bilateral halo artifact (white arrowhead) and air trapping (yellow arrowhead), with moderate and symmetric background parenchymal enhancement. An oval, circumscribed, equal-density mass is observed, presenting homogeneous internal enhancement, and moderate lesion conspicuity, located in the right breast, lower quadrants interline, middle third, 2 cm from the nipple (white dotted circle). **E-F**: grayscale US shows an oval, parallel, lobulated, hypoechoic mass, without vascularity on color Doppler, measuring 9 × 5 × 6 mm, located at 6 o'clock, 2 cm from the nipple of the right breast. **G**: elastogram shows intermediate stiffness, with a 5-point color scale score of 2 (mixed soft and hard). BI-RADS category 3: probably benign. An US-guided biopsy was performed at the request of the attending physician. **H**: histopathologic panoramic view (H&E, 4×) of a fibroepithelial lesion with predominance of the mesenchymal component, consisting of fibroblasts and abundant extracellular matrix. **I**: at higher magnification (H&E, 40×), the epithelial component appears compressed and displaced by the fibrous stroma, lined with columnar cells without evident cytological atypia. The histopathologic diagnosis was fibroadenoma.

CEM: contrast-enhanced mammography; CC: craniocaudal; MLO: mediolateral oblique; LE: low energy; RC: recombined; US: ultrasound; BI-RADS: Breast Imaging Reporting and Data System; H&E: hematoxylin and eosin.

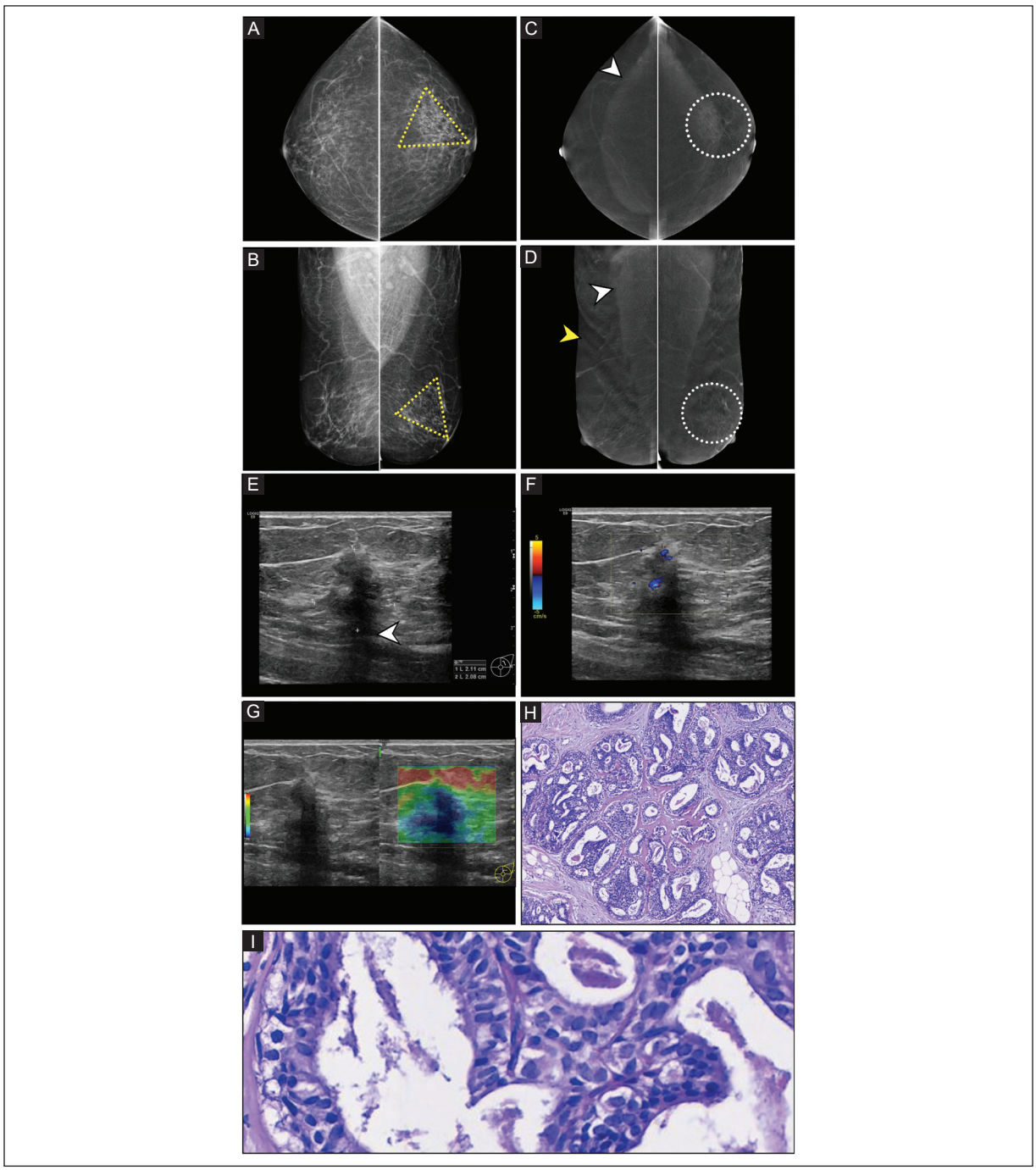

Figure 2. A 72-year-old woman who underwent diagnostic evaluation based on a previous mammography and US with a BI-RADS 4B category. **A-B:** CC and MLO LE views show breast tissue with scattered areas of fibroglandular density (B). Asymmetry is observed in the outer upper quadrants of the left breast, associated with round and linear segmental calcifications (yellow dotted triangle). **C-D:** CC and MLO RC views reveal bilateral air trapping (yellow arrowhead) and halo artifacts (white arrowhead), with minimal and symmetric background parenchymal enhancement. There is non-mass enhancement associated with calcifications (misregistration artifact) in a segmental distribution, and a clumped internal enhancement pattern with moderate lesion conspicuity, located in the left breast, outer upper quadrant, anterior third, 4 cm from the nipple (white dotted circle), corresponding to the asymmetry described in LE. **E:** targeted US using a GE LOGIQ E9 shows a non-mass lesion with calcifications and posterior shadowing (white arrowhead), measuring 21 × 21 mm, located in the outer upper quadrant of the left breast. **F:** color Doppler US shows vascularity within the non-mass lesion. **G:** elastogram shows a hard pattern; the 5-point color scale score is 5 (hard and larger on elastography than B-mode). Assessment category BI-RADS 4: suspicious. US-guided biopsy was performed. **H:** panoramic histopathology view (H&E 4×) shows glandular proliferation with a cribriform and papillary growth pattern, with no evidence of basement membrane rupture. **I:** at higher magnification (H&E 40×), the glands are lined by columnar epithelium with nuclear pleomorphism; elongated and hyperchromatic nuclei are observed, with the basement membrane remains intact. The histopathologic diagnosis was ductal carcinoma in situ.

CEM: contrast-enhanced mammography; CC: craniocaudal; MLO: mediolateral oblique; LE: low energy; RC: recombined; US: ultrasound; BI-RADS: Breast Imaging Reporting and Data System; H&E: hematoxylin and eosin.

definitive local therapy (usually surgery) when clinically appropriate[7]. The eighteenth section, which concludes the report, includes the radiologist's information: name, professional license number, and signature.

Table 2 presents a template example for reporting CEM examination of a benign clinical case involving a 45-year-old asymptomatic woman who underwent screening due to high breast density (D). A hyperenhancing mass was found in the right breast, BI-RADS category 3 (Figure 1). A US-guided biopsy was performed at the physician's request. The histopathologic diagnosis was benign fibroadenoma.

Table 3 presents a template example with the description of the structured and standardized CEM report of a malignant clinical case involving a 72-year-old woman who underwent diagnostic evaluation based on a previous mammography and US with BI-RADS category 4B (Figure 2). Asymmetry associated with non-mass enhancement and round and linear segmental calcifications was found in the left breast. US-guided biopsy was performed. The histopathologic diagnosis was ductal carcinoma in situ.

CONCLUSION

Based on the BI-RADS v2025 update, this technical note presents a structured template for standardized, systematic CEM reporting. The use of templates significantly impacts radiology and other medical specialties by changing how patients' clinical data are documented, communicated, and analyzed. However, excessive and mechanical use of templates should be avoided, as it can limit individual judgment, reduce the medical narrative, or generate repetitive documentation without critical analysis. To prevent this, templates should be flexible, allow supplementary free text, and be based on the specialty's needs. For radiologists, templates have transformed report preparation by organizing findings, reducing omissions, stratifying risk, and improving the quality of conclusions, enabling optimal clinical management for each patient. They also reduce variability among professionals, improve communication with attending physicians, and strengthen the medicolegal framework. Structuring data facilitates clinical research and the development of artificial intelligence. The impact is similar for clinical and surgical specialists, though with its own nuances. Templates ensure that relevant elements are documented. They also serve as checklists that reduce errors and omissions and facilitate follow-up. In the complex hospital environment, standardization facilitates interdisciplinary communication and reduces ambiguity. It increases efficiency by reducing writing time, streamlining workflows, and maintaining quality, even in high-volume patient scenarios.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of human subjects and animals. The authors declare that the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the World Medical Association and the Declaration of Helsinki. The procedures were authorized by the Institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have obtained approval from the Ethics Committee for the analysis of routinely collected and anonymized clinical data; therefore, individual informed consent was not required. Relevant ethical recommendations have been followed.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

Supplementary data

One supplementary template is available on the Journal of the Mexican Federation of Radiology and Imaging website (DOI: 10.24875/JMEXFRI.M26000125). This template is provided by the corresponding author and published online for the reader's benefit.

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