American College of Radiology
ACR Appropriateness Criteria®
Breast Imaging During Lactation

Variant: 1 Lactating female. Age 40 years or older. Breast cancer screening. Average risk.

Procedure	Appropriateness Category	Relative Radiation Level
Digital breast tomosynthesis screening	Usually Appropriate	☢☢
Mammography screening	Usually Appropriate	☢☢
MRI breast without and with IV contrast	May Be Appropriate	O
MRI breast without and with IV contrast abbreviated	May Be Appropriate	O
US breast	Usually Not Appropriate	O
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast abbreviated	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 2 Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.

Procedure	Appropriateness Category	Relative Radiation Level
MRI breast without and with IV contrast	May Be Appropriate	O
US breast	Usually Not Appropriate	O
Digital breast tomosynthesis screening	Usually Not Appropriate	☢☢
Mammography screening	Usually Not Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast abbreviated	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast abbreviated	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 3 Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

Procedure	Appropriateness Category	Relative Radiation Level
Digital breast tomosynthesis screening	Usually Appropriate	☢☢
Mammography screening	Usually Appropriate	☢☢
MRI breast without and with IV contrast	Usually Appropriate	O
MRI breast without and with IV contrast abbreviated	Usually Appropriate	O
US breast	Usually Not Appropriate	O
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast abbreviated	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 4 Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	Usually Not Appropriate	☢☢
Mammography diagnostic	Usually Not Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 5 Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	Usually Appropriate	☢☢
Mammography diagnostic	Usually Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 6 Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	Usually Not Appropriate	☢☢
Mammography diagnostic	Usually Not Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 7 Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	Usually Appropriate	☢☢
Mammography diagnostic	Usually Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 8 Lactating female. Newly diagnosed breast cancer. Locoregional staging.

Procedure	Appropriateness Category	Relative Radiation Level

US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	Usually Appropriate	☢☢
Mammography diagnostic	Usually Appropriate	☢☢
MRI breast without and with IV contrast	Usually Appropriate	O
US axilla	May Be Appropriate	O
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

Variant: 9 **Lactating female. Suspected breast infection or abscess. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	O
Digital breast tomosynthesis diagnostic	May Be Appropriate	☢☢
Mammography diagnostic	May Be Appropriate	☢☢
Mammography with IV contrast	Usually Not Appropriate	☢☢
MRI breast without and with IV contrast	Usually Not Appropriate	O
MRI breast without IV contrast	Usually Not Appropriate	O
Sestamibi MBI	Usually Not Appropriate	☢☢☢

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Summary of Literature Review

Introduction/Background

During lactation, breast tissue undergoes profound physiologic transformation due to hormonal stimulation. Increased glandular volume, ductal dilation, and vascularity are common and can obscure or mimic malignancy [1, 2]. Understanding the impact of lactation on imaging characteristics and selecting appropriate imaging modalities are essential to avoid diagnostic delays and to ensure optimal care for lactating women.

Breast symptoms are common during lactation and often reflect a spectrum of physiologic, infectious, inflammatory, or neoplastic processes that can overlap in presentation. These include inflammatory conditions such as lactational mastitis, breast abscess, benign proliferative lesions like galactoceles and lactating adenomas, and less commonly, pregnancy-associated breast cancer (PABC). These conditions may present with similar clinical findings such as a palpable mass, focal pain, or erythema, necessitating careful imaging evaluation to guide diagnosis and management. Mastitis and abscesses are relatively common in lactating patients. PABC is defined as breast cancer diagnosed during pregnancy or within 12 months postpartum, and although rare, it should be considered in the differential diagnosis [3]. These tumors are usually biologically aggressive and

often present at a more advanced stage compared to those diagnosed in nonpregnant, nonlactating women. Most patients diagnosed with PABC present with a palpable mass, but nonspecific findings such as focal pain, nipple discharge, or diffuse enlargement may delay diagnosis [4].

Occasionally, the infant may reject the affected breast during nursing ("milk rejection sign"). The goal of imaging in the lactating breast is to distinguish physiologic changes from suspicious findings, identify masses or infections requiring intervention, and minimize diagnostic delay for breast cancer. Imaging should be guided by clinical concerns, physical examination, and patient risk factors. Any new palpable abnormality, unresolving infectious symptom, or clinically suspicious nipple discharge should prompt imaging assessment, with tissue sampling when indicated.

Screening and diagnostic imaging can be safely conducted during lactation using protocols stratified by age and breast cancer risk similar to that of nonlactating individuals; therefore, imaging should not be delayed when clinically indicated. The American Society of Breast Surgeons also supports the use of multimodality imaging during lactation without restrictions [5]. Both the ACR and American College of Obstetricians and Gynecologists advise that breastfeeding need not be interrupted after contrast administration or for medically necessary nuclear medicine scans [6, 7]. There is no evidence-based restriction on the timing of the imaging, including contrast-enhanced imaging. When clinically indicated, image-guided core needle biopsy is safe and effective in lactating patients. Though rare, risks such as milk fistula or bleeding should be discussed during preprocedural counseling [8].

Although all patients are at risk for developing breast cancer, this document addresses breast imaging in lactating cisgender females (birth assigned female with a female gender identity). Additional ACR Appropriateness Criteria® topics on "Supplemental Breast Cancer Screening Based on Breast Density" and "Imaging after Breast Surgery" [9, 10] can be referenced in the appropriate clinical context.

Initial Imaging Definition

Initial imaging is defined as imaging at the beginning of the care episode for the medical condition defined by the variant. More than one procedure can be considered usually appropriate in the initial imaging evaluation when:

- There are procedures that are equivalent alternatives (ie, only one procedure will be ordered to provide the clinical information to effectively manage the patient's care)

OR

- There are complementary procedures (ie, more than one procedure is ordered as a set or simultaneously wherein each procedure provides unique clinical information to effectively manage the patient's care).

Discussion of Procedures by Variant

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk.

The primary goal of imaging is the early detection of breast cancer, which can be more challenging

to identify due to the increase in breast density associated with lactation. The expected outcome is to ensure timely intervention, which can improve patient prognosis, reduce disease burden, and contribute to better overall survival by identifying cancer at a treatable stage.

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. A. Digital breast tomosynthesis screening

Screening mammography remains the primary modality for average-risk women ≥40 years of age, including those who are lactating. Lactational changes may increase parenchymal density, potentially obscuring subtle findings. Digital breast tomosynthesis (DBT) may help decrease the masking effect of dense breast tissue and improve lesion visibility in dense breasts, making it a valuable adjunct to mammography [11, 12]. Pumping or breastfeeding prior to mammography reduces density and improves visualization and patient comfort during mammography [13].

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. B. Mammography screening

Mammography screening is safe during lactation and is recommended for all women ≥40 years of age with average risk. Although there are no clinical studies specifically addressing screening mammography in lactating women, a recent meta-analysis that reviewed both screening and diagnostic mammography performance during pregnancy and lactation showed that mammography contributed to the detection of PABC with a detection rate of 78.6%, although this was primarily in the diagnostic setting [14].

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. C. Mammography with IV contrast

Contrast-enhanced mammography (CEM) is safe in lactating women. Physiologic changes during lactation (eg, increased vascularity and density) may affect background enhancement and imaging interpretation, but do not contraindicate the use of CEM [29]. CEM demonstrates higher sensitivity compared to conventional mammography, particularly in women with dense breast tissue; however, these findings are based on studies that did not specifically include lactating patients [30]. The Breast Screening - Risk Adapted Imaging for Density trial (BRAID), which provided key evidence supporting the superior performance of CEM compared to mammography and automated breast US in average-risk women with dense breast >50 years of age excluded lactating women [31]. Due to the lack of specific data in screening lactating populations, CEM is not recommended in lactating average-risk women ≥40 years of age. For breast cancer screening in lactating women with dense breasts, please refer to ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" [10].

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. D. MRI breast without and with IV contrast

Contrast-enhanced MRI is considered safe during lactation. Pharmacokinetic studies have shown that <0.04% of the maternal dose of gadolinium is excreted into breast milk, and <1% of that is absorbed by the infant's gastrointestinal tract, resulting in negligible systemic exposure [15]. Based on this evidence, the ACR states that breastfeeding need not be interrupted following contrast-enhanced MRI [6]. In lactating women with an average lifetime risk of breast cancer, supplemental screening can be approached similarly to nonlactating women, with decisions guided by breast density [10]. Prospective trials and meta-analyses have shown that MRI significantly outperforms other modalities, with cancer detection rates ranging from 15.5 to 19.9 per 1,000, substantially higher than the mean rate for ultrasound (US) (4.5/1,000) and DBT (3.2/1,000) [16-20] [21]. The

Dutch Dense Tissue and Early Breast Neoplasm Screening (DENSE) trial further demonstrated that adding MRI to mammography in women with extremely dense breasts led to 16.5 additional cancers detected per 1,000 and reduced interval cancer rates from 5.0 to 0.8 per 1,000 [22, 23]. Based on such evidence, the European Society of Breast Imaging now recommends MRI screening for women with extremely dense breasts, regardless of their overall risk level [24]. For breast cancer screening in lactating women with dense breasts, please refer to ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" .

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. E. MRI breast without and with IV contrast abbreviated

There are no studies specifically evaluating the use of abbreviated breast MRI (AB-MRI) without and with intravenous (IV) contrast for breast cancer screening in lactating average-risk women ≥40 years of age. AB-MRI protocols, which focus on early postcontrast sequences, offer a streamlined alternative to standard MRI by reducing scan and interpretation times while maintaining high diagnostic performance. These protocols are designed to optimize cancer detection with fewer images, enabling faster interpretation and reduced workload for radiologists [25-28]. Multiple studies have demonstrated that AB-MRI achieves cancer detection rates ranging from approximately 15 to 18 per 1,000, even following negative mammography, and maintains sensitivity comparable to standard MRI, typically ranging from 88% to 100% [25-28]. Therefore, its efficiency and diagnostic yield make it a valuable tool in breast cancer screening, especially for women with dense breasts [10, 26]. For breast cancer screening in lactating women with dense breasts, please refer to ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" .

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. F. MRI breast without IV contrast

There is no relevant literature to support the use of breast MRI without IV contrast for screening of breast cancer in average-risk lactating women ≥40 years of age.

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. G. MRI breast without IV contrast abbreviated

There is no relevant literature to support the use of AB-MRI without IV contrast abbreviated for screening of breast cancer in average-risk lactating women ≥40 years of age.

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. H. Sestamibi MBI

There is no relevant literature to support the use of sestamibi molecular breast imaging (MBI) for screening of breast cancer in average-risk lactating women ≥40 years of age. For lactating women with dense breasts, please see the ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" [10].

Variant 1:Lactating female. Age 40 years or older. Breast cancer screening. Average risk. I. US breast

There is no relevant literature to support the use of whole breast US as a first-line imaging tool in average-risk lactating women ≥40 years of age. For lactating women with dense breasts, please see the ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" [10].

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.

The goal of imaging is to detect cancer at its earliest stage, when treatment is most effective. Given their elevated risk, high-risk women require more intensive screening due to the increased likelihood of developing aggressive breast cancers at a younger age. The expected outcome is to reduce the risk of late-stage diagnosis, thereby improving prognosis and survival through earlier, targeted intervention.

For women <25 years of age, there are no specific screening guidelines due to the low incidence of breast cancer in this age group. Women should have a risk assessment by age 25 to determine if earlier screening is needed based on their individual risk factors and family history. The National Comprehensive Cancer Network guideline "Genetic/Familial High-Risk Assessment: Breast, Ovarian, Pancreatic, and Prostate" recommends annual breast MRI for Li-Fraumeni syndrome starting at age 20 [32].

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
A. Digital breast tomosynthesis screening

There is no relevant literature to support the use of DBT screening in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
B. Mammography screening

There is no relevant literature to support the use of mammography screening in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
C. Mammography with IV contrast

There is no relevant literature to support the use of mammography with IV contrast in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
D. MRI breast without and with IV contrast

MRI may be considered on a case-by-case basis as deemed appropriate through joint decision between the patient and the provider, especially in women who have BRCA mutations or other genetic predispositions, and is safe during lactation with minimal gadolinium transfer [33, 34].

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
E. MRI breast without and with IV contrast abbreviated

There is no relevant literature to support the use of AB-MRI with and without IV contrast in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
F. MRI breast without IV contrast

There is no relevant literature to support the use of breast MRI without IV contrast in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
G. MRI breast without IV contrast abbreviated

There is no relevant literature to support the use of AB-MRI without IV contrast in high-risk lactating women <25 years of age.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
H. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI specific to lactating women <25 years of age with higher-than-average-risk of breast cancer.

Variant 2:Lactating female. Age under 25 years. Breast cancer screening. Higher-than-average risk.
I. US breast

There is no relevant literature to support the use of breast US screening in high-risk lactating women <25 years of age.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

The goal of imaging is to detect cancer at its earliest stage, when treatment is most effective. Given their elevated risk, high-risk women require more intensive screening due to the increased likelihood of developing aggressive breast cancers at a younger age. The expected outcome is to reduce the risk of late-stage diagnosis, thereby improving prognosis and survival through earlier, targeted intervention.

Women with genetics-based increased risk, those with a calculated lifetime risk of 20% or more, and those exposed to chest radiation at young ages are recommended to undergo MRI surveillance starting at 25 to 30 years of age as well as annual mammography when appropriate [35-37]. If annual screening breast MRI is performed, mutation carriers can delay mammographic screening until 40 years of age. For women with Li-Fraumeni syndrome, annual contrast-enhanced breast MRI is recommended to start at age 20, and annual mammography and MRI at ≥30 years of age [38]. Women diagnosed with breast cancer <50 years of age or with personal history of breast cancer and dense breasts should undergo annual supplemental breast MRI. MRI during lactation is safe and supported by recent consensus statements [39]. There is no evidence-based restriction on timing the MRI.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.
A. Digital breast tomosynthesis screening

In high-risk women >25 years of age, screening mammography with or without DBT is recommended to start between 25 and 40 years of age, depending on the type of risk [35]. DBT may help decrease the masking effect of dense breast tissue and improve lesion visibility in dense breasts, making it a valuable adjunct to mammography [11, 12]. Pumping or breastfeeding prior to mammography reduces density and may improve visualization and patient comfort during mammography.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

B. Mammography screening

Mammography screening is safe during lactation and is recommended annually for high-risk women ≥30 years of age. Although there are no clinical studies specifically addressing screening mammography in lactating women, a recent meta-analysis reviewing both screening and diagnostic mammography during pregnancy and lactation mammography contributed to the detection of PABC with a detection rate of 78.6%, although this was primarily in the diagnostic setting [14].

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

C. Mammography with IV contrast

CEM is safe in lactating women [29]. CEM offers a higher sensitivity than conventional mammography and diagnostic performance comparable to contrast-enhanced MRI in high-risk women [31]. However, large-scale studies evaluating these modalities have systematically excluded lactating women from their cohorts [31, 35]. Due to the lack of specific data in lactating populations, CEM is not recommended in lactating higher-than-average-risk women ≥25 years of age.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

D. MRI breast without and with IV contrast

Contrast-enhanced MRI is considered safe during lactation. Pharmacokinetic studies have shown that <0.04% of the maternal dose of gadolinium is excreted into breast milk, and <1% of that is absorbed by the infant's gastrointestinal tract, resulting in negligible systemic exposure [33]. Based on this evidence, the ACR states that breastfeeding need not be interrupted following contrast-enhanced MRI [6]. In lactating women with increased lifetime risk of breast cancer, screening can be approached similarly to nonlactating women [35]. The ACR recommends that women with a calculated lifetime risk of 20% or more and those exposed to chest radiation at young ages (beginning 8 years after treatment or at 25 years of age, whichever is later) are recommended to undergo MRI surveillance starting at 25 to 30 years of age and annual mammography (with a variable starting time between 25 and 40 years of age, depending on the type of risk) [35]. Mutation carriers and their untested first-degree relatives who are undergoing annual breast MRI starting at 25 years of age may delay mammographic screening until 40 years of age. For patients who are not undergoing annual breast MRI, annual mammographic screening is recommended beginning at 30 years of age.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.

E. MRI breast without and with IV contrast abbreviated

AB-MRI protocols, which focus on early postcontrast sequences, offer a streamlined alternative to standard MRI by reducing scan and interpretation times while maintaining high performance metrics. These protocols are designed to optimize cancer detection with fewer images, enabling faster interpretation and reduced workload for radiologists. Multiple studies have demonstrated that AB-MRI achieves cancer detection rates ranging from approximately 15 to 18 per 1,000, even following negative mammography, and maintains sensitivity comparable to standard MRI, typically ranging from 88% to 100% [26, 40]. The AB-MRI efficiency and diagnostic yield make it a valuable tool in breast cancer screening, especially for women with dense breasts or elevated risk [26, 40]. AB-MRI may be an acceptable alternative to standard MRI for lactating patients.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.
F. MRI breast without IV contrast

There is no relevant literature to support the use of breast MRI without IV contrast for screening of breast cancer in higher-than-average-risk lactating women ≥25 years of age.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.
G. MRI breast without IV contrast abbreviated

There is no relevant literature to support the use of AB-MRI without IV contrast for screening of breast cancer in higher-than-average-risk lactating women ≥25 years of age.

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.
H. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI specific to lactating women ≥25 years of age with higher-than-average-risk of breast cancer. For lactating women with dense breasts, please see the ACR Appropriateness Criteria® topic on "Supplemental Breast Cancer Screening Based on Breast Density" [10].

Variant 3:Lactating female. Age 25 years or older. Breast cancer screening. Higher-than-average risk.
I. US breast

To date, no studies have specifically evaluated the role of whole breast US (either handheld or automated) as a screening tool in lactating women. Due to the lack of specific data in lactating populations, whole breast US is not recommended in lactating higher-than-average-risk women ≥25 years of age.

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.

The goal of imaging is to distinguish between benign lactational changes, benign lesions, and malignancy. The expected outcome is to accurately identify the cause of the symptoms, enabling appropriate management—whether reassurance and follow-up—for benign conditions or timely intervention for suspicious findings, thereby minimizing unnecessary anxiety and optimizing patient care. Since clinical examination alone cannot safely exclude malignancy in this context, imaging should not be delayed.

In lactating women <30 years of age, palpable breast masses are predominantly benign. Common benign etiologies include galactocele, lactating adenoma, fibroadenoma, and normal breast tissue. Galactoceles arise from ductal obstruction and present as compressible, nontender cystic masses; imaging may confirm their milk-fat content and distinguish them from solid lesions [13]. Lactating adenomas are hormonally driven lesions appearing as rapidly enlarging, well-circumscribed masses. Imaging aids differentiation from malignancy and informs biopsy decisions [41]. Fibroadenomas may enlarge or display atypical imaging features during lactation, often necessitating further evaluation or biopsy [42]. Though rare in this age group, PABC, which accounts for 0.7% to 3.8% of breast cancers, must be excluded [11, 43].

The ACR Appropriateness Criteria® topic on "Palpable Breast Masses" recommends prompt and

age-stratified imaging in all postpartum and lactating women with a palpable abnormality, regardless of presumed etiology [44].

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
A. Digital breast tomosynthesis diagnostic

DBT is not useful as the first-line imaging modality for palpable breast masses in lactating women <30 years of age. In a retrospective study of lactating women with palpable masses, adding mammography including DBT after US did not identify additional cancers and significantly reduced specificity (*P* = .02) [43]. This may largely be due to the increased density of breast parenchyma during lactation, which can obscure findings and reduce sensitivity [45-47].

According to the ACR Appropriateness Criteria® topic on "Palpable Breast Masses," mammography with or without DBT may be used as a secondary modality if US reveals suspicious or indeterminate findings that warrant further characterization [44]. DBT can aid in evaluating calcifications or architectural distortion not well seen on US, but it remains an adjunct rather than a primary diagnostic tool.

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
B. Mammography diagnostic

Mammography without DBT is generally not useful as the initial diagnostic modality for palpable breast masses in lactating women <30 years of age due to the increased breast density and glandular changes that reduce sensitivity and specificity [13]. However, according to the ACR Appropriateness Criteria® topic on "Palpable Breast Masses," mammography may be used after US if suspicious or indeterminate findings require further evaluation, particularly to assess possible calcifications or subtle architectural distortion that may not be evident on US [44].

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
C. Mammography with IV contrast

Although CEM is safe in lactating women, there is no published evidence supporting the use of CEM as a first-line diagnostic modality in lactating women <30 years of age who present with a palpable breast abnormality. The physiologic changes of lactation, including increased vascularity and prominent background parenchymal enhancement, may reduce specificity and lead to interpretive challenges and false positives [12].

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
D. MRI breast without and with IV contrast

There is no relevant literature to support the use of MRI breast without and with IV contrast is as the first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women <30 years of age.

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of MRI without IV contrast as the first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women <30 years

of age.

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI for evaluating focal pain or palpable breast masses in lactating women <30 years of age.

Variant 4:Lactating female. Age less than 30 years. Focal pain or palpable breast mass. Initial imaging.
G. US breast

US is the preferred initial imaging modality for lactating women <30 years of age presenting with a palpable breast mass, due to its high sensitivity, accessibility, and ability to distinguish between cystic and solid lesions. Qian et al [13] demonstrated that lactational breast changes such as ductal dilation, increased parenchymal density, and milk retention can complicate physical examination and mammography, making US the most effective tool for initial evaluation.

The ACR Appropriateness Criteria® topic on "Palpable Breast Masses" recommends targeted US as the first-line imaging study in this age group regardless of clinical suspicion [44]. In a large retrospective cohort study, Chung et al [43] assessed 167 lactating women (mean age 35) presenting with a palpable mass who underwent targeted US as the first imaging modality. The study showed that US detected 100% (5/5) of malignancies, had a negative predictive value of 100%, specificity of 70%, and a positive predictive value per biopsy of 10%.

These findings reinforce the ACR Appropriateness Criteria® topic on "Palpable Breast Masses" recommendation that US is useful as the initial evaluation of palpable masses in lactating women <30 years of age [44].

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.

In lactating women ≥30 years of age presenting with a palpable breast mass or focal pain, the primary goal of imaging is to distinguish benign masses and physiologic changes from PABC [4, 41].

Women ≥30 years of age are at higher risk for PABC compared to women <30 years of age, which is estimated to occur in approximately 10 to 20 per 100,000 births within the first postpartum year. Tumors are often high grade, present at an advanced stage, and are hormone receptor negative, contributing to poor prognosis [12]. The imaging approach should mirror that of nonlactating women, beginning with mammography.

The expected outcome of imaging is to provide a clear diagnosis, guiding appropriate and timely management to improve patient outcomes.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
A. Digital breast tomosynthesis diagnostic

DBT is useful as a first-line diagnostic modality in lactating women ≥30 years of age with a palpable abnormality. Modern digital mammography is safe during lactation, with no need to

interrupt breastfeeding, and it can detect suspicious calcifications, masses, or architectural distortion that may not be evident on clinical examination [12, 29, 48, 49].

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
B. Mammography diagnostic

Diagnostic mammography is appropriate as a first-line modality in lactating women ≥30 years of age with a palpable mass, either alone or in conjunction with DBT. The ACR Appropriateness Criteria® topic on "Palpable Breast Masses" indicates that lactation is not a contraindication to mammography and that standard diagnostic pathways used for nonlactating women ≥30 years of age should be followed [44]. Breastfeeding can continue without interruption after mammography, and expressed milk does not need to be discarded.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
C. Mammography with IV contrast

There is no relevant literature to support the use of CEM as a first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women ≥30 years of age.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
D. MRI breast without and with IV contrast

There is no relevant literature to support the use of MRI without and with IV contrast as a first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women ≥30 years of age.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of MRI without IV contrast as a first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women ≥30 years of age.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI as a first-line imaging modality for evaluating focal pain or palpable breast masses in lactating women ≥30 years of age.

Variant 5:Lactating female. Age 30 years or older. Focal pain or palpable breast mass. Initial imaging.
G. US breast

In women ≥30 years of age, US is useful for further characterization of palpable or mammographically detected lesions. The ACR Appropriateness Criteria® topic on "Palpable Breast Masses" indicated that for women 30 to 39 years of age with a palpable mass, diagnostic mammography with or without DBT may be performed first, followed by targeted US depending on clinical and mammographic findings, or US may be performed first [44]. It is also noted that DBT may demonstrate architectural distortion or calcifications that may be difficult to appreciate on US. For women ≥40 years of age, diagnostic mammography with or without DBT should be the

initial imaging examination. US, in conjunction with mammography, is highly sensitive in lactating women and helps distinguish benign lactational changes from malignancy [43, 48]. Please refer to the ACR Appropriateness Criteria® topic on "Palpable Breast Masses".

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.

Nipple discharge occurs in approximately 4.8% to 7.4% of women and is the third most common breast symptom after pain and palpable masses [50]. The clinical challenge is differentiating physiologic from pathological nipple discharge. Physiologic discharge is typically bilateral, originates from multiple ducts, and is nonbloody and expressed only upon manipulation. In contrast, pathologic discharge is spontaneous, usually unilateral, arises from a single duct orifice, and may be serous, clear, or bloody. Milk mixed with blood (rusty or pink-tinged) may occur transiently during the early postpartum period, a self-limited condition in early lactation caused by fragile, highly vascularized ducts sometimes termed "rusty pipe syndrome." It typically presents as bilateral, painless, brown-tinged or bloody discharge that resolves within 7 to 10 days without affecting feeding or requiring treatment [51]. Late-onset or prolonged bloody discharge, especially if unilateral or persisting beyond the first postpartum week, should prompt further workup, as it may indicate papilloma, duct ectasia, infection, or rarely, malignancy [52]. A key concern when imaging lactating patients is distinguishing normal lactational changes from intraductal masses while also minimizing unnecessary interventions that could interfere with breastfeeding or milk production.

Imaging can be helpful to exclude malignancy, especially in the younger population [50, 53]. Numerous studies have shown that premenopausal status and age <40 years are strong predictors of benign etiology in patients presenting with nipple discharge [54-57].

The goal of imaging is to identify the underlying cause of pathologic nipple discharge, differentiating between benign causes like ductal ectasia or periductal inflammation and more concerning conditions such as intraductal papilloma or malignancy. The expectation is to identify any possible neoplastic etiology of the discharge, enabling appropriate treatment or further diagnostic steps, and to rule-out serious conditions while minimizing the risk of delayed diagnosis and intervention. In the absence of any imaging findings, suspicious nipple discharge should be managed clinically.

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
A. Digital breast tomosynthesis diagnostic

There is no relevant literature to support the use of DBT in the initial evaluation of clinically suspicious nipple discharge in women <30 years of age, regardless of lactation status. However, DBT with standard mammography can be performed in conjunction with US if a suspicious abnormality is identified [11, 58].

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
B. Mammography diagnostic

There is no relevant literature to support the use of mammography as the initial imaging modality to assess clinically suspicious nipple discharge in lactating women <30 years of age. However, mammography can be performed in conjunction with US if a suspicious abnormality is

identified [11, 58].

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
C. Mammography with IV contrast

There is no relevant literature to support the use of CEM as a first-line diagnostic tool in lactating women <30 years of age with clinically suspicious nipple discharge.

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
D. MRI breast without and with IV contrast

There is no relevant literature to support the use of MRI without and with IV contrast as a first-line diagnostic tool in lactating women <30 years of age with clinically suspicious nipple discharge.

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of breast MRI without IV contrast as a first-line diagnostic tool in lactating women <30 years of age with clinically suspicious nipple discharge.

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI as a first-line diagnostic tool in lactating women <30 years of age with clinically suspicious nipple discharge.

Variant 6:Lactating female. Age less than 30 years. Clinically suspicious nipple discharge. Initial imaging.
G. US breast

The diagnostic imaging algorithm for women <30 years of age with clinically suspicious nipple discharge during lactation mirrors that of nonlactating patients in the same age group, with targeted US as the initial imaging modality [58]. US is sensitive for detecting intraductal masses or ductal abnormalities such as papilloma or duct ectasia [56, 59-61].

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.

Unilateral, spontaneous bloody or serous discharge occurring after the first postpartum week, especially in women ≥30 years of age, warrants further imaging evaluation. In lactating patients ≥30 years of age, the goal of imaging is to identify the underlying cause, as the incidence of intraductal papilloma and malignancy increases with age [58]. The expectation is that imaging can help determine the cause of the discharge, guiding management if needed, and ensuring that any serious conditions are detected and managed promptly to optimize outcomes.

The ACR Appropriateness Criteria® topic on "Evaluation of Nipple Discharge" recommends an age-stratified approach to the diagnostic evaluation of suspicious nipple discharge [58]. For women 30 to 39 years of age, either diagnostic mammography or targeted US may be used as the initial imaging modality. For women ≥40 years of age, diagnostic mammography (with or without DBT) is the preferred first-line imaging modality, with US serving as an adjunct. This framework also applies to lactating patients, as mammography is safe during breastfeeding [11,

62]. In the absence of any imaging findings, suspicious nipple discharge should be managed clinically [50, 53].

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
A. Digital breast tomosynthesis diagnostic

DBT is usually useful as an initial imaging modality, equivalent to standard mammography in this population [58]. It enhances evaluation in dense lactational tissue by reducing tissue overlap and improving detection of distortion and masses.

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
B. Mammography diagnostic

Diagnostic mammography is useful as an initial study in lactating women ≥30 years of age with pathologic nipple discharge [58]. Although lactational density may reduce sensitivity, mammography remains safe and effective in identifying calcifications, asymmetries, and masses. Benign results from both mammography and US, when combined with a benign physical examination correlate with low malignancy rates [66]. In a single-institution retrospective study that evaluated 320 patients with nipple discharge, found that the combination of mammography and US achieved a sensitivity of 93% and a negative predictive value of 98% for detecting malignancy [53].

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
C. Mammography with IV contrast

There is no relevant literature to support the use of CEM in lactating women ≥30 years of age with clinically suspicious nipple discharge as the initial imaging study.

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
D. MRI breast without and with IV contrast

There is no relevant literature to support the use of MRI breast without and with IV contrast in lactating women ≥30 years of age with clinically suspicious nipple discharge as the initial imaging study.

Although MRI with IV contrast is usually not useful as an initial test, it may be valuable when mammography and US are inconclusive and clinical suspicion remains high [44]. MRI demonstrates high sensitivity for intraductal lesions or noncalcified ductal carcinoma in situ with micropapillary features. MRI is useful when conventional imaging is inconclusive, or when evaluating the full extent of ductal pathology [36, 63, 64, 67-69]. Baydoun et al [64] reported that breast MRI demonstrated a sensitivity of 95% and a specificity of 80% in detecting underlying neoplastic causes of nipple discharge. Subsequent studies have confirmed high diagnostic performance of contrast-enhanced MRI in patients presenting with nipple discharge and negative mammography and US, reporting sensitivities between 92% and 100% and specificities ranging from 68% to 85% [36, 53, 67, 68, 70].

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of MRI breast without IV contrast in lactating women ≥30 years of age with clinically suspicious nipple discharge as the initial imaging study.

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI in lactating women ≥30 years of age with clinically suspicious nipple discharge as the initial imaging study.

In select cases, where initial conventional imaging is inconclusive, MBI may offer a functional alternative for further evaluation. Emerging data suggests its potential usefulness in detecting malignancy in patients with persistent pathologic nipple discharge, though evidence in lactating populations remains limited. A recent study performed in 96 women with pathologic nipple discharge and negative or inconclusive mammography and US findings, MBI outperformed conventional imaging with a sensitivity of 83% and negative predictive value of 96% [71]. Sestamibi MBI is considered safe in lactating women as current guidelines support its use with minimal interruption to breastfeeding and no significant risk to the infant [72].

Variant 7:Lactating female. Age 30 years or older. Clinically suspicious nipple discharge. Initial imaging.
G. US breast

US is usually useful as an adjunct to mammography in lactating women ≥30 years of age presenting with clinically suspicious nipple discharge. It offers real-time evaluation of intraductal contents, ductal wall abnormalities, and subtle masses, and guides sampling if a lesion is detected [59-61, 63]. Adding US to mammography can increase cancer detection by 26% [53, 64]. Hence, mammography and US are complementary examinations [65]. For women <30 years of age, US is the initial imaging modality, with mammography/DBT added if there are suspicious findings or if the patient is at elevated lifetime risk for developing breast cancer. In patients 30 to 39 years of age, mammography/DBT or breast ultrasound may be performed first based on institutional preference and individual patient considerations. For women ≥40 years of age, mammography/DBT is the preferred initial study. For additional guidance, refer to the ACR Appropriateness Criteria® topic on "Evaluation of Nipple Discharge" [58].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.

In lactating patients with newly diagnosed breast cancer, the primary imaging goals are accurate characterization of tumor size, assessment of multifocal and multicentric disease, evaluation of regional lymph node involvement, and guidance of surgical and systemic treatment planning. PABC often presents at a younger age with larger tumors, more advanced stage, and higher rates of aggressive subtypes such as triple-negative and HER2-positive disease [41, 73-76]. These criteria apply to lactating patients, as mammography, US, CEM, and MRI are all safe during breastfeeding when performed with appropriate protocols.

Imaging significantly informs management by delineating tumor extent, identifying candidates for immediate surgery versus neoadjuvant systemic therapy, and detecting contralateral or additional ipsilateral lesions that may alter surgical approach or systemic therapy selection.

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
A. Digital breast tomosynthesis diagnostic

DBT is useful for initial locoregional staging, reducing tissue overlap and improving detection of additional malignant lesions. Studies show DBT increases detection of multifocal disease by up to 15% compared to 2-D mammography alone, although clinical evidence specific to lactating population is lacking [77].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
B. Mammography diagnostic

Diagnostic mammography is useful for all lactating patients with newly diagnosed breast cancer. It remains the foundation of locoregional staging in all women regardless of age with US as an adjunct. Mammography's sensitivity in the setting of breast cancer in lactating patients ranges from 69% to 80% and specificity from 80% to 90%, even in dense lactational tissue [41, 42, 49, 78]. In a recent meta-analysis pooling three eligible studies that investigated the diagnostic performance of mammography in pregnant and lactating patients showed an area under the receiver operating curve of 0.93 (95% CI, 0.75, 0.97), sensitivity of 72% (95% CI, 47, 88), and a specificity of 93% (95% CI, 86, 97) in cancer detection [79].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
C. Mammography with IV contrast

Given the limited evidence regarding its diagnostic performance in lactating women, CEM is not useful as a first-line imaging method in nonlactating patients [78, 84-86]. Further research is warranted.

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
D. MRI breast without and with IV contrast

Breast MRI with IV contrast is usually useful for comprehensive mapping of tumor extent when mammography and US are inconclusive, or to evaluate for multifocal, multicentric, or contralateral disease. In identifying multifocal and multicentric disease, MRI generally offers high sensitivity, ranging from 88.1% to 100%, but with varying specificity from 36.4% to 92.31% [48, 80], and for identifying contralateral malignancy, MRI has demonstrated sensitivity in the range of 80% to 86% and specificity between 88% and 98% [80] [81]. Ultrafast MRI sequences capturing the first 10 to 15 seconds of contrast uptake offer an advantage over conventional dynamic contrast-enhanced MRI in the lactating breast by minimizing background parenchymal enhancement and improving the diagnostic evaluation of PABC [82].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of MRI breast without IV contrast in lactating women with newly diagnosed breast cancer.

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI as an initial imaging modality in lactating women with newly diagnosed breast cancer. In the nonlactating population, MBI has been shown to have comparable sensitivity to MRI in determining cancer size and multifocal/centric disease [87]. However, unlike MRI, MBI is limited for evaluation of axillary disease and anterior chest wall involvement. An additional limitation of MBI for surgical planning regards invasive lobular carcinomas, which have less intense sestamibi uptake than invasive ductal carcinomas [88].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.

G. US axilla

Although data specific to lactating women are lacking, the ACR Appropriateness Criteria® topic on "Imaging of the Axilla" suggests that axillary US may be useful as the initial axillary imaging in some patients with newly diagnosed breast cancer. The need for axillary imaging depends on various factors, including tumor size, clinical findings, and concurrent breast imaging [83].

Variant 8:Lactating female. Newly diagnosed breast cancer. Locoregional staging.
H. US breast

US is useful as an adjunctive modality in locoregional staging of known breast cancer in lactating patients. It accurately assesses tumor extent, multifocality, and regional nodal status [41, 48]. In a recent meta-analysis, investigating the diagnostic performance of imaging modalities in pregnant and lactating patients, the authors found breast US to have a sensitivity of 81% (95% confidence interval (CI), 56, 94), and a specificity of 85% (95% CI, 71, 92) with an area under the receiver operating curve of 0.90 (95% CI, 0.85, 0.93).

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.

Breast infection and abscess are common complications during lactation, particularly within the first few postpartum weeks, often resulting from milk stasis and bacterial entry through nipple trauma. Clinical differentiation between mastitis and abscess can be challenging due to overlapping symptoms, including erythema, warmth, and tenderness. Imaging, particularly US, plays a central role in confirming or excluding abscess and guiding management, as physical examination alone may be unreliable, particularly in women with dense lactating parenchyma. US-guided aspiration has become the preferred intervention for lactational breast abscesses due to its safety and effectiveness. Early imaging is critical to avoid delayed diagnosis, preventing unnecessary surgical intervention, and minimizing disruption of breastfeeding. Additional imaging modalities have limited roles in the setting of infection.

The goal of imaging is to confirm mastitis and identify any underlying abscess formation. The expectation is that imaging will accurately identify the presence and location of an abscess, guiding appropriate interventions such as drainage or antibiotic therapy. This ensures timely treatment, alleviates symptoms, and helps prevent complications. Imaging can also help distinguish infection from other potential breast pathologies or malignancy.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
A. Digital breast tomosynthesis diagnostic

Mammography is considered safe in lactating patients. In addition, DBT may provide the additional benefit of improved sensitivity in women with dense breasts and provides global assessment of the breast parenchyma. As the clinical features of a breast abscess may mimic the clinical features of an advanced PABC, namely inflammatory breast cancer, DBT provides a global assessment of the affected breast that is lacking with targeted breast US. Therefore, DBT may be an initial imaging test in the assessment of patients >30 years of age if the patient is able to tolerate the examination, or as an adjunctive tool if there is a clinically suspicious finding on US.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
B. Mammography diagnostic

Mammography is considered safe in lactating patients and provides a global assessment of the breast parenchyma. As the clinical features of a breast abscess may mimic the clinical features of an advanced PABC, namely inflammatory breast cancer, mammography provides a global

assessment that is lacking with targeted breast US. Therefore, mammography may be primary imaging test in the assessment of patients >30 years of age if the patient is able to tolerate the examination, or as an adjunctive tool if there is a clinically suspicious finding on US in women <30 years of age.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
C. Mammography with IV contrast

There is no relevant literature to support the use of CEM as the initial imaging test in lactating women with suspected infection or abscess.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
D. MRI breast without and with IV contrast

There is no relevant literature to support the use of breast MRI without and with IV contrast as the initial imaging test in lactating women with suspected infection or abscess.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
E. MRI breast without IV contrast

There is no relevant literature to support the use of breast MRI without IV contrast as the initial imaging test in lactating women with suspected infection or abscess.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
F. Sestamibi MBI

There is no relevant literature to support the use of sestamibi MBI as the initial imaging test in lactating women with suspected infection or abscess.

Variant 9:Lactating female. Suspected breast infection or abscess. Initial imaging.
G. US breast

US is the first-line modality for suspected lactational infection or abscess. In a prospective cohort of 182 lactating women with clinical suspicion of breast infection, targeted US detected fluid collections consistent with abscess in 168 cases, yielding a sensitivity of 92.3% and specificity of 89.1% [89]. Measurements of the maximal abscess diameter by US correlated with surgical findings ($r = 0.87$, $P < .001$).

When an abscess is identified, US-guided aspiration is safe, effective, and often definitive. US-guided aspiration has become the preferred intervention for lactational breast abscesses due to its high success rate, low complication risk, and preservation of breastfeeding [89-91]. In a recent meta-analysis, the authors found that aspiration and incision and drainage had comparable cure rates for breast abscesses (relative risk = 0.96; 95% CI, 0.86-1.07; P = .469) and similar recurrence rates (relative risk = 0.68; 95% CI, 0.35-1.30; P = .241) [91]. However, aspiration showed several significant clinical advantages. Patients treated with aspiration had a shorter healing time by an average of 11.02 days (95% CI, −15.14−−6.90; P < .001). The risk of developing a breast fistula was 79% lower in the aspiration group (relative risk = 0.21; 95% CI, 0.06-0.72; P = .013), and the rate of interrupted breastfeeding was significantly lower (relative risk = 0.28; 95% CI, 0.20-0.39; P < .001). Additionally, aspiration was associated with a higher rate of satisfaction with breast appearance (relative risk = 1.51; 95% CI, 1.03-2.21; P = .035). These findings support aspiration, even without US guidance, as a first-line treatment for breast abscesses in most cases.

Summary of Highlights

This is a summary of the key recommendations from the variant tables. Refer to the complete narrative document for more information.

· Variant 1:

For average-risk lactating females ≥40 years of age, screening mammography and screening DBT are considered alternative screening modalities, and either is usually appropriate. In women with dense breasts, MRI breast without and with IV contrast and AB-MRI without and with IV contrast may be appropriate as complementary procedures, performed in addition to mammography or DBT to improve cancer detection.

CEM, MRI breast without IV contrast, AB-MRI without IV contrast, sestamibi MBI, and breast US are usually not appropriate.

· Variant 2:

For lactating women <25 years of age who are higher-than-average risk, MRI breast without and with IV contrast may be appropriate. DBT screening, mammography screening, AB-MRI without and with IV contrast, US breast, CEM, MRI breast without IV contrast, AB-MRI without IV contrast, and sestamibi MBI are usually not appropriate in these patients.

· Variant 3:

For lactating women ≥25 years of age with a higher-than-average lifetime risk of breast cancer, mammography screening and DBT screening are considered alternative primary screening modalities, and either is usually appropriate

. MRI breast without and with IV contrast and AB-MRI without and with IV contrast are usually appropriate as complementary screening examinations, performed in addition to mammography screening or DBT screening in this higher-risk population. US breast, CEM, MRI breast without IV contrast, AB-MRI without IV contrast, and sestamibi MBI are usually not appropriate in this population.

· Variant 4:

Breast US is usually appropriate as the initial imaging modality to evaluate a palpable mass or focal pain in lactating women <30 years of age. DBT screening, mammography screening, MRI breast without and with IV contrast, AB-MRI without and with IV contrast, CEM, MRI breast without IV contrast, AB-MRI without IV contrast, and sestamibi MBI are usually not appropriate as the initial imaging modality.

· Variant 5:

In lactating females ≥30 years of age presenting with focal pain or a palpable mass, mammography diagnostic and DBT diagnostic are usually appropriate and are considered alternative initial diagnostic modalities. US breast is usually appropriate as a complementary examination, performed in conjunction with mammography diagnostic or DBT diagnostic for further evaluation. MRI breast without and with IV contrast, CEM, MRI breast without IV contrast, and sestamibi MBI are usually not appropriate as first-line tests.

· Variant 6:

Breast US is usually appropriate as the initial imaging test to evaluate clinically suspicious nipple discharge in lactating women <30 years of age. DBT diagnostic, mammography diagnostic, MRI breast without and with IV contrast, CEM, MRI breast without IV contrast, and sestamibi MBI are usually not appropriate first-line tests.

· Variant 7:

In lactating females >30 years of age presenting with clinically suspicious nipple discharge, mammography diagnostic and DBT diagnostic are usually appropriate and are considered alternative initial diagnostic modalities. US breast is usually appropriate as a complementary

examination, performed in conjunction with mammography diagnostic or DBT diagnostic for further evaluation. MRI breast without and with IV contrast, CEM, MRI breast without IV contrast, and sestamibi MBI are usually not appropriate as first-line tests.

· Variant 8:

In lactating females with newly diagnosed breast cancer, comprehensive locoregional staging should be performed. The goal is to provide optimal assessment of tumor extent, multifocality, and contralateral disease to guide surgical planning. DBT diagnostic and mammography diagnostic are usually appropriate and are considered alternative initial imaging modalities. DBT diagnostic and mammography diagnostic are performed in conjunction with US breast, which is usually appropriate as a complementary examination. MRI breast without and with IV contrast also is considered usually appropriate as a complementary examination to further evaluate disease extent. US axilla may be appropriate to evaluate the nodal status. CEM, MRI breast without IV contrast, and sestamibi MBI are usually not appropriate.

· Variant 9:

Breast US is usually appropriate as the first-line imaging modality for suspected breast infection or abscess in lactating patients. Mammography diagnostic and DBT diagnostic may be the initial imaging test in patients >30 years of age or when there is clinical concern for malignancy presenting with inflammatory features. MRI breast without and with IV contrast, MRI breast without IV contrast, CEM, and sestamibi MBI are usually not appropriate.

Supporting Documents

The evidence table, literature search, and appendix for this topic are available at https://acsearch.acr.org/list. The appendix includes the strength of evidence assessment and the final rating round tabulations for each recommendation.

For additional information on the Appropriateness Criteria methodology and other supporting documents, please go to the ACR website at https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria.

Gender Equality and Inclusivity Clause

The ACR acknowledges the limitations in applying inclusive language when citing research studies that predates the use of the current understanding of language inclusive of diversity in sex, intersex, gender, and gender-diverse people. The data variables regarding sex and gender used in the cited literature will not be changed. However, this guideline will use the terminology and definitions as proposed by the National Institutes of Health.

Appropriateness Category Names and Definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit

		ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, because of both organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared with those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document.

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."

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Disclaimer

physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

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