

# Evaluation of Breast Masses: Adolescents and Adults

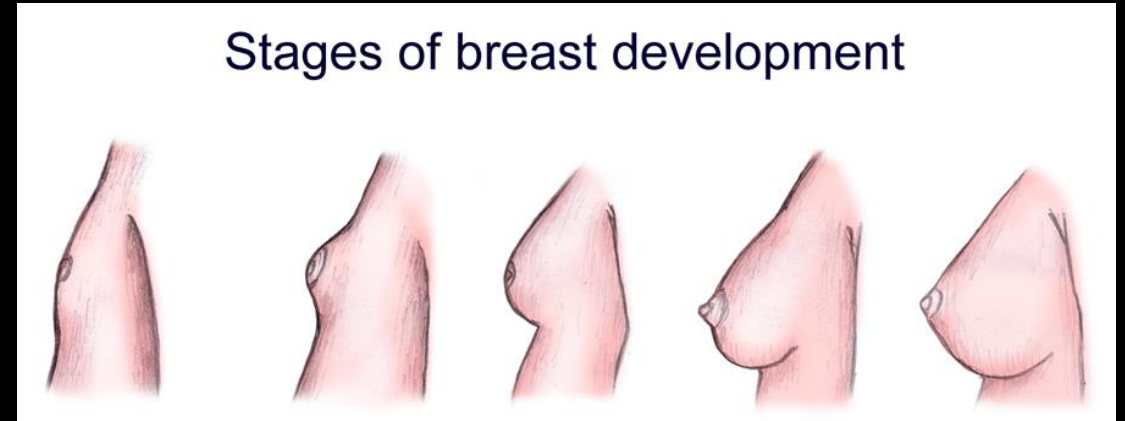
Stamatia Destounis, MD, FACR, FSBI, FAIUM  
Managing Partner, Elizabeth Wende Breast Care  
Chair, American College of Radiology (ACR) Breast Commission  
Chair, ACR Breast MRI Accreditation and Economics Committees  
Rochester, NY

# Evaluation with Multimodality Breast Imaging

- Mammography--Digital Breast Tomosynthesis (DBT) with C-view which has become our standard of care
- Breast Ultrasound (US)
- MRI
- Image-Guided Core Biopsy under DBT, US, MRI guidance
- Sequence of imaging protocol dependent on factors including patient's age

# Breast Masses in Adolescents

- Majority are benign
- Usually, breast buds
  - In pubertal children usually first sign of puberty
  - In prepubertal children may indicate premature thelarche or precocious puberty
- Development of the breasts can be asymmetric, and patients may present for evaluation of a palpable mass that in fact is a normal breast bud
- US is the breast imaging method indicated for young/adolescent patients; mammography is contraindicated



# Common Breast problems and Benign Diagnoses – Adolescents

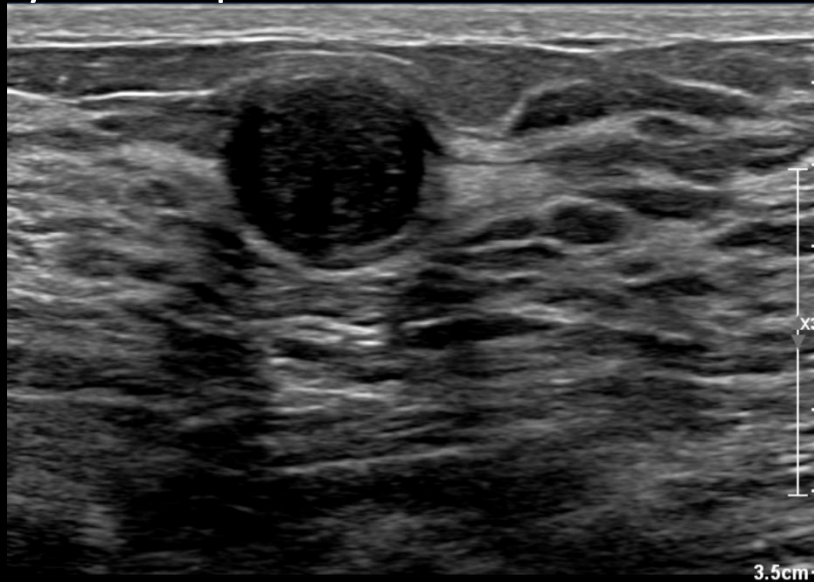
## **Breast concerns**

- Normal and abnormal breast development
- Infection
- Trauma
- Cyst formation
- Pain

## **Benign diagnoses**

- Fibroadenoma/Juvenile Fibroadenoma
- Cyst
- Juvenile papillomatosis
- Mastitis
- Gynecomastia
- Hormonal changes (pain)

15-year-old presents with left breast lump



LT BREAST 1130 3 CMFN Long AOC PALP |

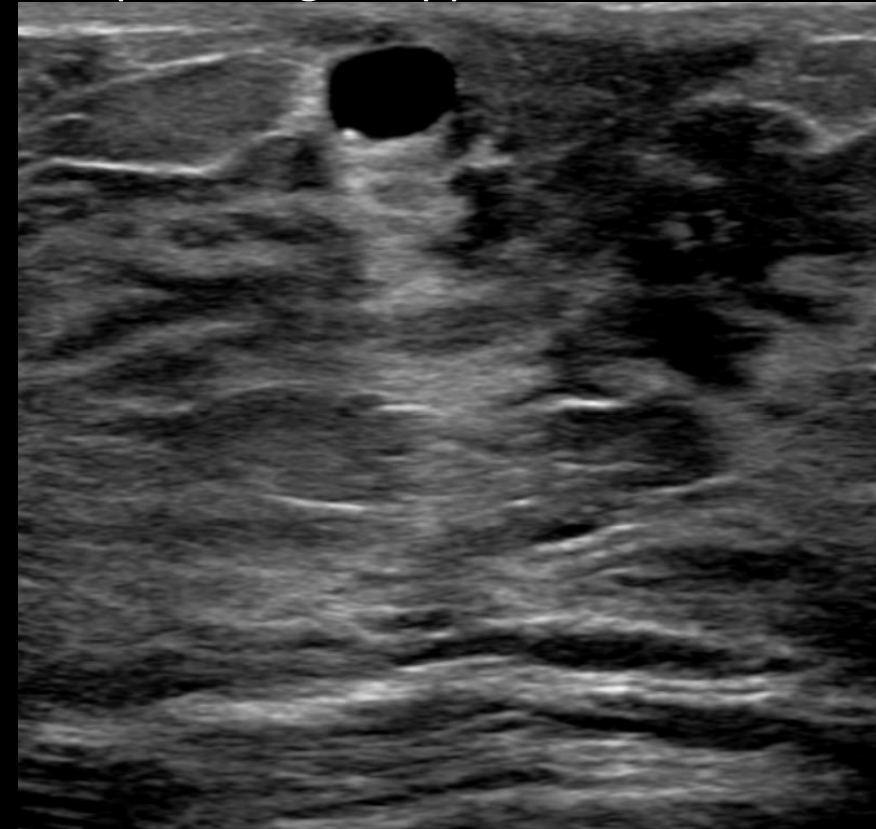
## Fibroadenomas in Adolescents

- Fibroadenomas represent over half of breast masses
- Hormonal influences are believed to play a factor in their development as a significant number of fibroadenomas change with hormones
- *Giant fibroadenoma* - refers to lesions  $> 5$  cm in diameter
  - Typically occurs in patients 15 to 17 years
  - Rec. surgery

# Cysts

- Fibrocystic change represents a range of findings from benign solitary simple cysts to proliferative fibrocystic changes
- In adolescent girls, retroareolar cysts can develop from obstruction of the glands of Montgomery at the periphery of the areola

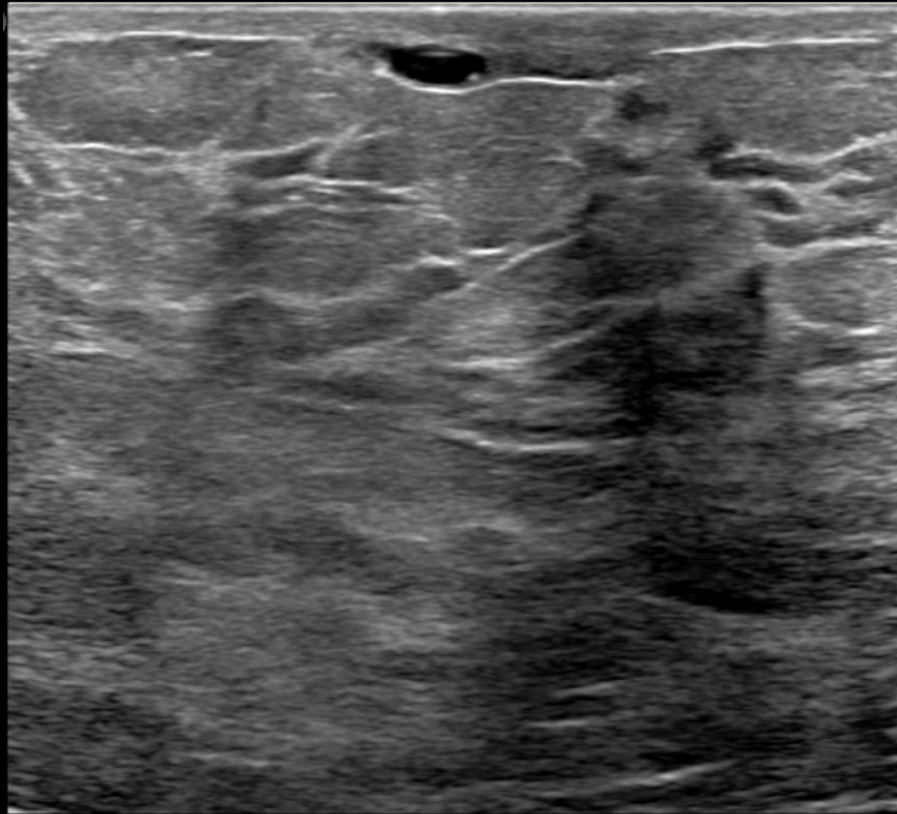
13-year-old presents with palpable lump near right nipple



RT BREAST 12:00 SA Trans AOC



# Work-up of Adolescent Patient



LT BREAST SA Trans

- 13-year-old presents for lump in left SA region
  - Mother BRCA 1 positive with personal history of BC at age 40
- Cyst on US
- Due to family history and mother's BRCA status, refer pt to genetic testing by age 18

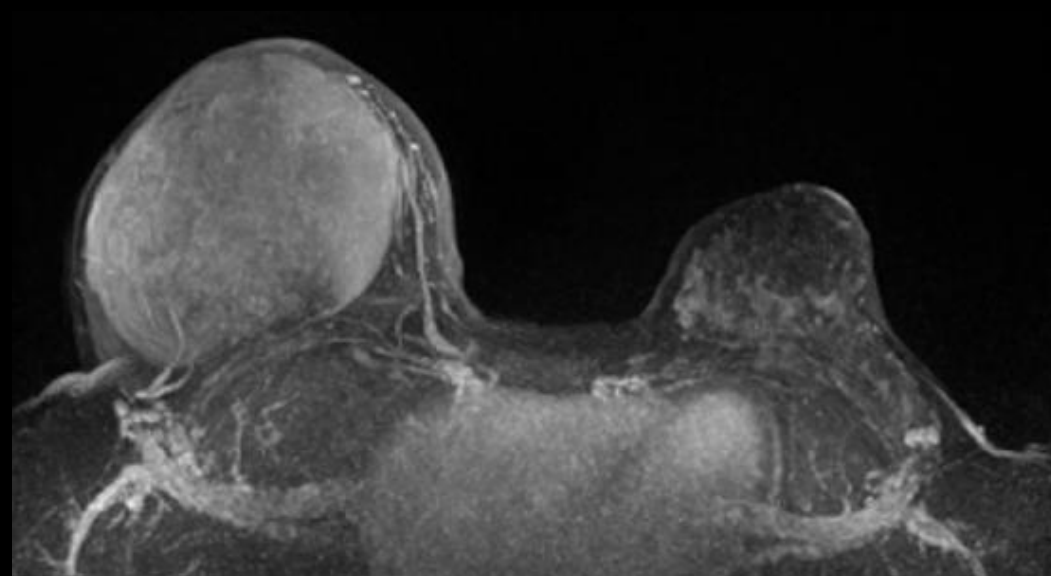
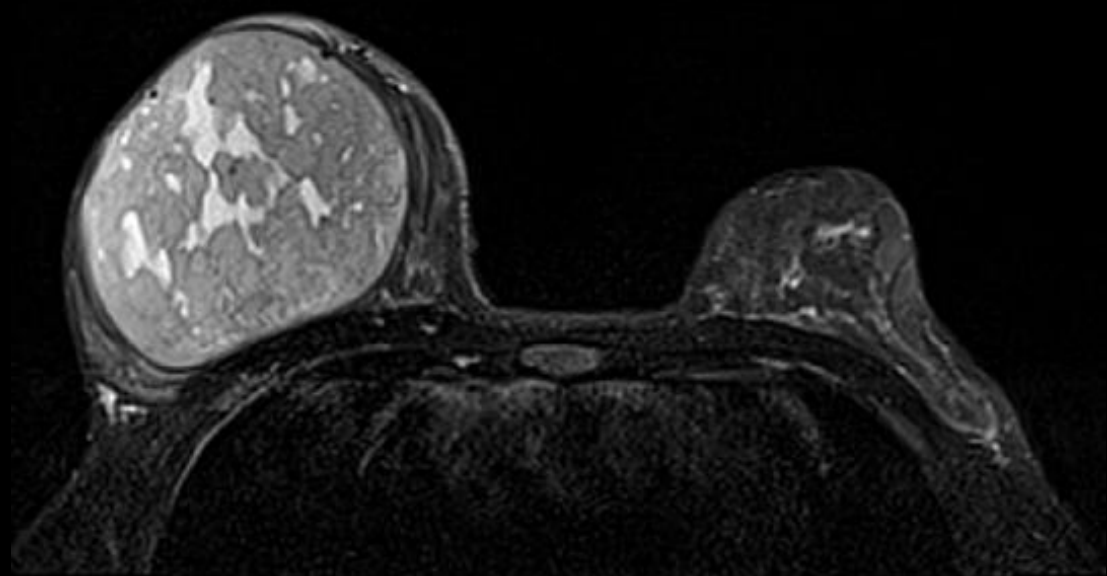
# 12-year-old presents for evaluation of enlarging right breast



Large vascular mass on US  
approx. 15cm

Surgical excision  
recommended  
w/ pre-surgical MRI





Surgical excision – juvenile fibroadenoma

# ACR Screening Guidelines

- Most recent guidelines recommend *all* women have a risk assessment done by age 30
- Those who are eligible are recommended to undergo genetic testing to understand their risk
- Based on risk, patients can be eligible for screening with mammography/MRI at earlier age
  - ie 10 years prior to age of diagnosis of first-degree family member
- Important for our adolescent patients to be aware of family history and guide management appropriately

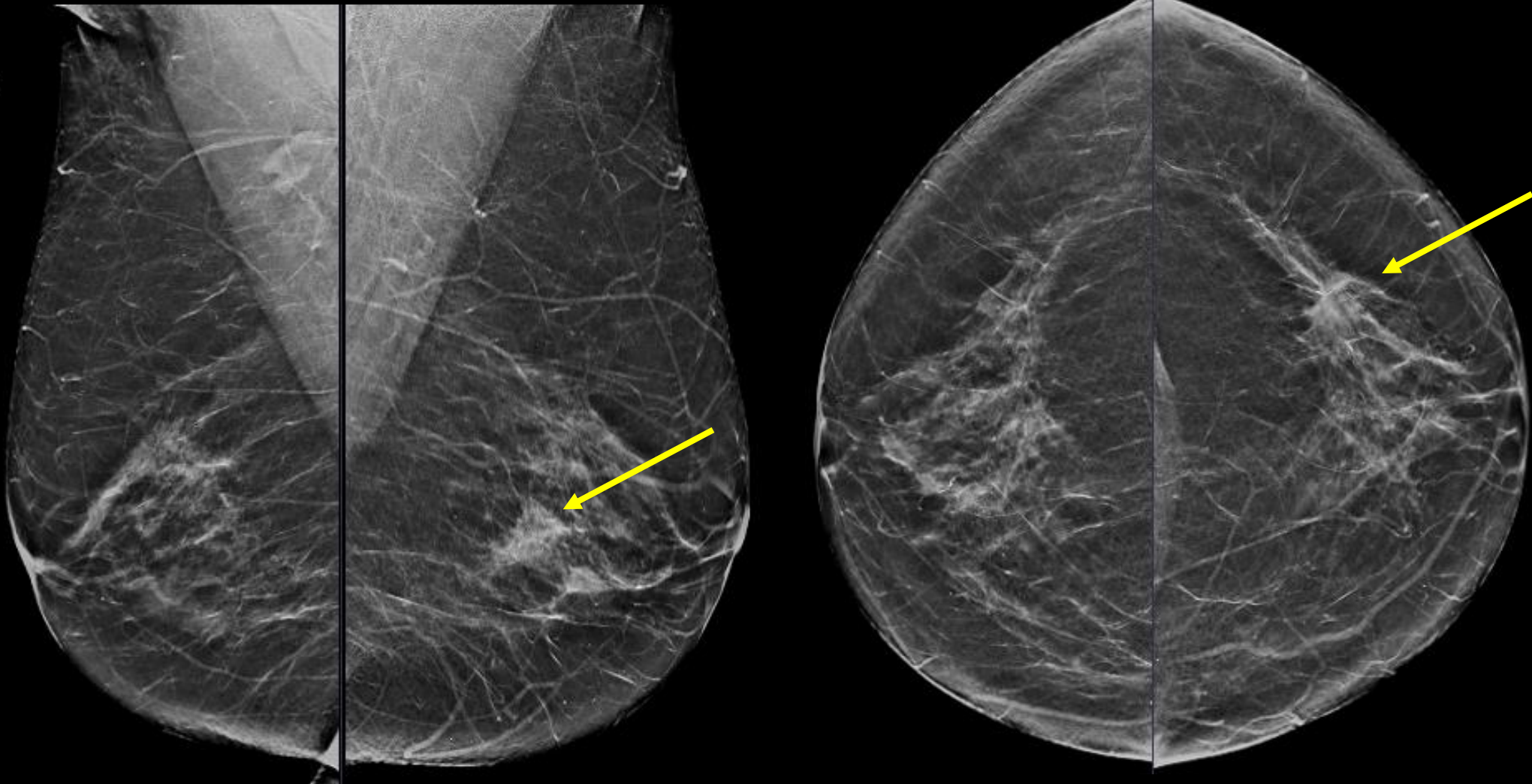
# Diagnostic Patients – Young Adult/Adult

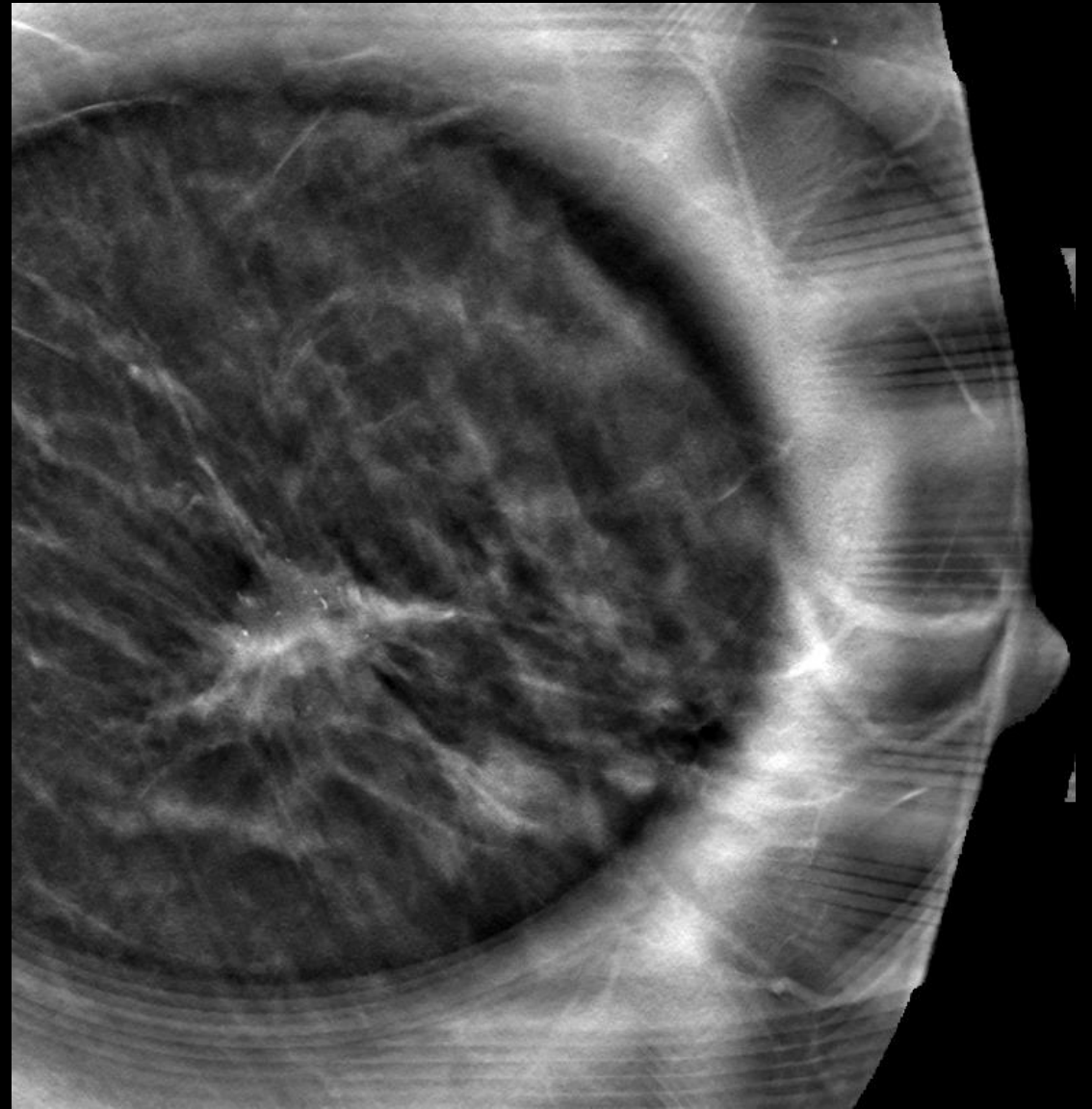
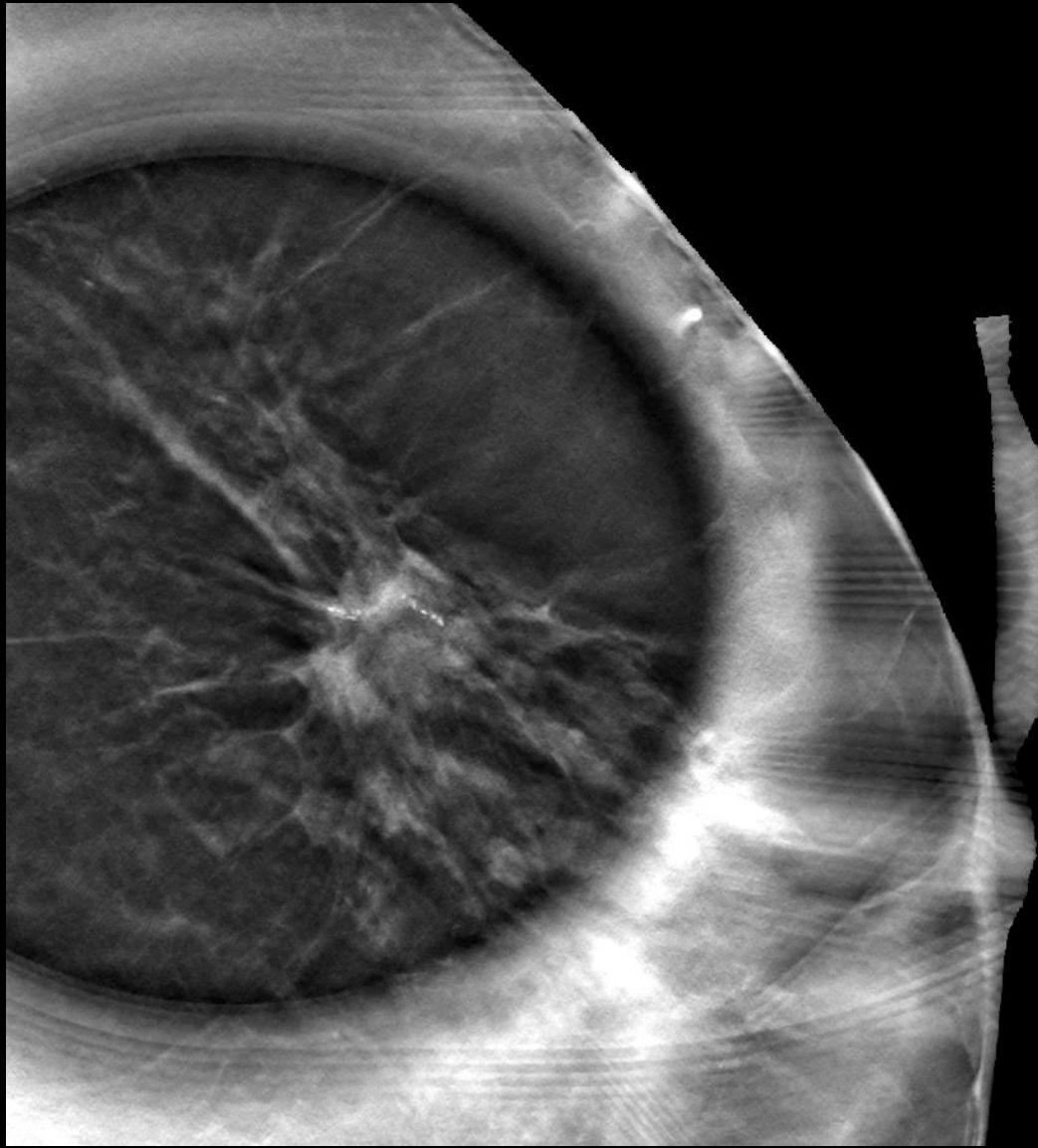
- Patients present for a diagnostic visit when they have a new breast concern:
  - Nipple changes/inversion
  - Skin changes
  - Pain
  - Discharge
  - Lump

# Breast Pain

- Very common complaint – up to 80% of women will experience in their lifetime
  - *Rarely related to existing cancer when not associated with a palpable mass or other suspicious clinical finding*
- Bilateral diffuse breast pain – routine screening – **cyclical (hormonal)**
- Focal or one-sided breast pain – usually requires evaluation - **noncyclical**

58-year-old patient presents with focal left breast pain that comes and goes, feels area of thickening









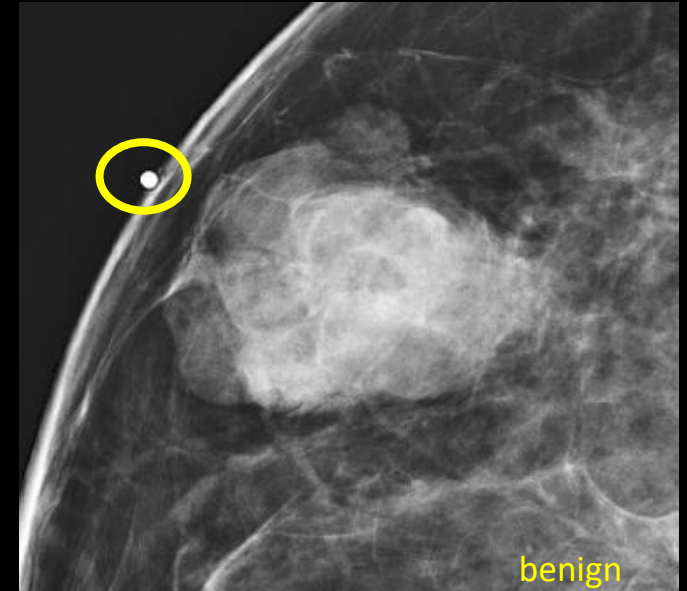
Left 3:00- Invasive ductal carcinoma nuclear grade 3  
ER, PR Positive, Her2 Negative

1.60 cm  
1.17 cm LT BREAST 3:00 5 CMFN Long PALP 4.0cm



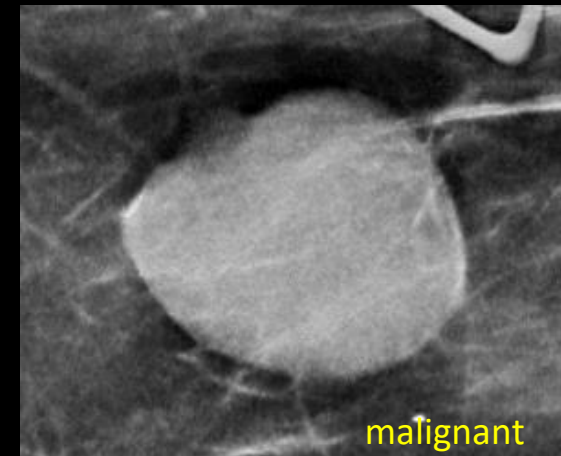
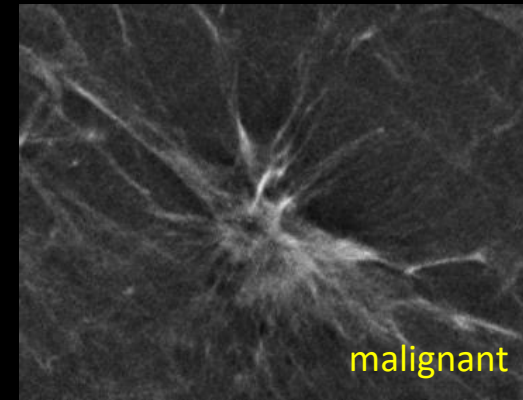
# Palpable Lump

- A patient with a new palpable mass needs a full diagnostic evaluation
- Majority are benign
- Typical features—but not always
  - Benign – smooth, mobile, soft
  - Malignant – irregular, immobile



# Mass

- Area containing a grouping of cells or an abnormal growth of cells
- Generally present as areas of asymmetry on imaging
- Can be benign or malignant



# Imaging Evaluation of Palpable Lesions

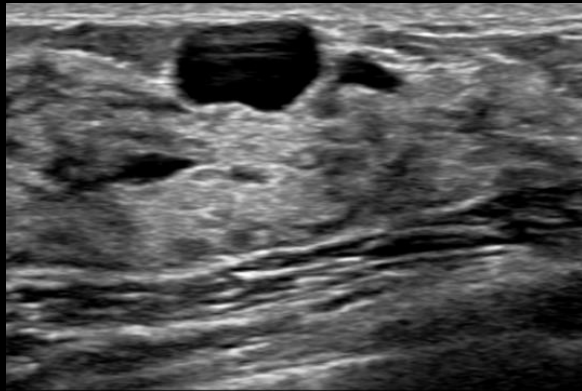
- Women over age 40 years
- Mammography first
  - Need only include ipsilateral breast if patient had bilateral within last 3-6 mos
  - Mark lump with a radiopaque marker
  - Tangential magnification of lump



## Mammographic Views to Evaluate Lumps

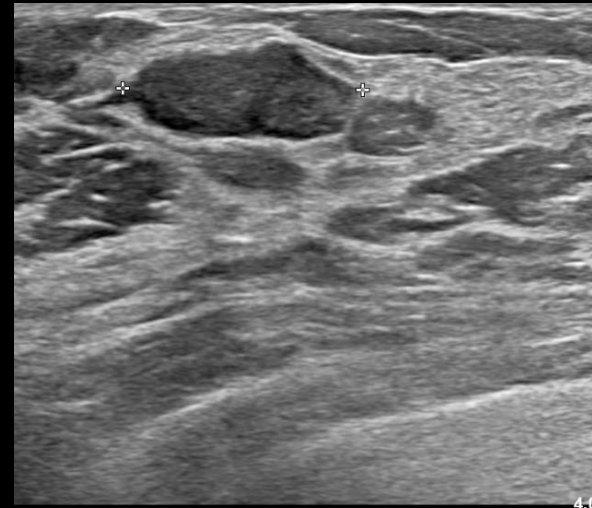
- Spot compression
- Magnification
- Exaggerated CC (medial/lateral)
- Tangential
- Angled view/rolled view
- Cleavage view
- Cleopatra
- Lateral

# US Work-Up of Palpable Lesions



RT BREAST 12:00 2 CMFN TRANS

Cyst



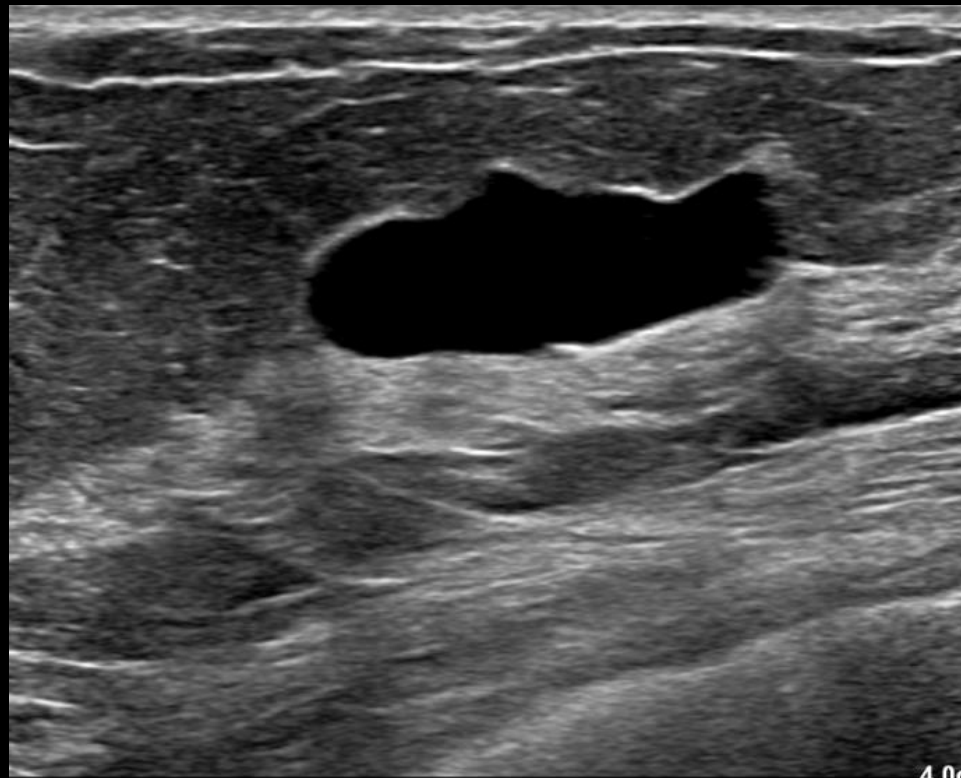
RT BREAST 3:00 1 CMFN Trans 4.0c

Fibroadenoma

- Women 40 years of age and older - usually performed after MMG
- Helpful characterizing masses - differentiates cystic v. solid



# Masses on US



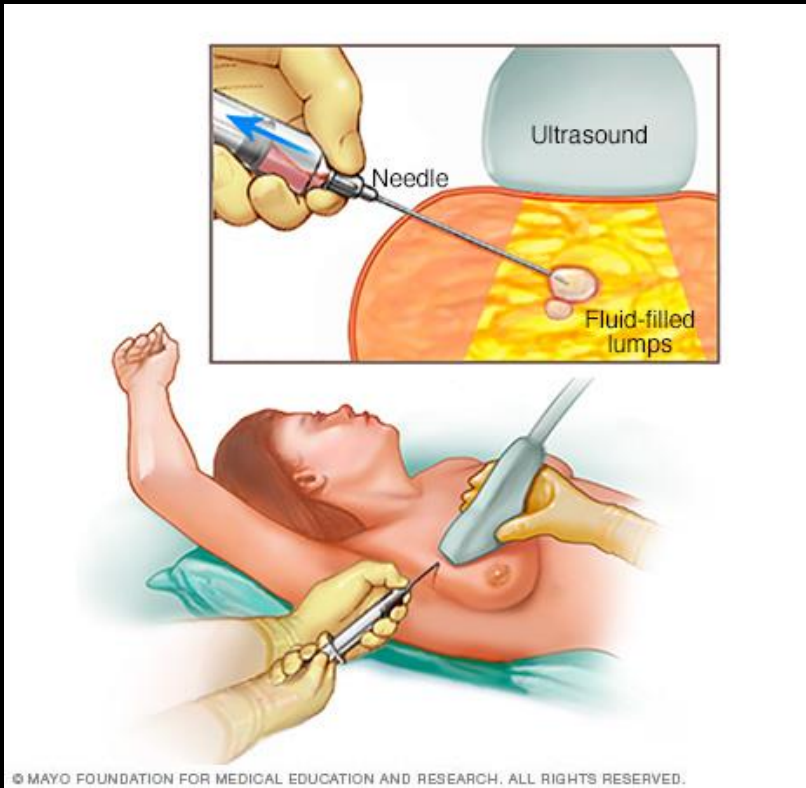
RT BREAST 1200 2 CMFN TRANS |

Cyst



LT BREAST 830 1 CMFN Long PALP AOC

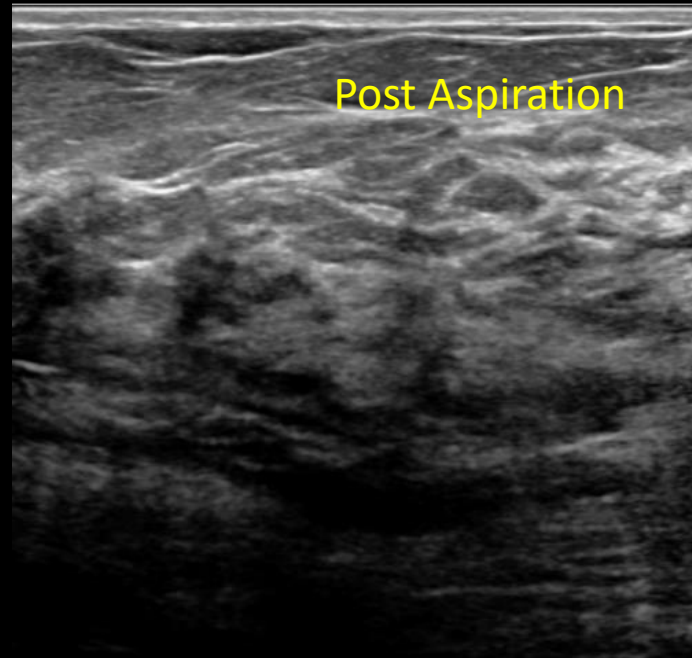
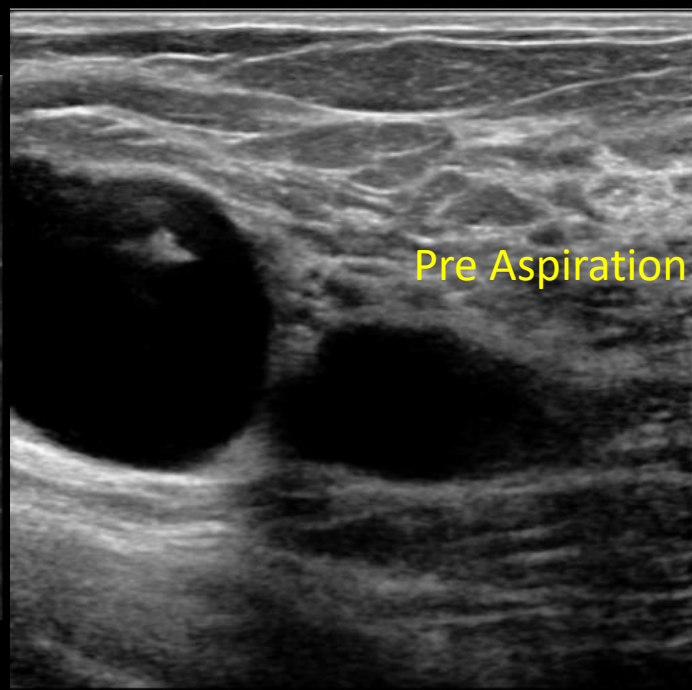
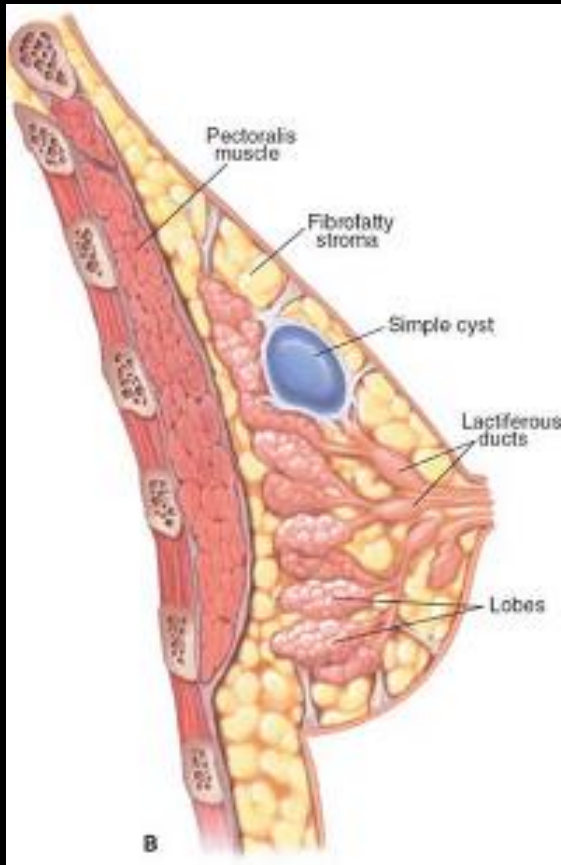
Invasive ductal carcinoma



# Cyst Aspiration

- Diagnostic procedure in which fluid is drawn out from a cyst with a needle
- Fluid is generally discarded but on occasion will be sent to pathology





**Breast Cysts -**  
Benign, fluid-filled  
sac within the  
breast

# Core Biopsy

- Diagnostic test in which a sampling of tissue from the breast is removed using a large needle tru cut (multiple insertion)
- Vacuum assisted device single insertion larger gauge
- Used for diagnosis of a new or worrisome area in the breast one view findings on DBT or screening US only findings

# Core Biopsy

- Can be used to biopsy both masses and microcalcifications
- Uses mammographic (stereotactic/3D) or ultrasound guidance to accurately target an abnormality
- Can replace open surgical biopsy in most cases as most biopsies are benign

# Stereotactic Biopsy/DBT



Prone stereotactic biopsy



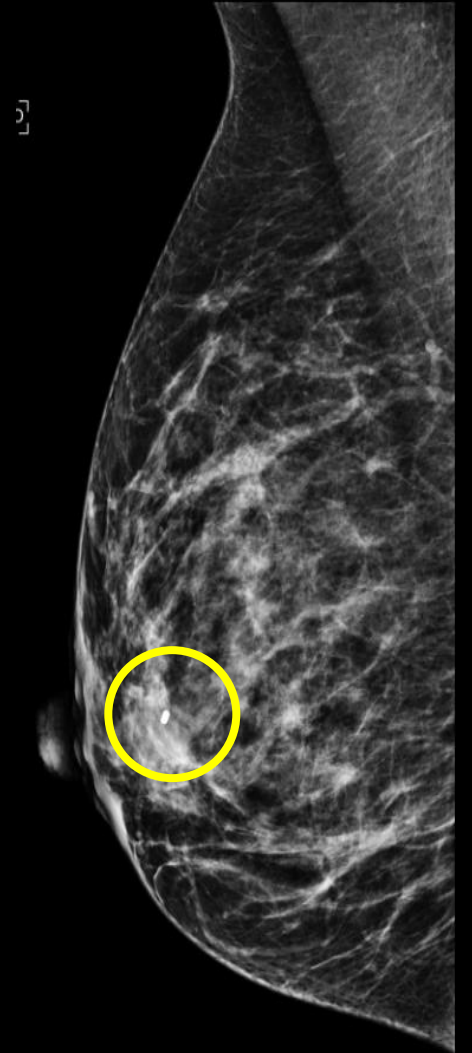
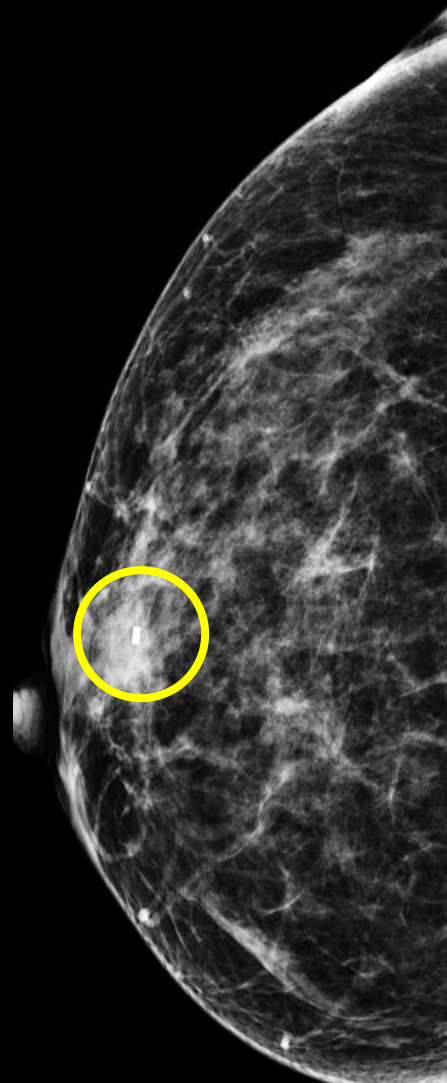
Upright



# US Core Biopsy



LT Breast 11:30 BX Subareolar





## Clip Placement

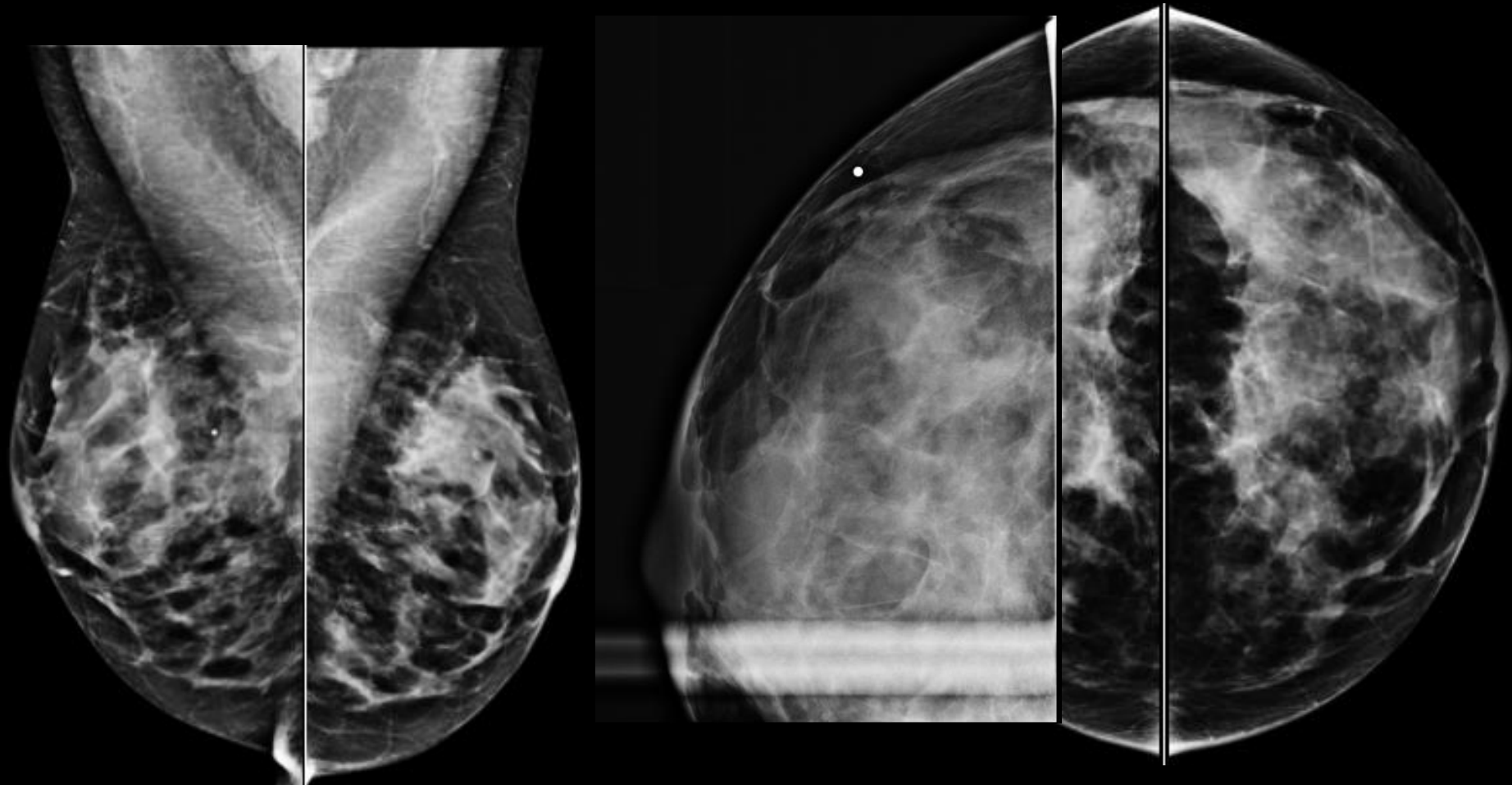
- A clip/marker is placed in the breast after a biopsy procedure is performed to mark the area of interest

## Women Age 30-39

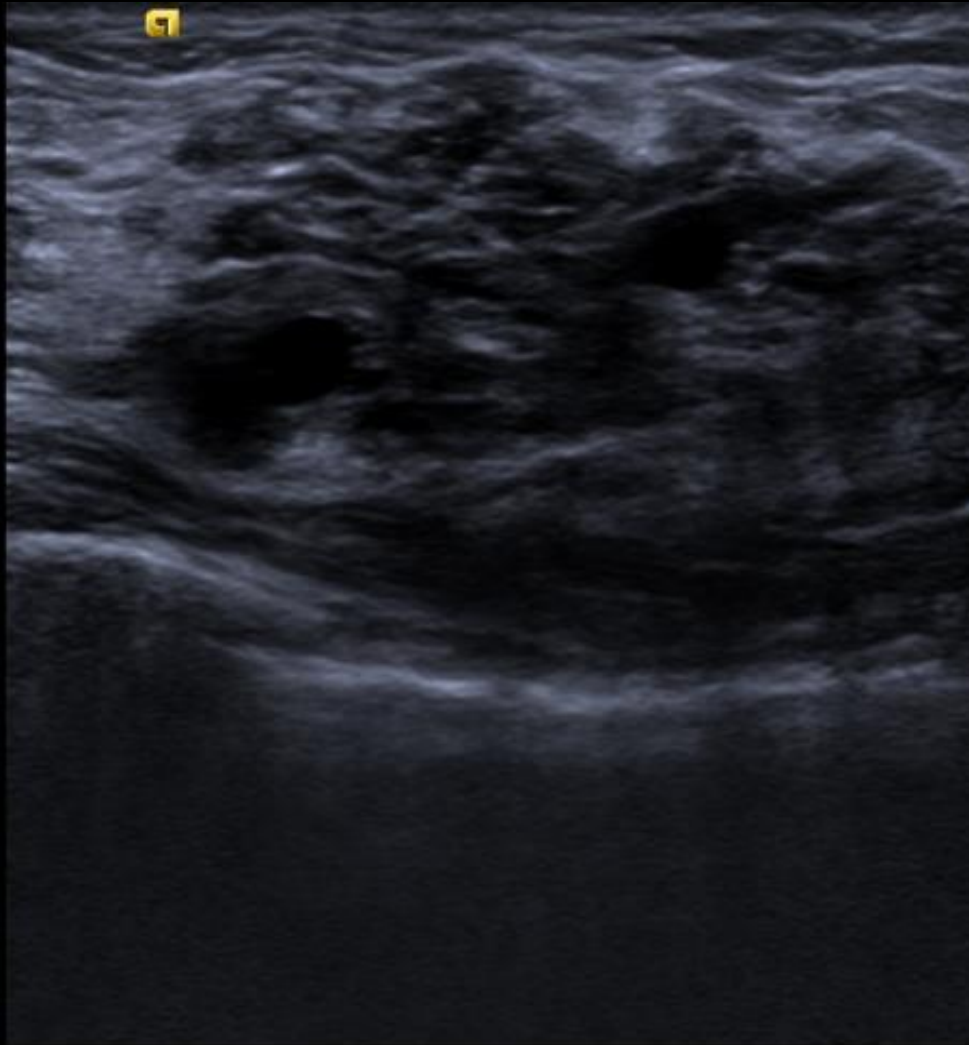
- Diagnostic US and/or Mammography can be used as initial imaging
- If physical exam is highly suspicious and mammography is negative, biopsy is warranted



30-year-old presents for evaluation of right breast lump- Family history of ovarian cancer in mother age 40, grandmother with breast cancer age 70



1.0



Juvenile papillomatosis

Recommend surgical  
excision

RT BREAST 8:00 2CM FROM NIPPLE TRANS

# Juvenile Papillomatosis (JP)

- “Swiss cheese disease”
- Usually benign, localized mass without sharp borders
- Most often seen in teens and young adults  $\leq 30$  years
- Although a benign disease, is considered a marker for familial breast cancer, an association of up to 28% has been found in families of individuals with JP
- Approx. 10% of those with the disease are thought to develop breast cancer later in life

## Women under Age 30 (Young Adult)

- US is the first tool
    - Targeted specifically to the palpable finding
  - Mammography if US suspicious
  - Diagnostic mammography in high-risk patients younger than 30 may be used first
  - Biopsy may be warranted after US if mass is suspicious
  - If US is benign- clinical follow-up
- 
- Women under 30 with focal breast signs/symptoms have low (0.4%) incidence of malignancy [Loving 2010]
    - Study found 100% sensitivity and NPV of targeted US
    - No malignancies found in BI-RADS 3 lesions, supporting US surveillance over biopsy

# Multimodality Management

- When mammography and US are negative or benign, the NPV is high, over 97%
- A highly suspicious PE should prompt biopsy regardless of imaging findings

26-year-old presents for evaluation of left breast lumps

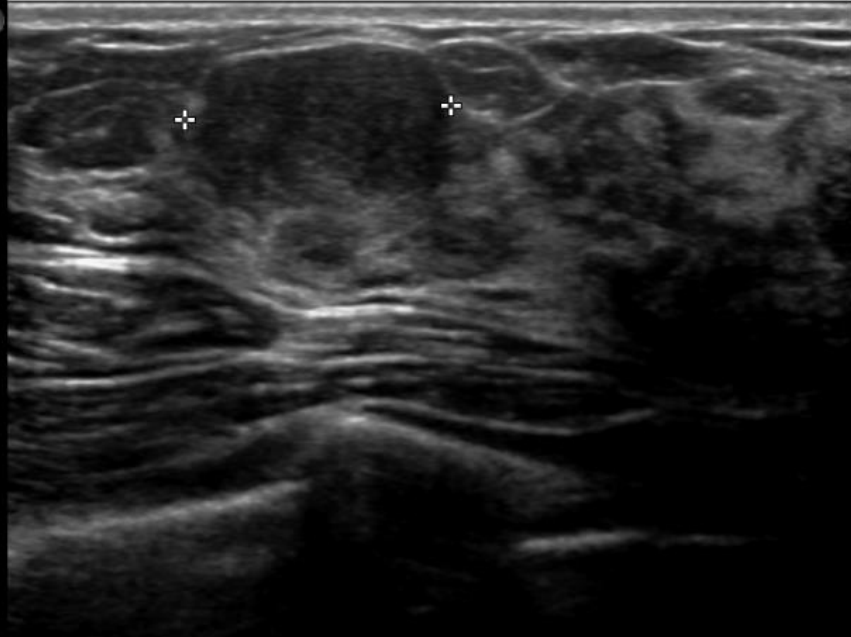


Left 1:00 5 cm from nipple Trans AOC



Left 2:00 6 cm from nipple Long

Rec. 6-month follow-up



LT Breast 1:00 Trans 5cmfn



LT Breast 2:00 Trans 6cmfn

Stable benign-appearing masses; 6-month follow-up

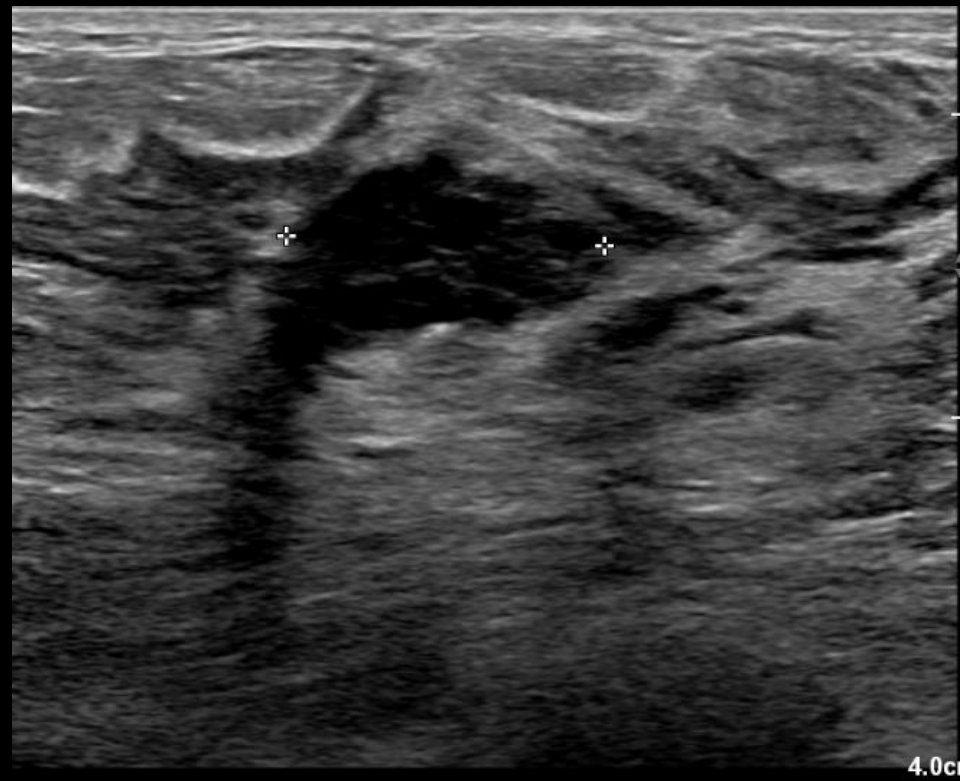


29-year-old presents for evaluation of left lump- Family history of grandmother with breast cancer age 43 & 55, and two aunts with ovarian cancer --no genetic testing in the family

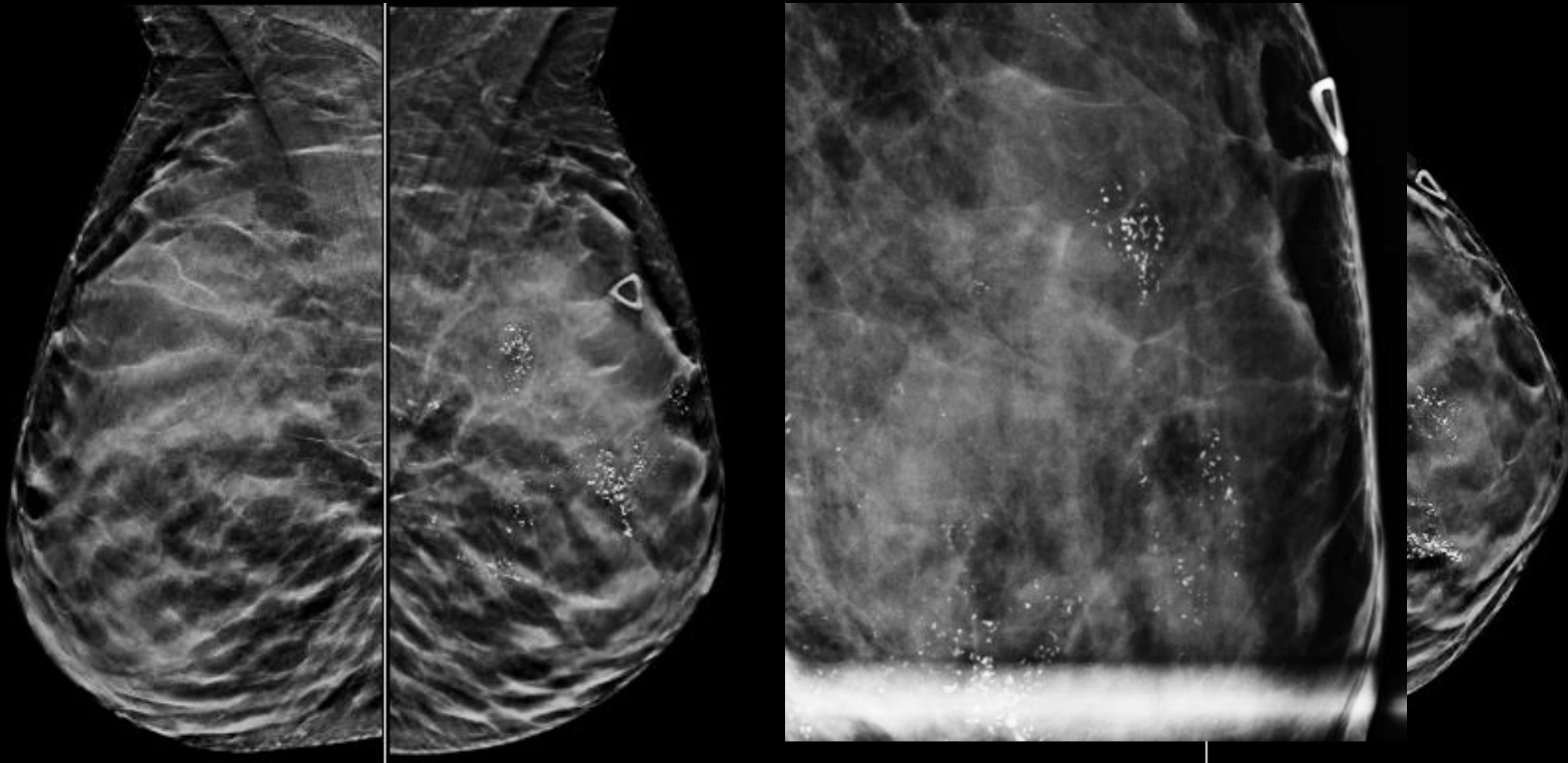
US and palpable findings suspicious warranted a mammogram



LT BREAST 1:00 2 CMFN Trans

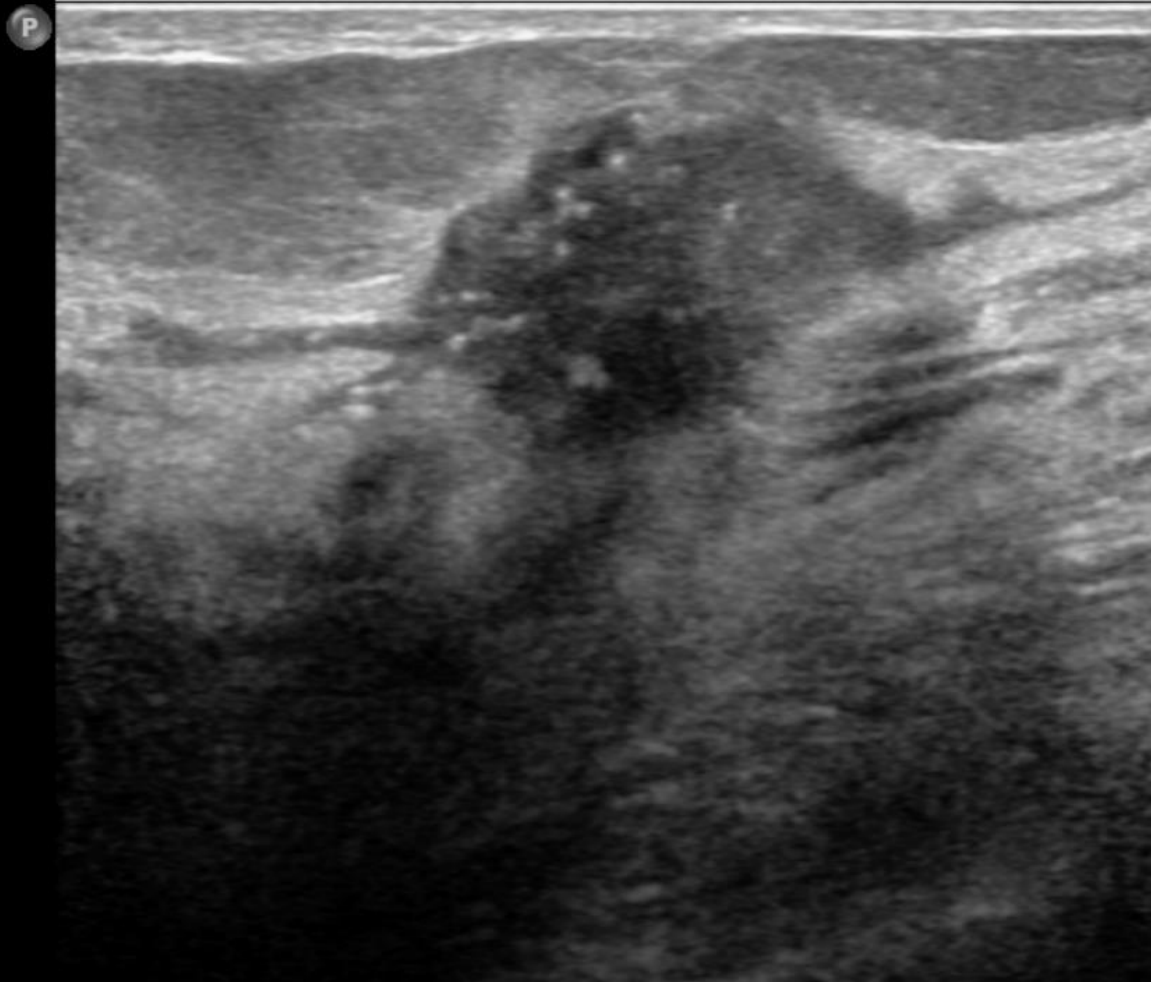


LT BREAST 1:00 2 CMFN Long



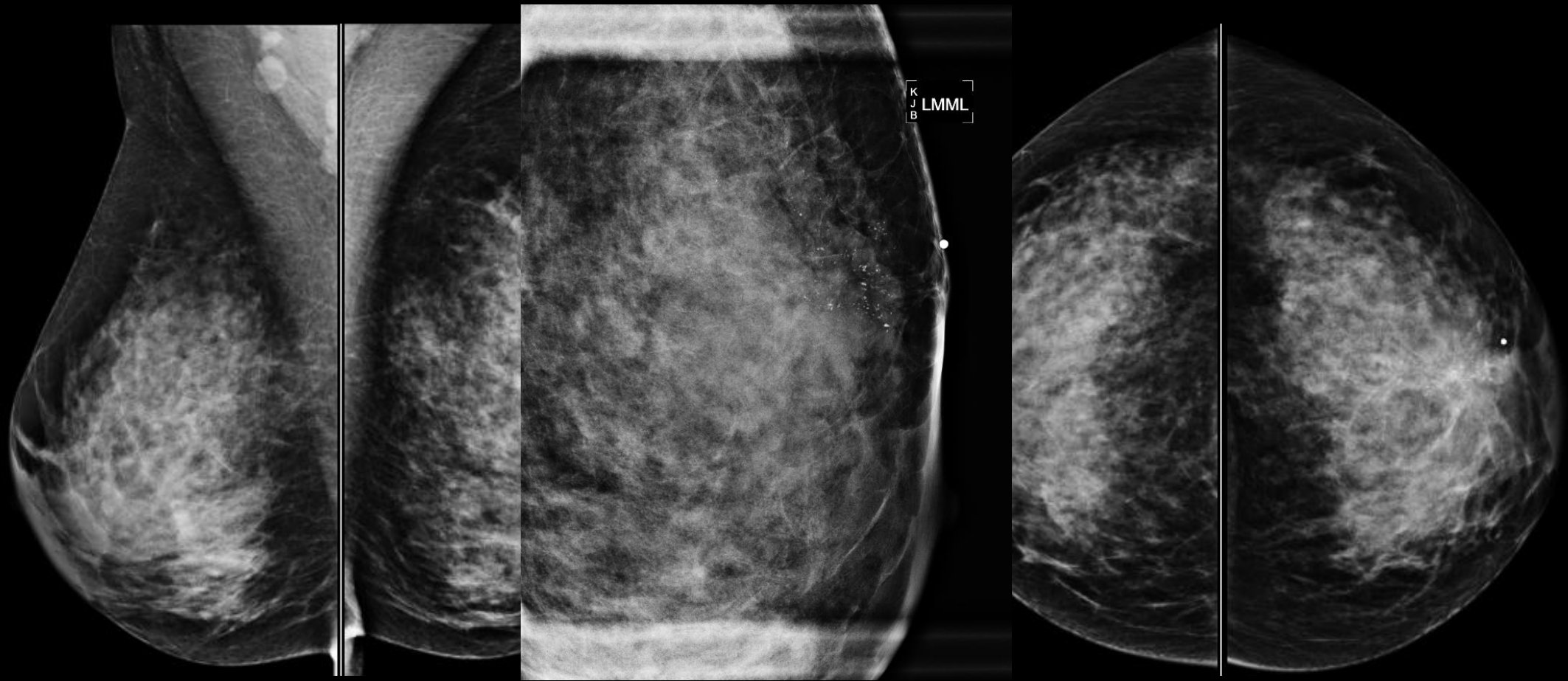
Invasive ductal carcinoma

28-year-old patient presents with left lump

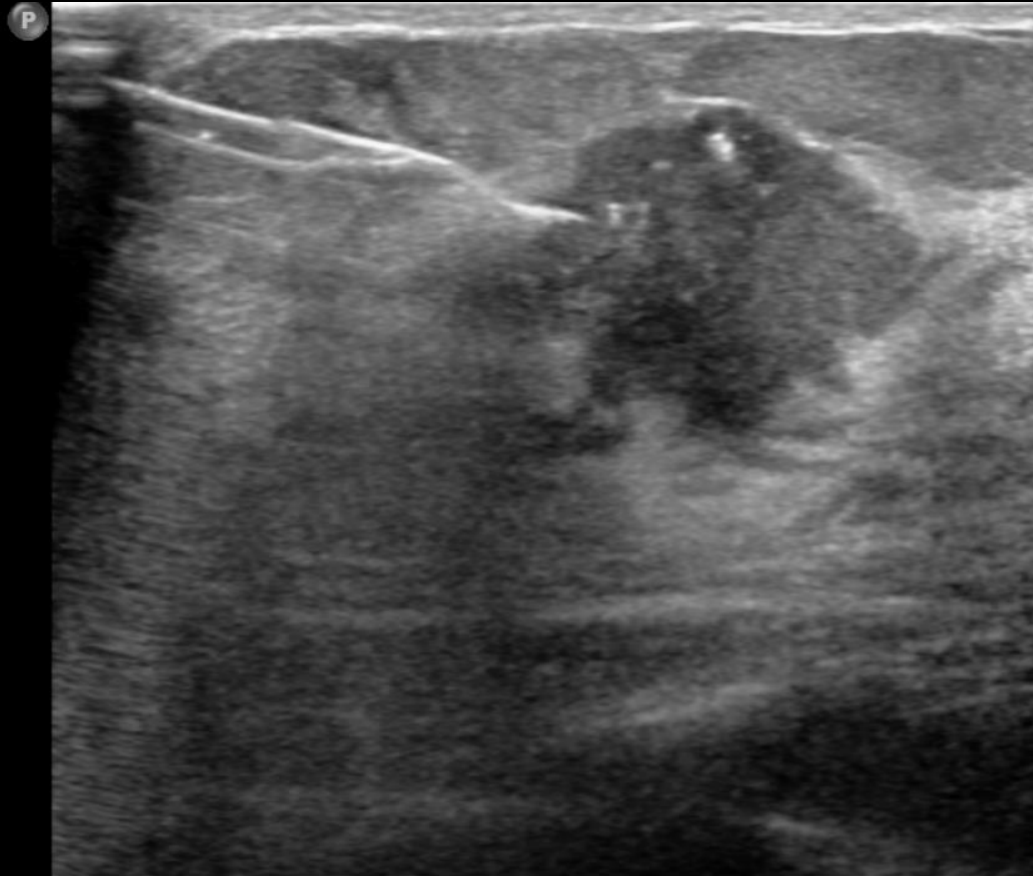


Irregular hypoechoic mass left  
12:00 in the area of palpable  
lump with echogenic foci (calcs)

LT Breast 12:00 2 CM from Nipple



A/D with pleomorphic calcs



LT Breast 12:00 BX 1

US guided biopsy= Invasive ductal carcinoma



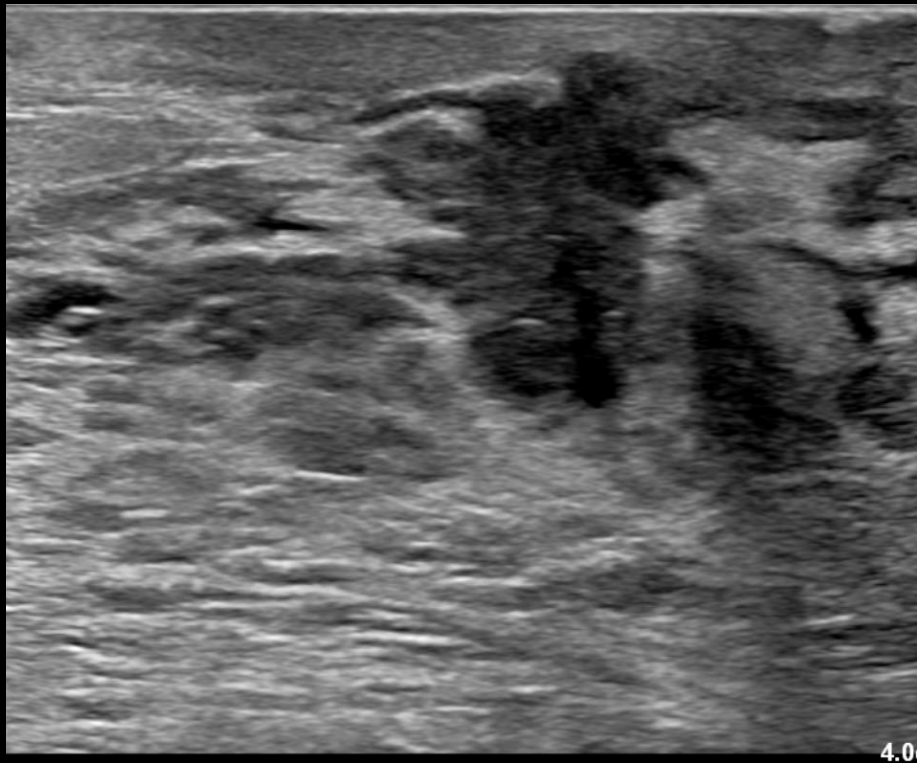
# Breast Cancer in Young Patients

- Breast cancer in women < 40 accounts for ~7% of cases diagnosed annually cannot ignore suspicious presentations
- These tumors tend to be more aggressive and have higher mortality rates

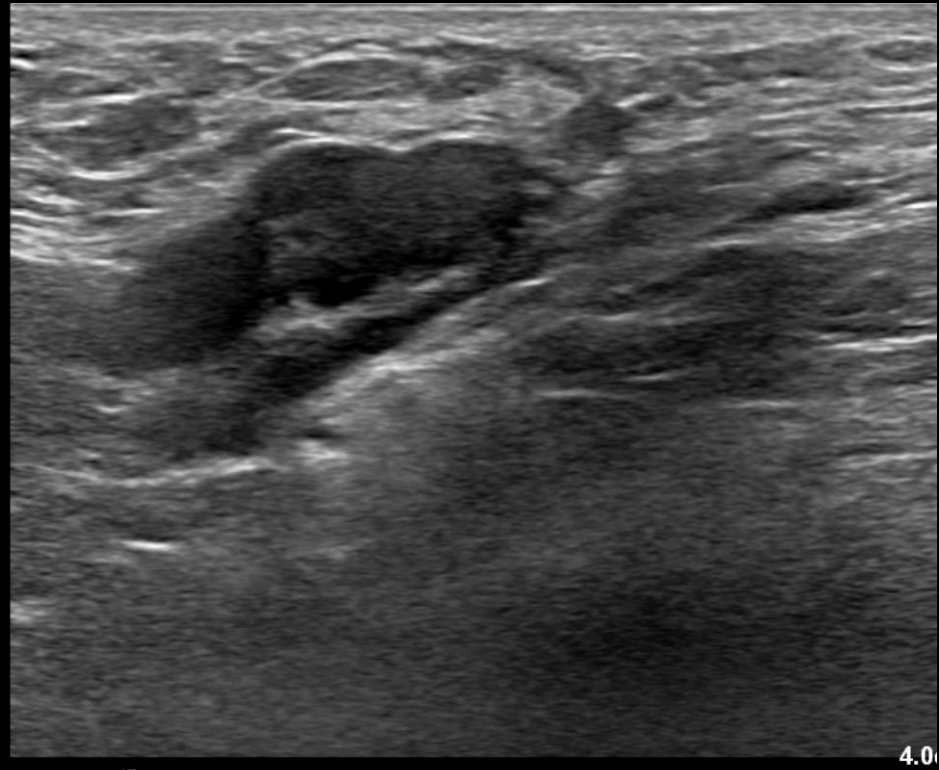
# Palpable Lesions in Pregnant and Lactating women

- US the modality of choice for evaluating palpable lesions in pregnant and lactating women due to having the highest sensitivity for imaging this population
- If breast US is negative, but there are suspicious sonographic findings, additional imaging with mammography/digital breast tomosynthesis (DBT) is indicated
  - Mammography has slightly decreased sensitivity compared to breast sonography in this clinical setting, ranging from 74% to 90%

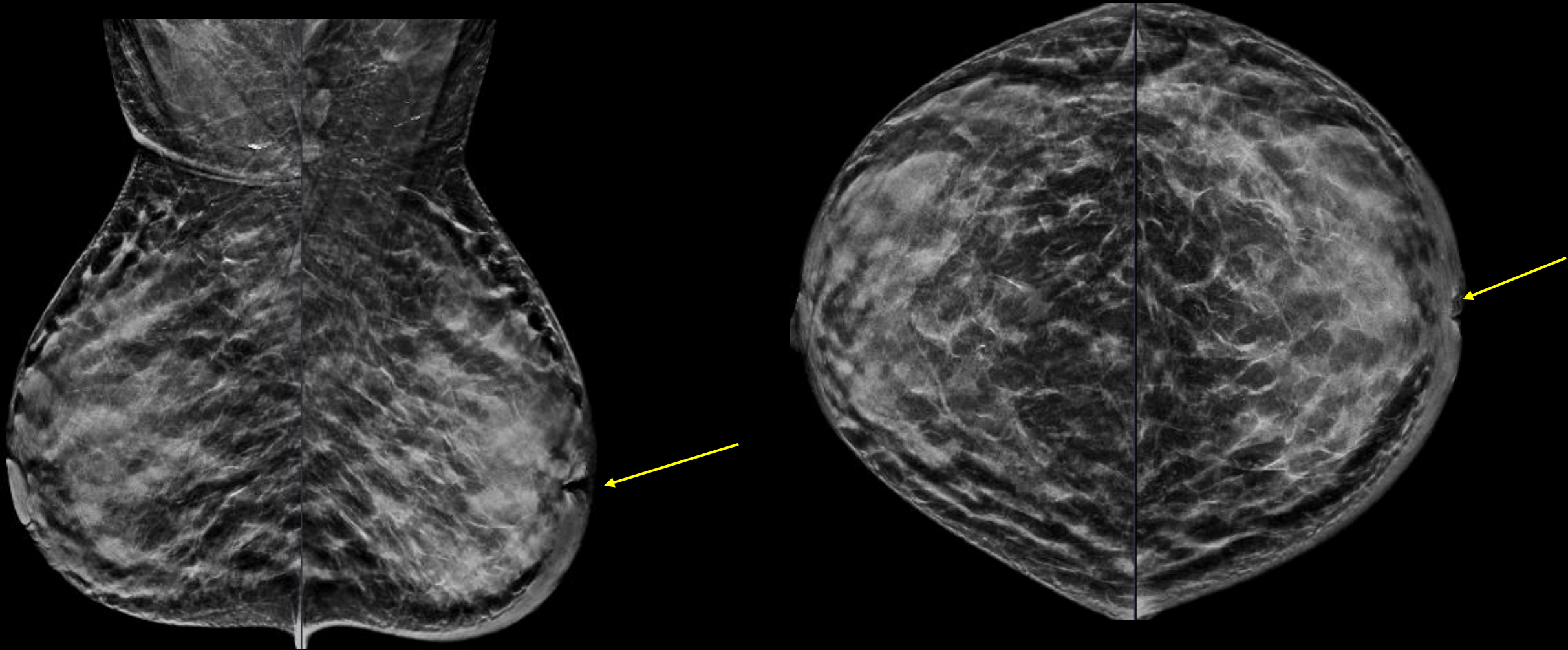
32-year-old 16 weeks pregnant presents for evaluation of probable left mastitis



LEFT BREAST SA Trans

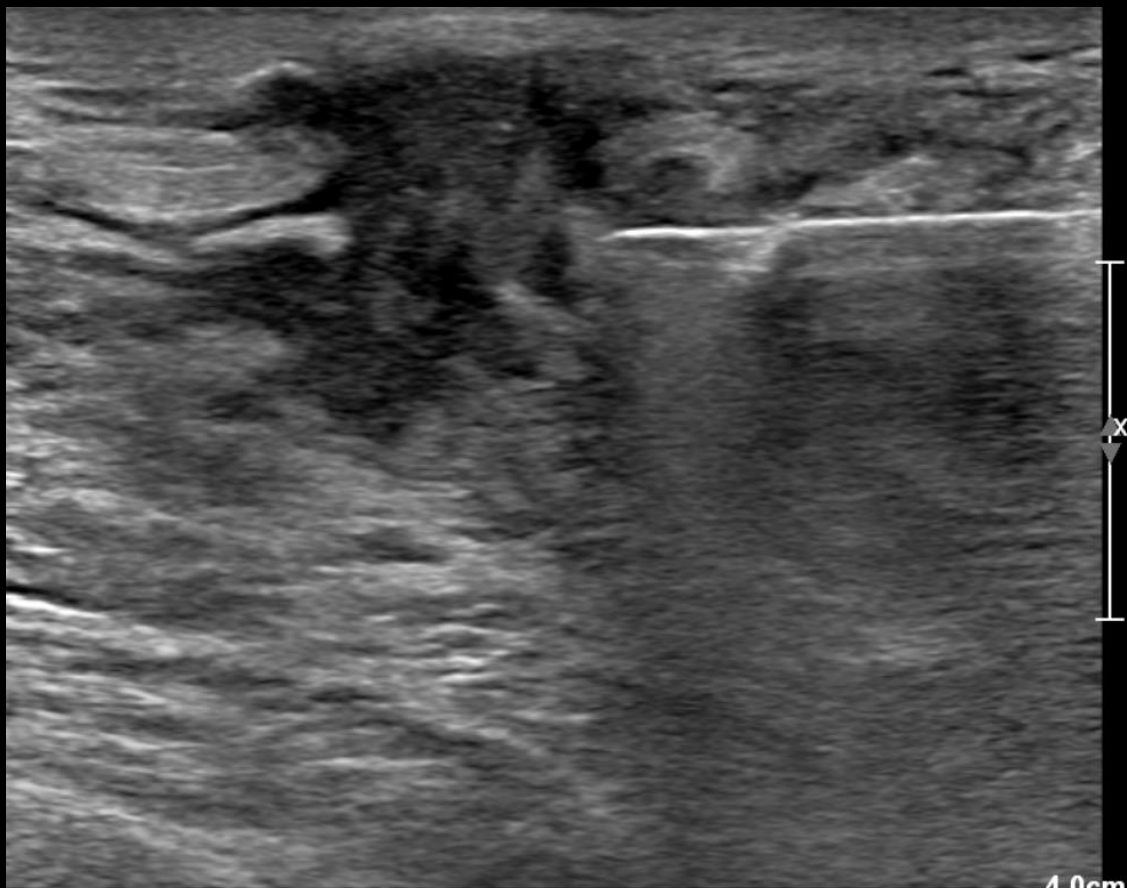


LEFT BREAST Axilla |



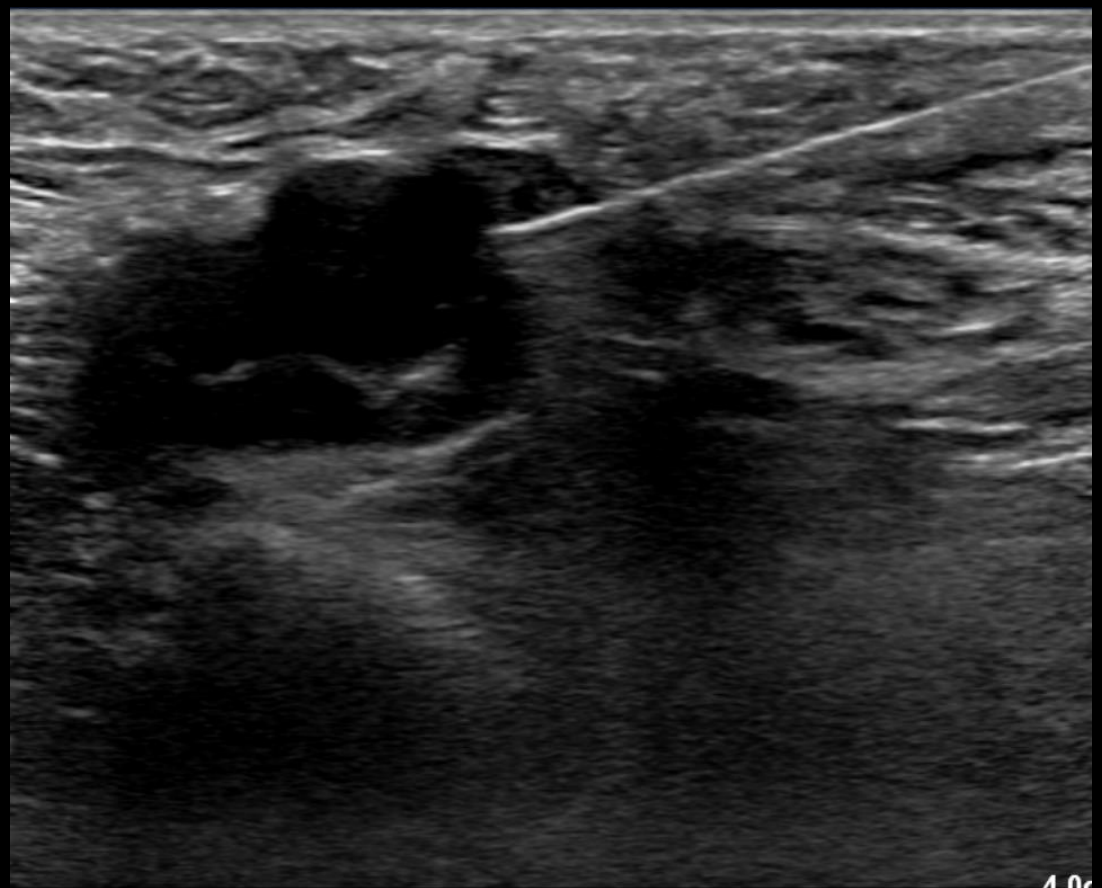
Left nipple inversion, skin thickening, question of distortion SA





LT BREAST SA Trans PRE BX

Left SA – Invasive ductal carcinoma gr 2  
ER positive, PR positive, Her2 negative



LT BREAST Axilla Trans PRE BX |

Left axilla – Metastatic ductal carcinoma

# ACR Appropriateness Criteria

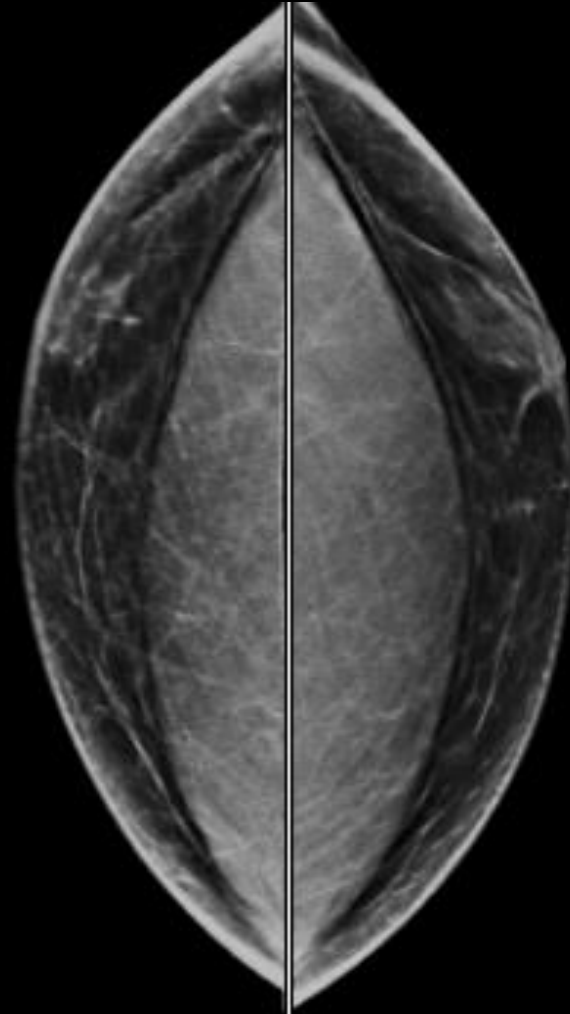
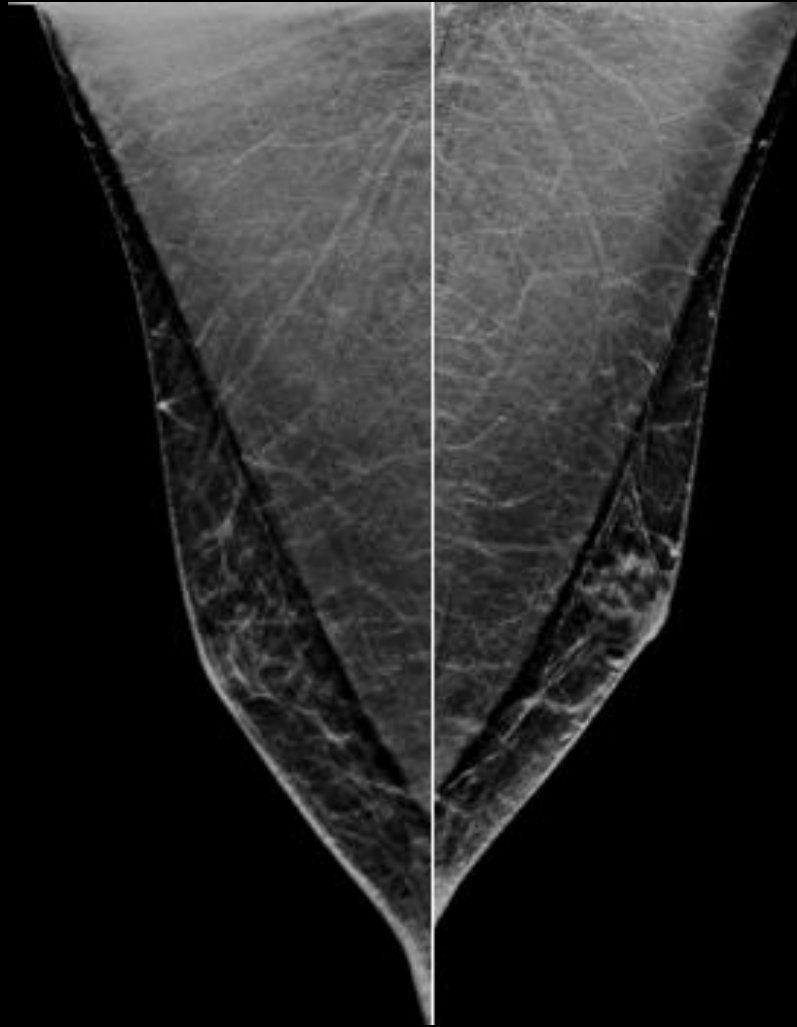
- Male patient (any age) with symptoms of gynecomastia and PE consistent with gynecomastia
  - Most men with breast symptoms can be diagnosed on clinical findings
  - Gynecomastia is bilateral in half of patients
  - On PE- soft, rubbery, or firm mobile mass directly under nipple



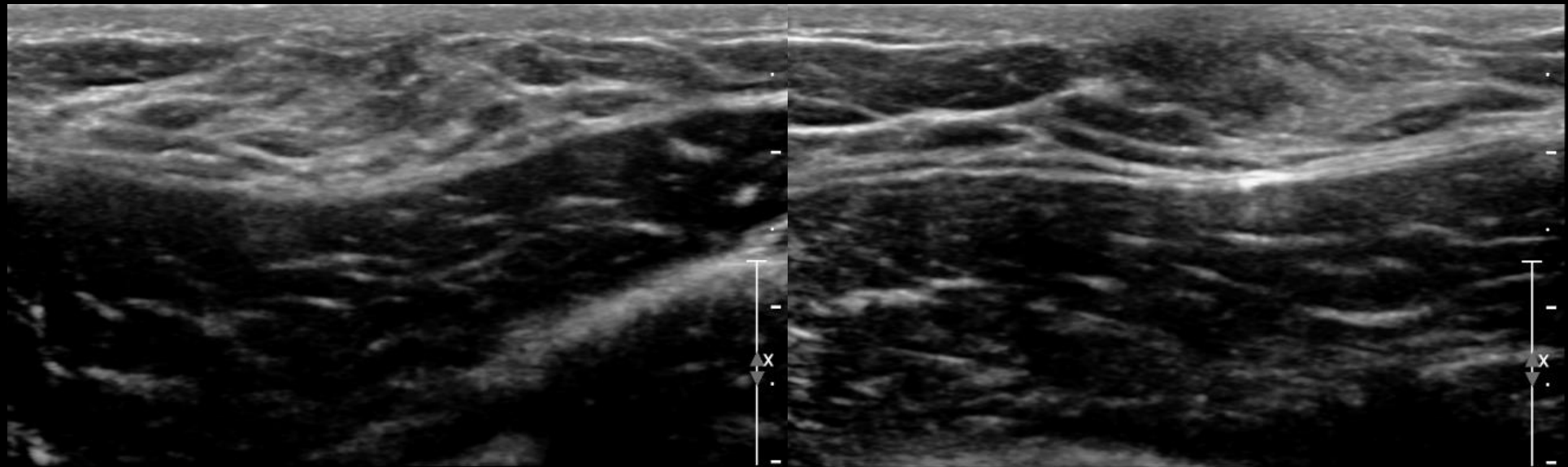
# ACR Appropriateness Criteria

- Male >25 with indeterminate palpable mass; initial exam
- Perform mammography
  - US can be used as an adjunct to mammography if mammogram is indeterminate or suspicious or does not reveal a cause for the palpable finding

26-year-old male presents with palpable thickening behind the left nipple- family history of mother at age 38, aunt age 50s



Mild bilateral gynecomastia- left greater than right



RT Breast 3:00 SA Trans

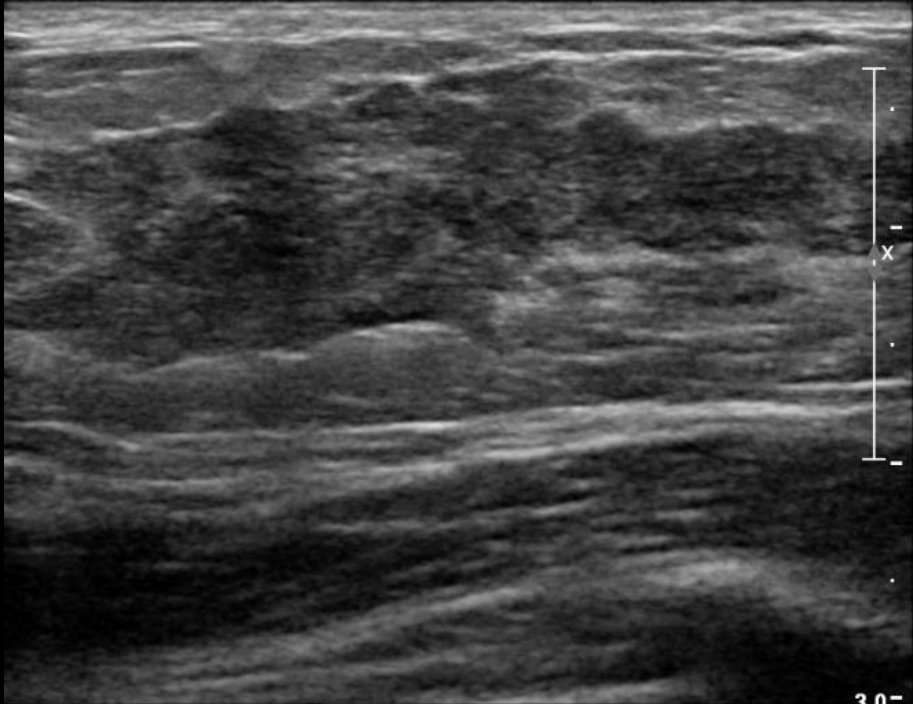
LT Breast 6:00 SA | Trans

Findings and causes discussed with the patient

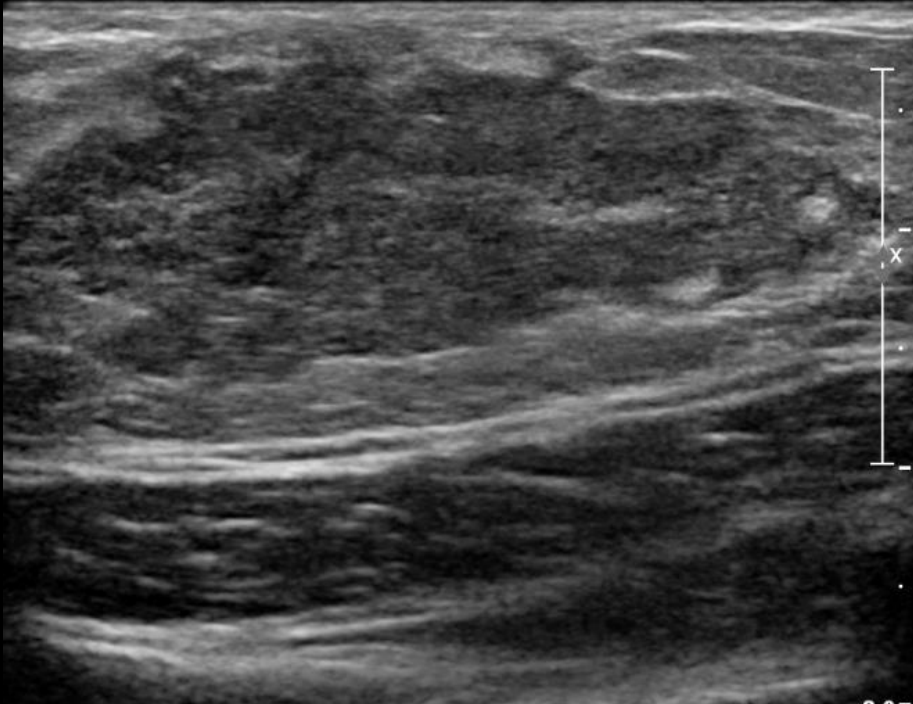
# ACR Appropriateness Criteria

- Male <25 with indeterminate palpable breast mass; initial exam
  - 6% of breast cancers occur under age 40, 1% under age 30
  - Age-based protocols that do not include mammography often used in younger men
  - Some suggest US useful as initial imaging modality
  - If suspicious features on US, mammography should be performed

21-year-old male presents for evaluation of left breast lump



LT Breast 12:00 1 CMFN Trans



LT Breast 6:00 1 CMFN Trans

Moderate gynecomastia

# Gynecomastia

- Abnormal presence of palpable unilateral or bilateral enlargement and proliferation of glandular ductal benign breast tissue in males
- Caused by imbalance between estrogen and testosterone
  - Can occur as side effect of medications and illicit drugs, result of hormonal changes, and in the setting of chronic liver disease
- Prevalence reported to be 36% in younger adult males



# Summary



Managing the diagnostic patient with a breast mass can be dependent based on the patient age/presentation



Procedures and protocols should be in place



Multimodality approach is vital for an accurate complete approach

# References

- Jones KN. Imaging of the Adolescent Breast. *Semin Plast Surg* 2013; 27(1): 29-35.
- Monticciolo DL, et al. Breast Cancer Screening Recommendations Inclusive of All Women at Average Risk: Update from the ACR and Society of Breast Imaging. *JACR* 2021; online.
- Labidi, SI, et al. Inflammatory breast cancer in Tunisia in the era of multimodality therapy. *Ann Oncol.* 2007;19(3):473–480.
- Devi, GR, et al. Perspectives on inflammatory breast cancer (IBC) research, clinical management and community engagement from the Duke IBC Consortium. *J Cancer.* 2019;10(15):3344–3351.
- Mazzarello S, Arnaout A. Nipple discharge. *CMAJ* 2015; 187(8): 599.
- American College of Radiology. ACR Appropriateness Criteria®: Palpable Breast Masses. Available at: <https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria>
- American College of Radiology. ACR Appropriateness Criteria®: Breast Pain. Available at : <https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria>
- Chung, EM et al. Breast Masses in Children and Adolescents: Radiologic-Pathologic Correlation. *RadioGraphics* 2009
- Loving VA, et al. Targeted Ultrasound in Women Younger than 30 Years with Focal Breast Signs or Symptoms: Outcomes Analyses and Management Implications. *AJR* 2010; 195(6): 1472-1477.
- American College of Radiology. ACR Appropriateness Criteria®: Breast Imaging of Pregnant and Lactating Women. Available at: <https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria>
- Munoz Carrasco R, et al. Mammography and ultrasound in the evaluation of male breast disease. *Eur Radiol.* 2010;20(12):2797-2805.
- Braunstein GD. Clinical practice. Gynecomastia. *N Engl J Med.* 2007;357(12):1229-1237.
- American College of Radiology. ACR Appropriateness Criteria®: Evaluation of the Symptomatic Male Breast. Available at: <https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria>
- Nuttall F. Gynecomastia as a physical finding in normal man. *J Clin Endocrinol Metab* 48: 338-340.
- Crichlow RW, Galt SW. Male breast cancer. *Surg Clin North Am.* 1990;70(5):1165-1177.

Thank You

[sdestounis@ewbc.com](mailto:sdestounis@ewbc.com)

