

Intro to Mammography

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Overview

- Screening recommendations
- Patient positioning
- Screening vs Diagnostic exams
- BIRADS reporting
- Case example

Breast Cancer

- Major risk factors: female sex and advancing age
- 1 in 8 women will develop breast cancer (vs men: lifetime risk is 1 in 1000)
- Risk doubles with a first-degree relative with breast cancer
- 85% of cases are sporadic
- 5-10% due to genetic mutation (BRCA1/2)

Increased risk of Breast Cancer

- Increased estrogen exposure
 - Early menarche
 - Late menopause
 - Late age of first pregnancy
 - Obesity (peripheral aromatization of estrogen from adipocytes)
- BRCA1/2
- Ashkenazi Jewish descent
- Prior chest radiation for lymphoma

Society of Breast Imaging and ACR Recommendations for Screening

- Average risk women: age 40, then annually
- Women at increased risk of breast cancer
 - BRCA mutation or untested with first degree relative with BRCA mutation: starting at age 30
 - Women with >20% lifetime risk of breast cancer on the basis of family history: yearly starting at age 30, or 10 yrs prior to youngest affected relative's diagnosis of cancer, whichever is *later*
 - Women with mothers or sisters with premenopausal breast cancer: yearly starting at age 30, or 10 yrs prior to youngest affected relative's diagnosis of cancer, whichever is *later*

SBI and ACR Screening Recommendations

- When should screening stop?
 - When life expectancy is less than 5-7yrs on the basis of age or comorbid conditions
 - When abnormal results of a mammogram would not be acted upon due to age or a comorbid condition

High Risk Lesions

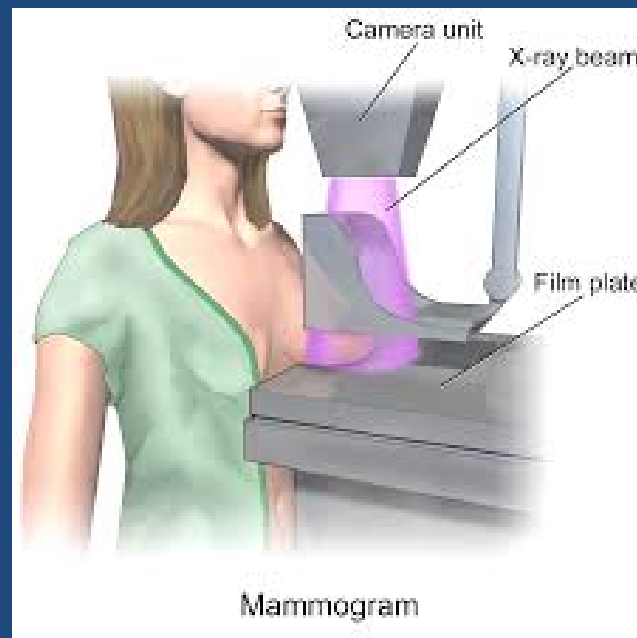
- LCIS: lobular carcinoma in situ
 - Associated with 6% of breast cancers
 - 90% occur in premenopausal women
- ADH: atypical ductal hyperplasia
 - Nonobligate precursor to DCIS
 - In women with positive family hx: RR of 9.7
 - Women age 20-30: RR 7.0

High Risk Syndromes

- BRCA1/2
 - BRCA 1: up to 85% lifetime risk of breast cancer
 - BRCA-2: up to 65% lifetime risk, but tends to occur at a later age
- Cowden Syndrome (PTEN gene)
- Li-Fraumeni syndrome (p53 gene)
- Muir-Torres syndrome (MSH2 and MLH1 gene)
- Peutz-Jeghers syndrome (STK11 gene)

Screening Mammograms

- 2 views of each breast
- CC view= craniocaudal view
 - Compression plane is transaxial



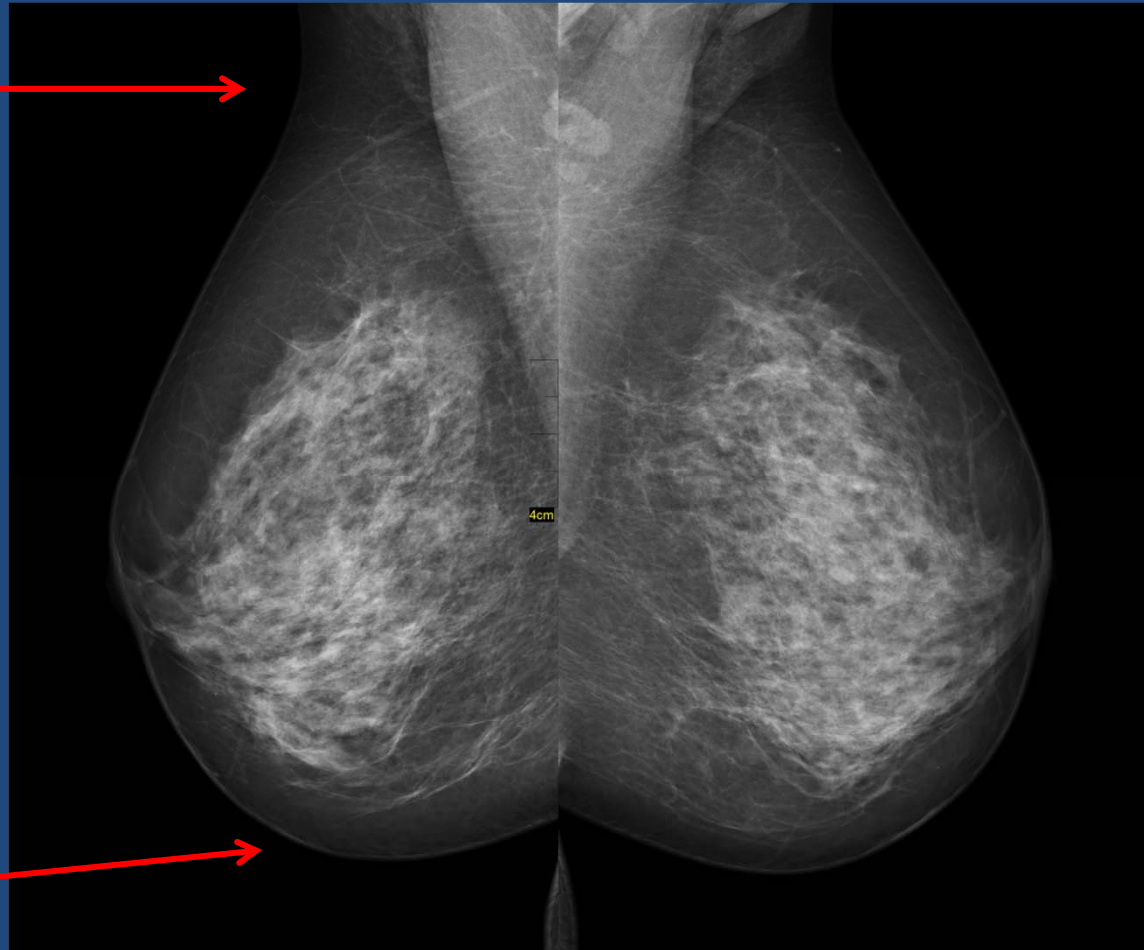
Screening Mammograms

- MLO view= medial lateral oblique
 - Compression plane is 45-60 degrees from the axial plane, depending on patient anatomy
 - Parallels course of pectoralis muscle



MLO

Superior



Inferior

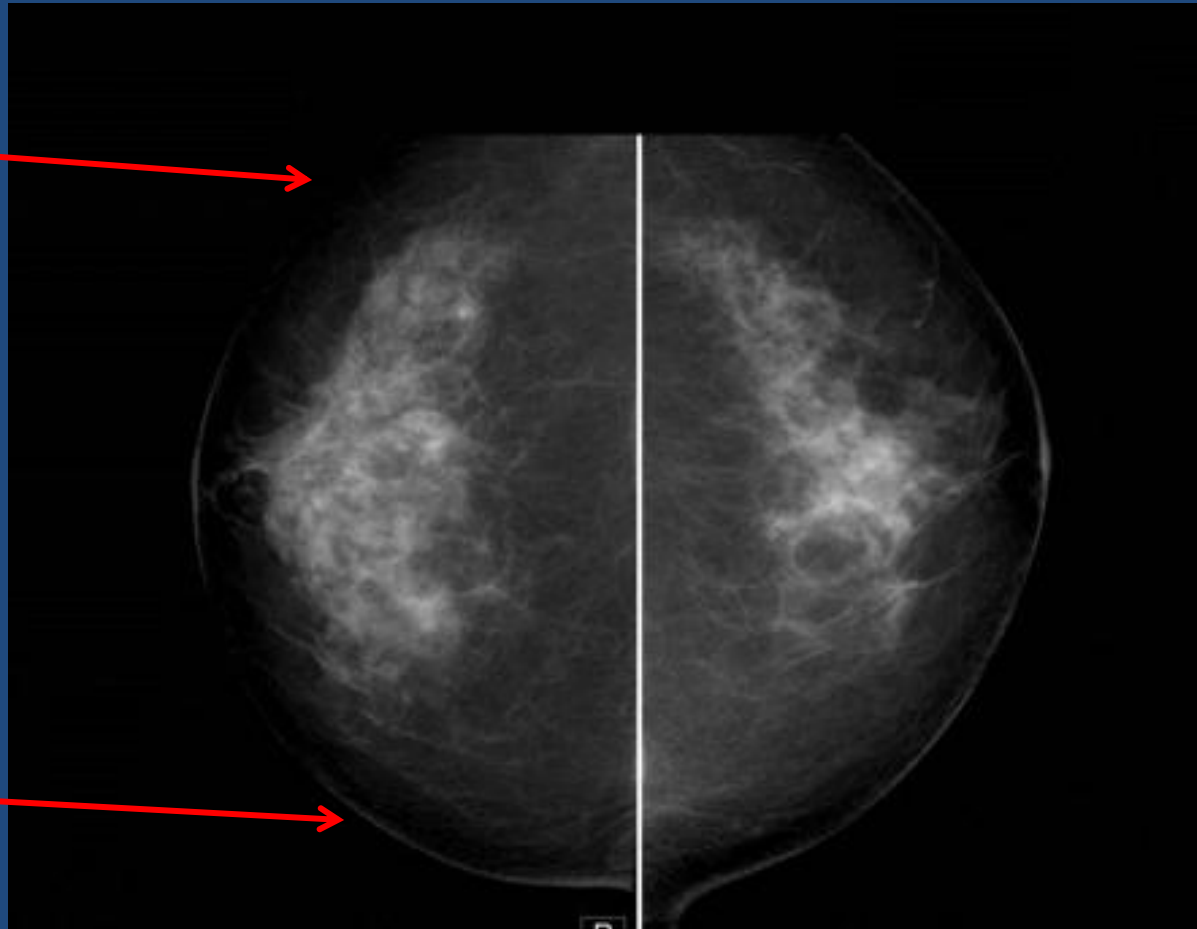


CC

Lateral



Medial



Additional Views

- Cleavage view: pulls in medial tissue of both breasts
- Exaggerated CC view: pulls in either lateral or medial tissue
- Implant displaced views

Diagnostic Mammogram

- Different from a screening mammogram!
- Occurs when there is a breast “problem”
 - the patient has a palpable lesion, nipple discharge, nipple inversion, etc.
 - the patient is called back from a screening mammogram for additional views
 - short interval follow-up was recommended
 - personal history of breast cancer

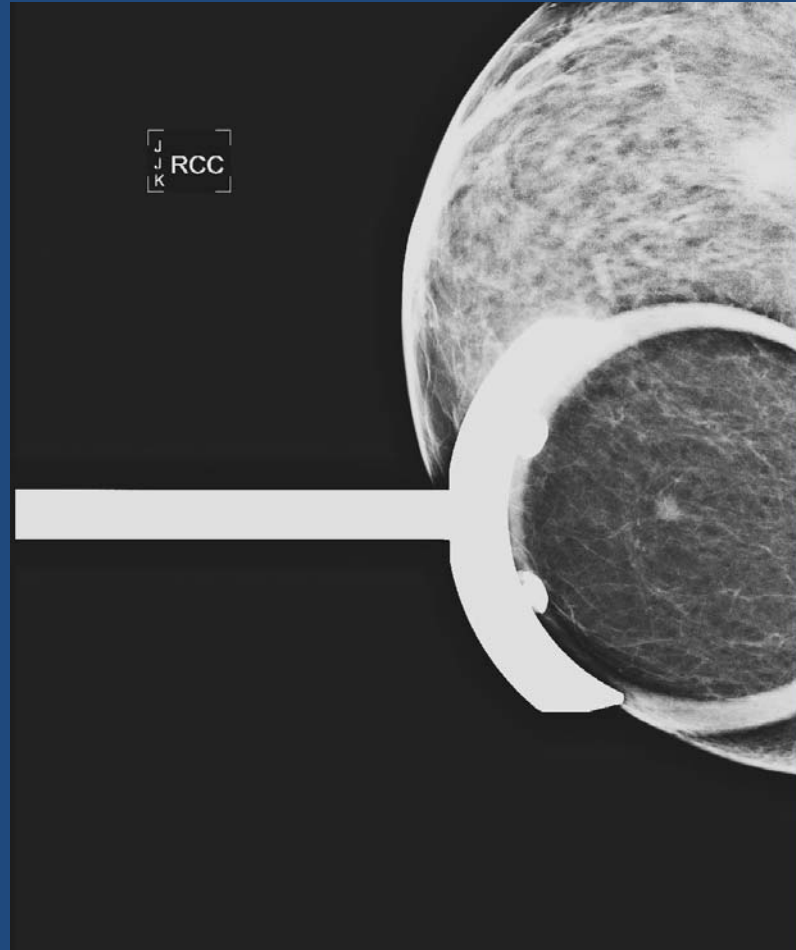
Diagnostic Mammogram

- Can be one or both breasts
- Can include CC and MLO view
- Can include tomosynthesis
- Spot compression
- Magnification
- Diagnostic work-up often includes ultrasound

Spot Compression

- Used for an asymmetry or soft tissue lesion
- Purpose is to “remove” overlapping tissue, and better characterize lesions

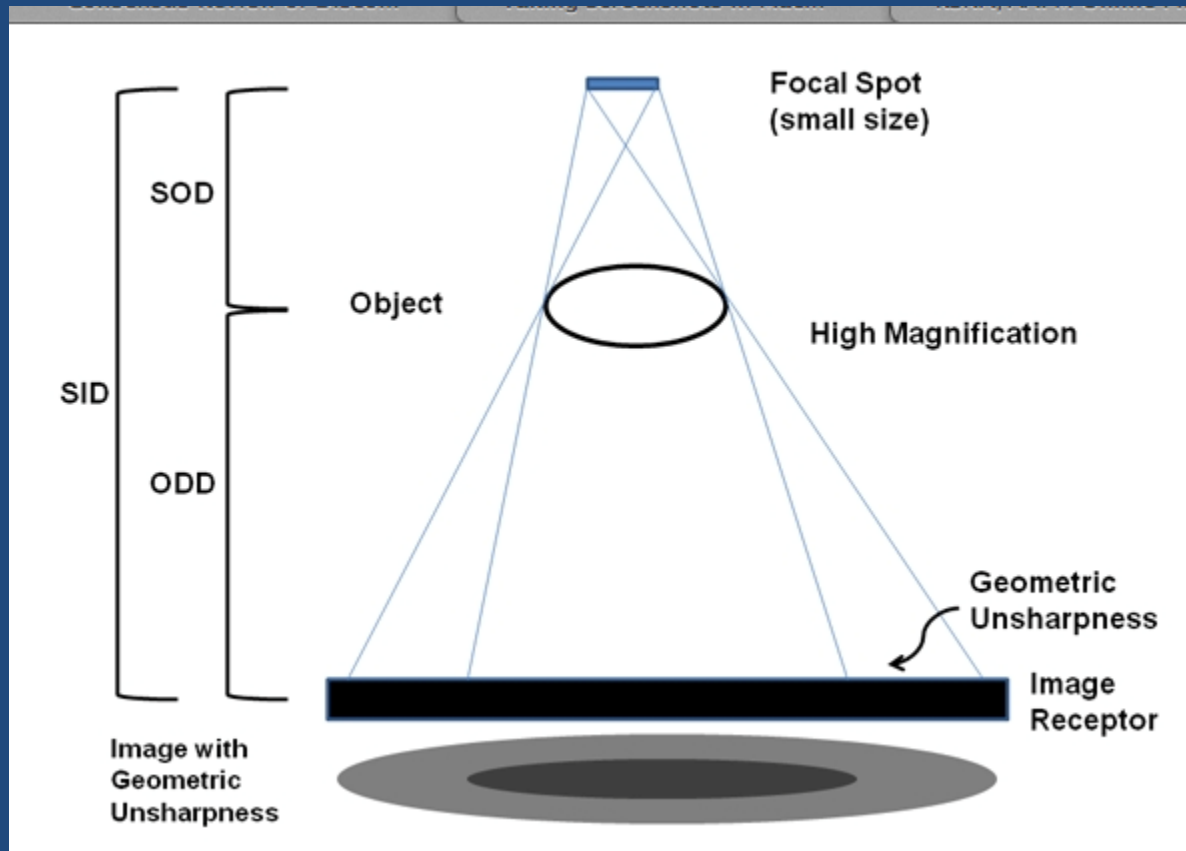
Spot Compression View



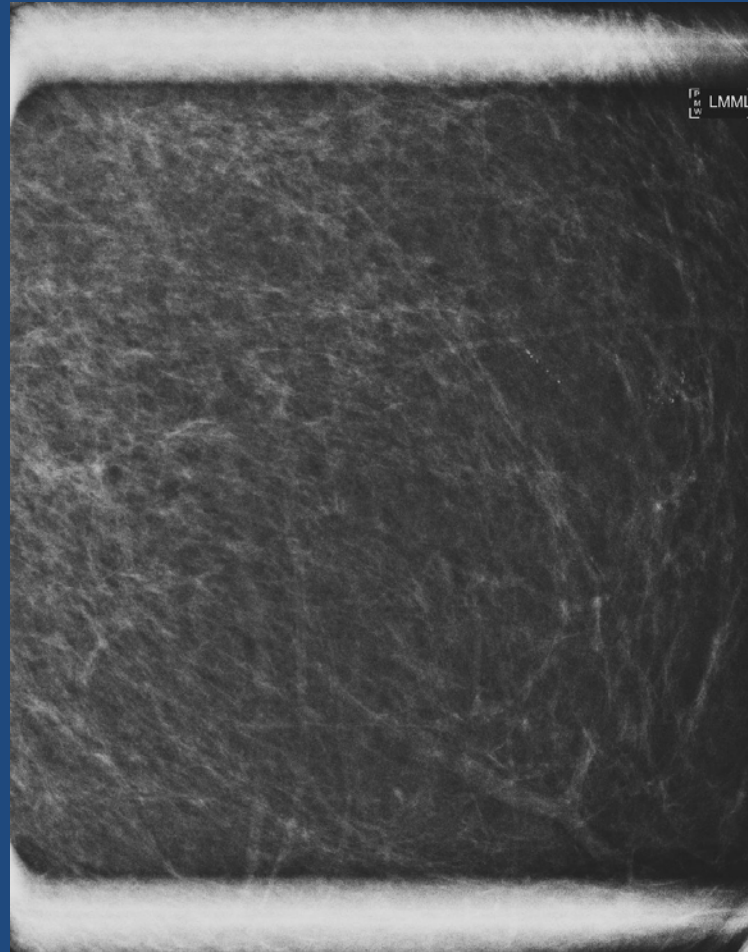
Magnification

- Used to evaluate calcifications
- Introduces an air-gap
 - Reduces scatter
- Small focal spot

Magnification



Magnification View

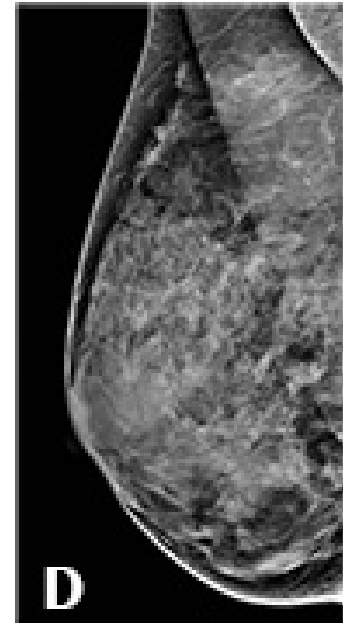


Breast Glandularity

- Screening mammogram reports should include a statement about breast tissue glandularity
- Almost entirely fat: <25% fibroglandular tissue
- Scattered: 25-50% fibroglandular tissue
- Heterogeneously dense: 51-75% fibroglandular
- Extremely dense: >75% fibroglandular

Breast Glandularity

According to BI-RADS®, breast density ranges among (A) an almost entirely fatty breast, (B) a breast with scattered areas of fibroglandular density, (C) a heterogeneously dense breast, and (D) an extremely dense breast.



BIRADS

- An overall assessment, assigned to a number category
- Include course of action (routine annual screening, recommend biopsy, short time interval follow-up, etc)

BIRADS

- 0= incomplete. Additional imaging is needed
 - For screening mammograms ONLY
- 1= negative. Normal breasts
- 2= benign
 - Findings described in the report are benign. No additional workup or follow-up is needed
- These are the only BIRADS categories for screening mammograms!

BIRADS

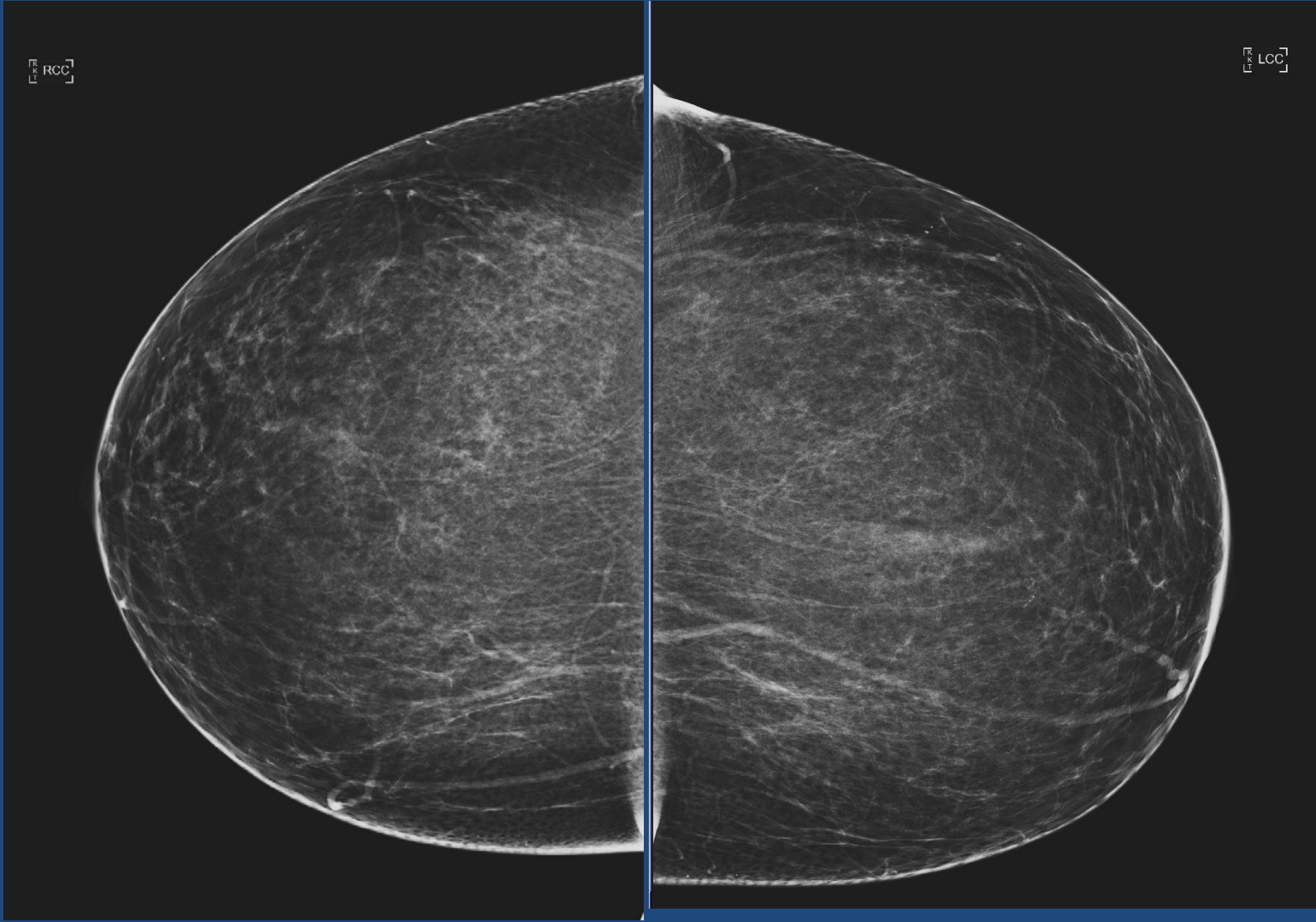
- 3= Probably benign. Short interval follow-up is recommended
 - Lesions in this category have <2% chance of malignancy
 - Never appropriate for a screening mammogram
- 4= Suspicious. Biopsy is recommended
 - 4a= low suspicion for malignancy
 - 4b= intermediate suspicion
 - 4c= high suspicion
 - Probability of malignancy ranges from >2% to <95%

BIRADS

- 5= Highly suggestive of malignancy
 - Probability of malignancy is >95%
 - Biopsy or surgical treatment is recommended
- 6= Known malignancy
 - Lesions have already been biopsied and proven as cancer
 - Treatment plan is usually already in place

Case

- Test yourself!
- 54 yo female presents for routine annual screening mammogram
- No personal or family history of breast cancer





How would you characterize breast glandularity?

- A. Almost entirely fat
- B. Scattered
- C. Heterogeneously dense
- D. Extremely dense

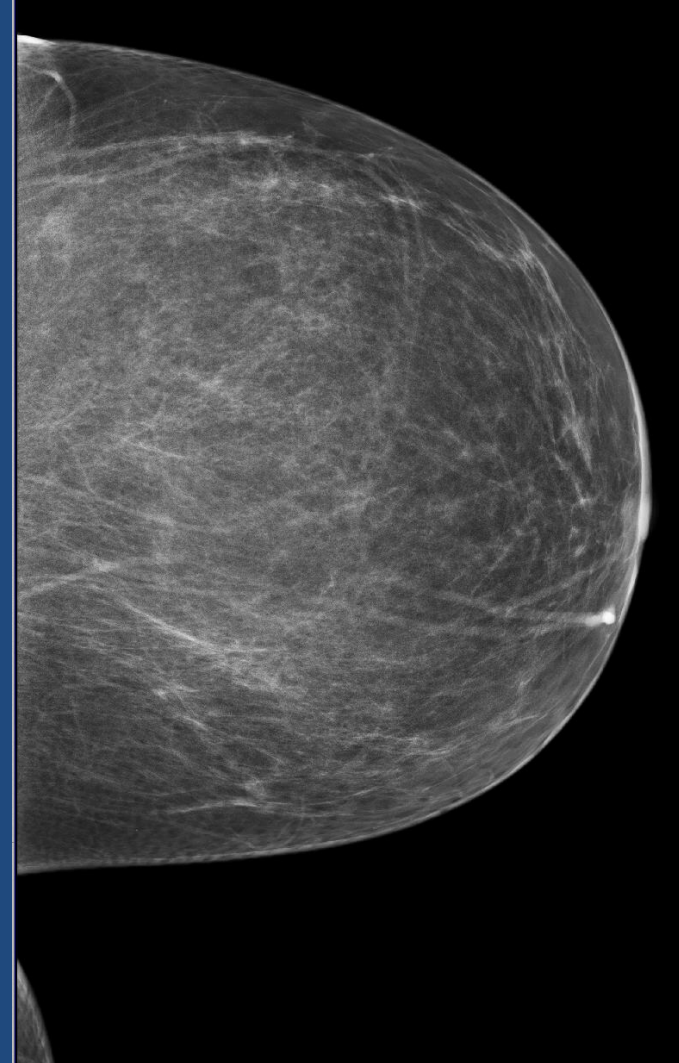
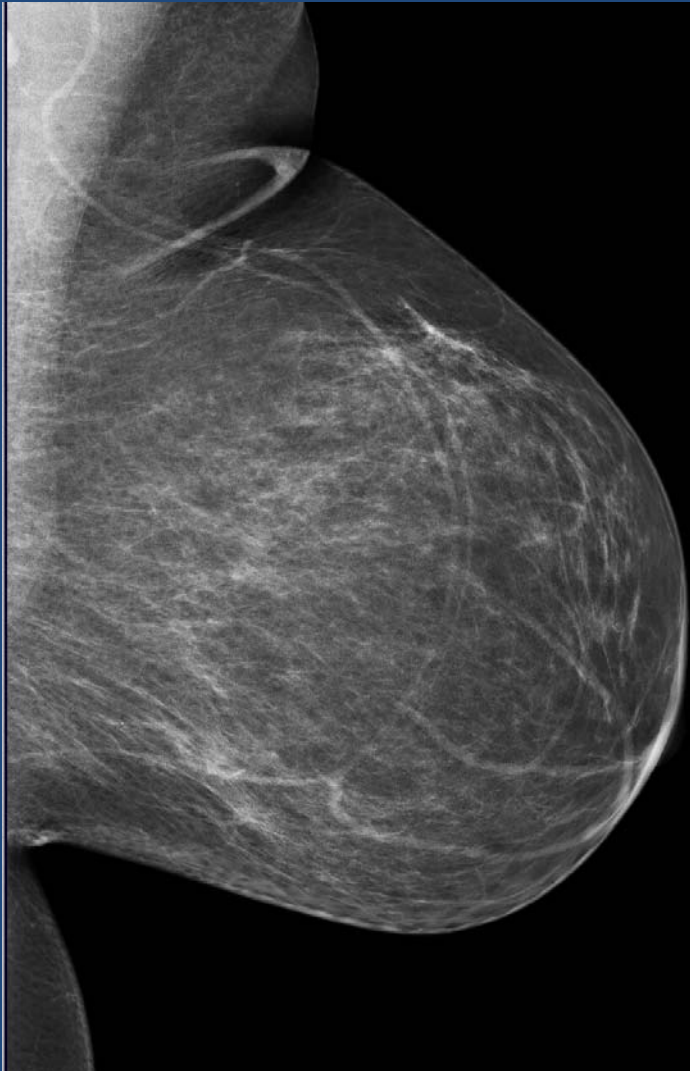
How would you characterize breast glandularity?

- A. Almost entirely fat**
- B. Scattered
- C. Heterogeneously dense
- D. Extremely dense

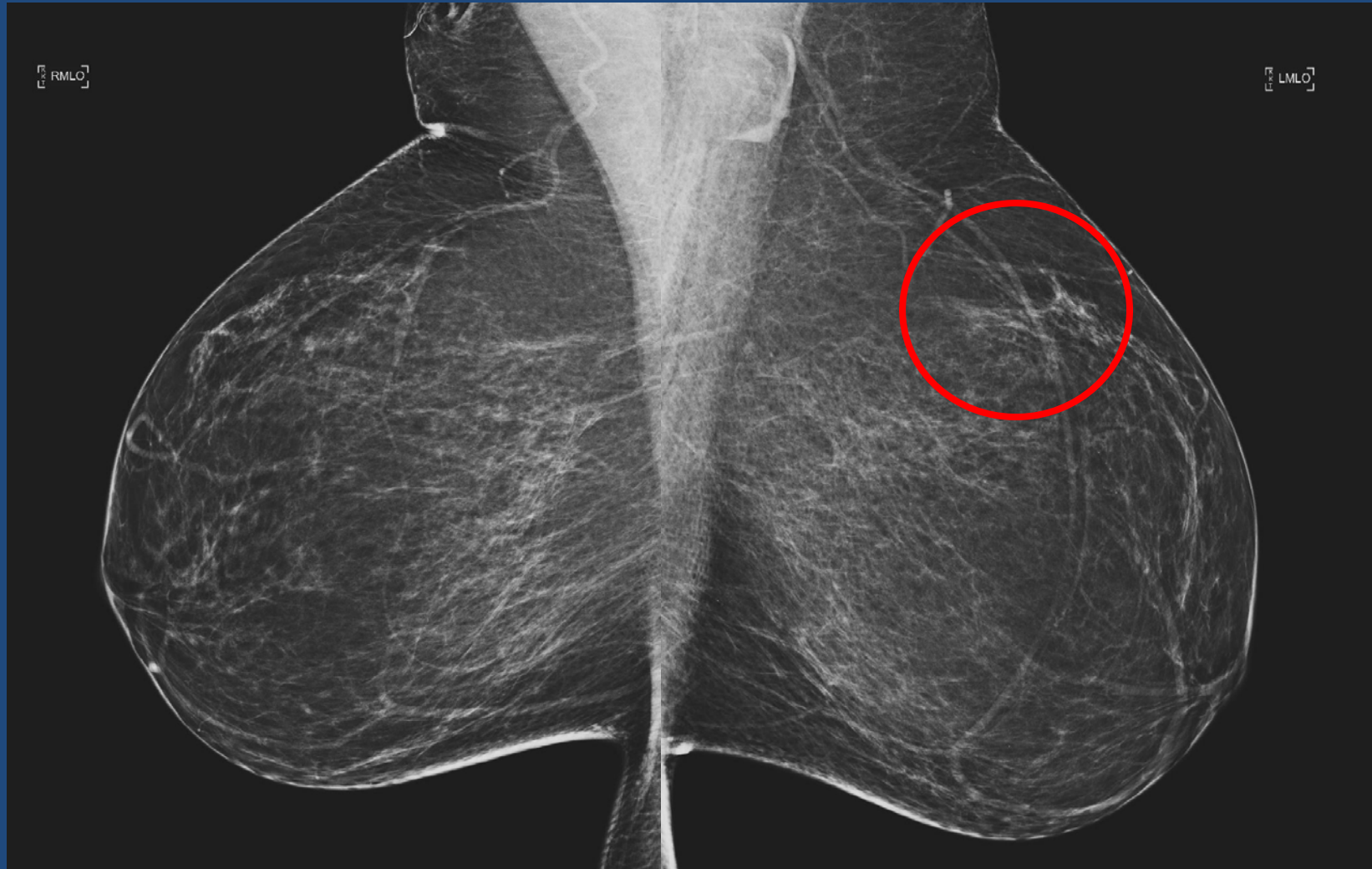
Case

- What would you describe in the report?
- Hint: compare to old studies!

2011 Screening Exam



Current Screening Exam



Current Screening Exam

- There are new calcifications in the upper outer left breast
- Calcifications are linear, branching and in a ductal distribution

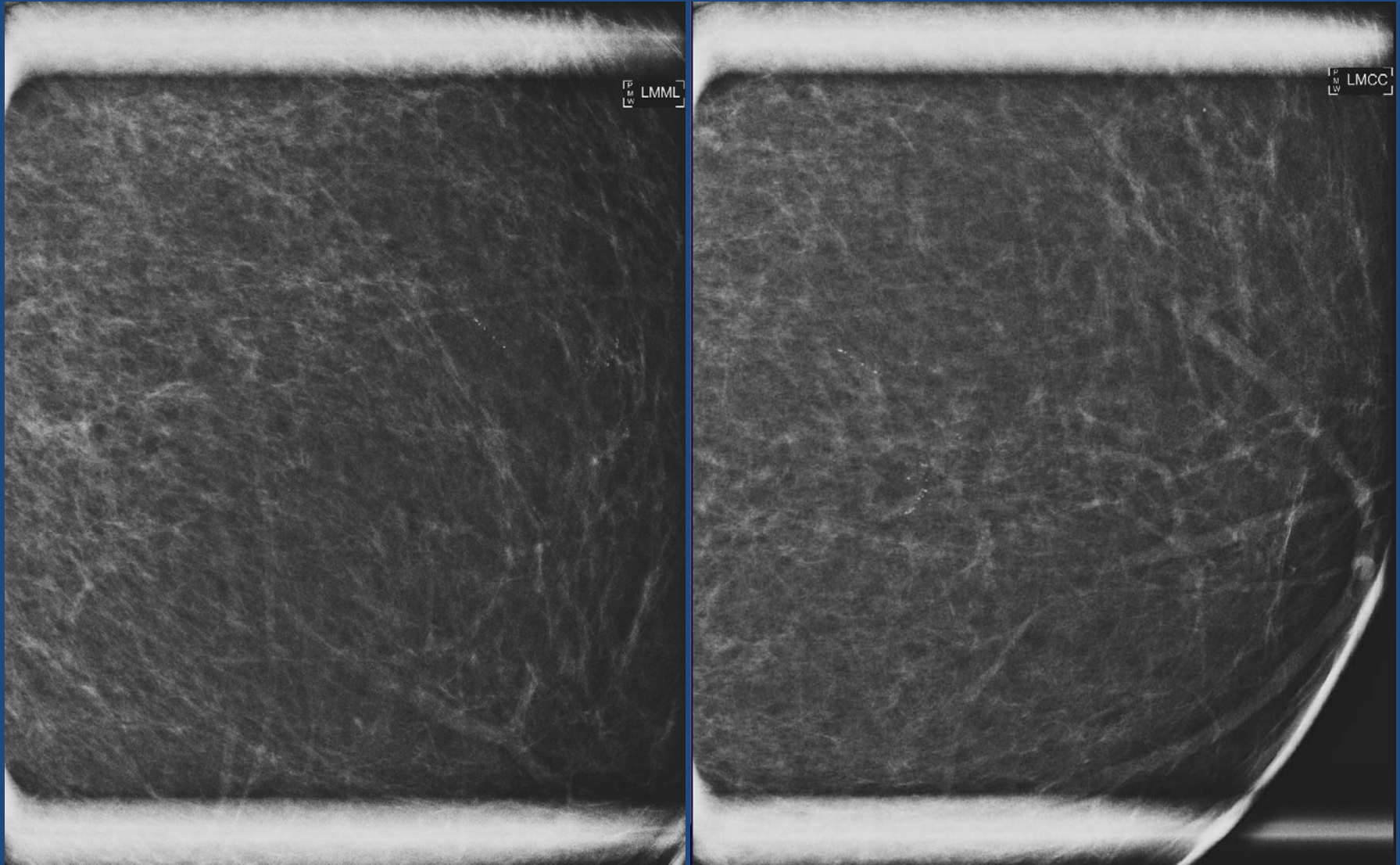
What would BIRADS category would you assign?

- A. 0. Incomplete. Spot compression views are recommended.
- B. 0. Incomplete. Magnification views are recommended.
- C. 2. Benign.
- D. 4. Suspicious. Biopsy is recommended.

What would BIRADS category would you assign?

- A. 0. Incomplete. Spot compression views are recommended.
- B. 0. Incomplete. Magnification views are recommended.**
- C. 2. Benign.
- D. 4. Suspicious. Biopsy is recommended.

Diagnostic Exam



Now what would BIRADS category would you assign?

- A. 0. Incomplete. Biopsy is recommended.
- B. 0. Incomplete. Ultrasound is recommended.
- C. 2. Benign.
- D. 3. Probably benign. Six month follow-up is recommended.
- E. 4. Suspicious. Biopsy is recommended.

Now what would BIRADS category would you assign?

- A. 0. Incomplete. Biopsy is recommended.
- B. 0. Incomplete. Ultrasound is recommended.
- C. 2. Benign.
- D. 3. Probably benign. Six month follow-up is recommended
- E. 4. Suspicious. Biopsy is recommended.**

Case

- Stereotactic biopsy was performed.
- Path showed DCIS

References

- Lee, CH et al. 2010. Breast Cancer Screening with Imaging: Recommendations from the Society of Breast Imaging and the ACR on the use of Mammography, Breast MRI, Breast ultrasound and Other Technologies for the Detection of Clinically Occult Breast Cancer. *Journal of the American College of Radiology*. 7(1): 18-27.