DR.SARAH ALSULTAN

BREAST IMAGING CONSULTANT

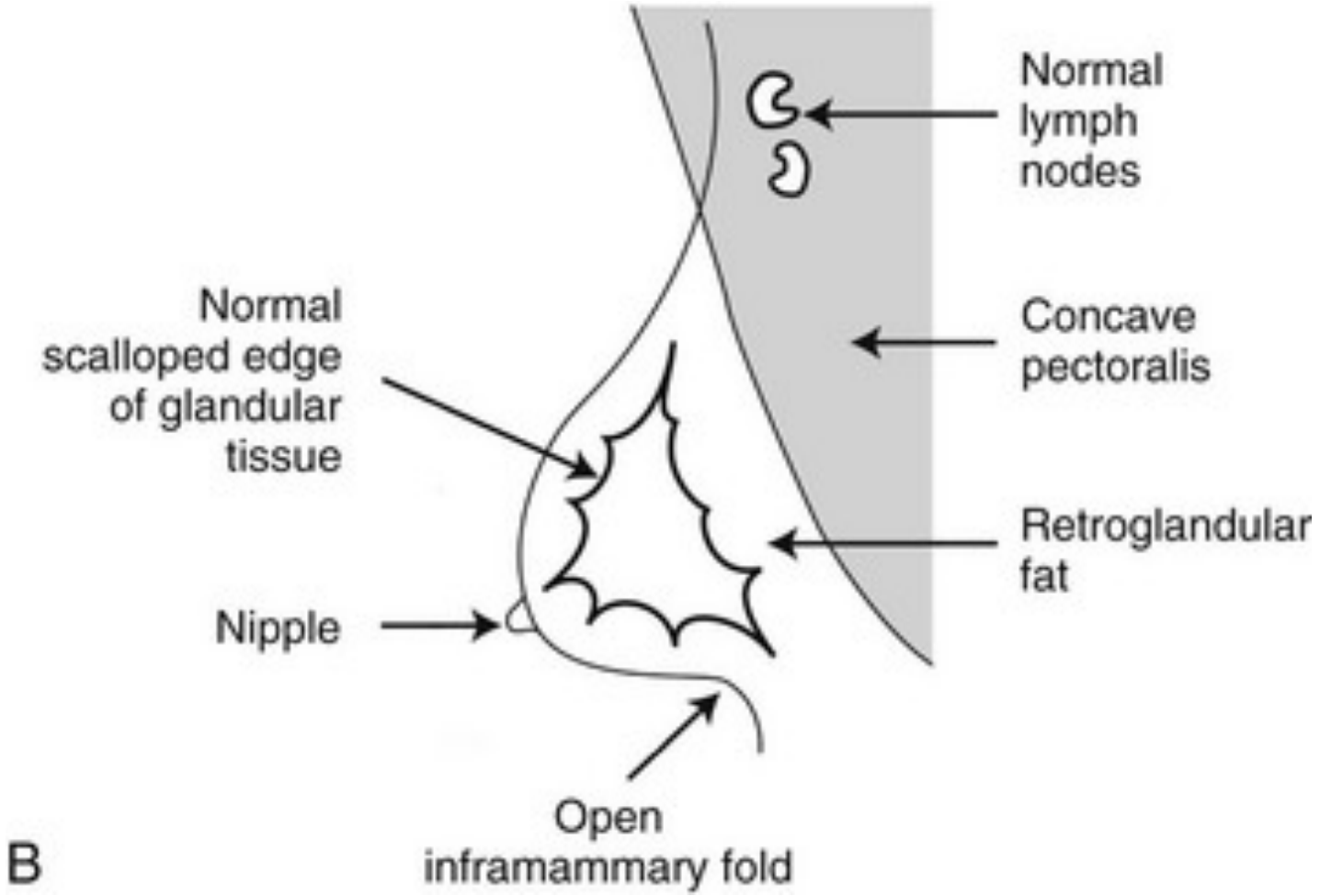
KING KHALID UNIVERSITY HOSPITAL

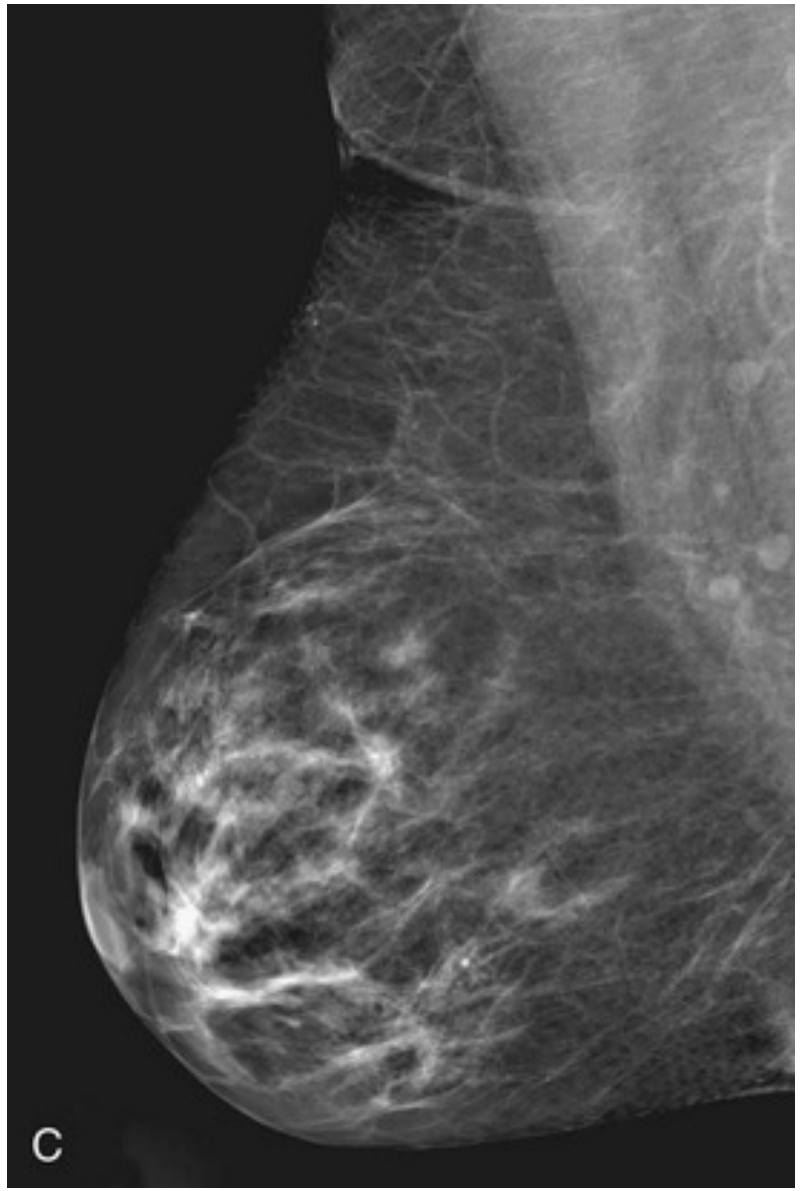
BREAST IMAGING

OBJECTIVES

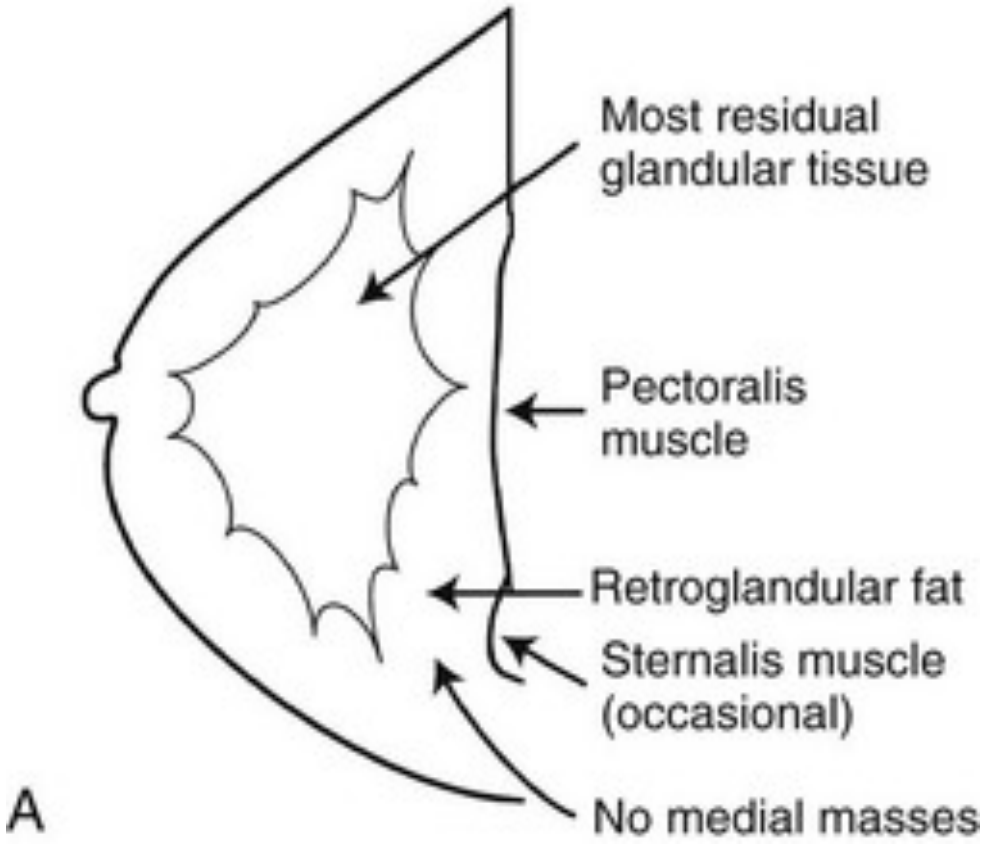
- Radiological **anatomy** of the breast.
- To highlight the **suitable modality** for each **age.**
- **Role of imaging/radiology** in diagnosing breast lesions particularly breast cancer.

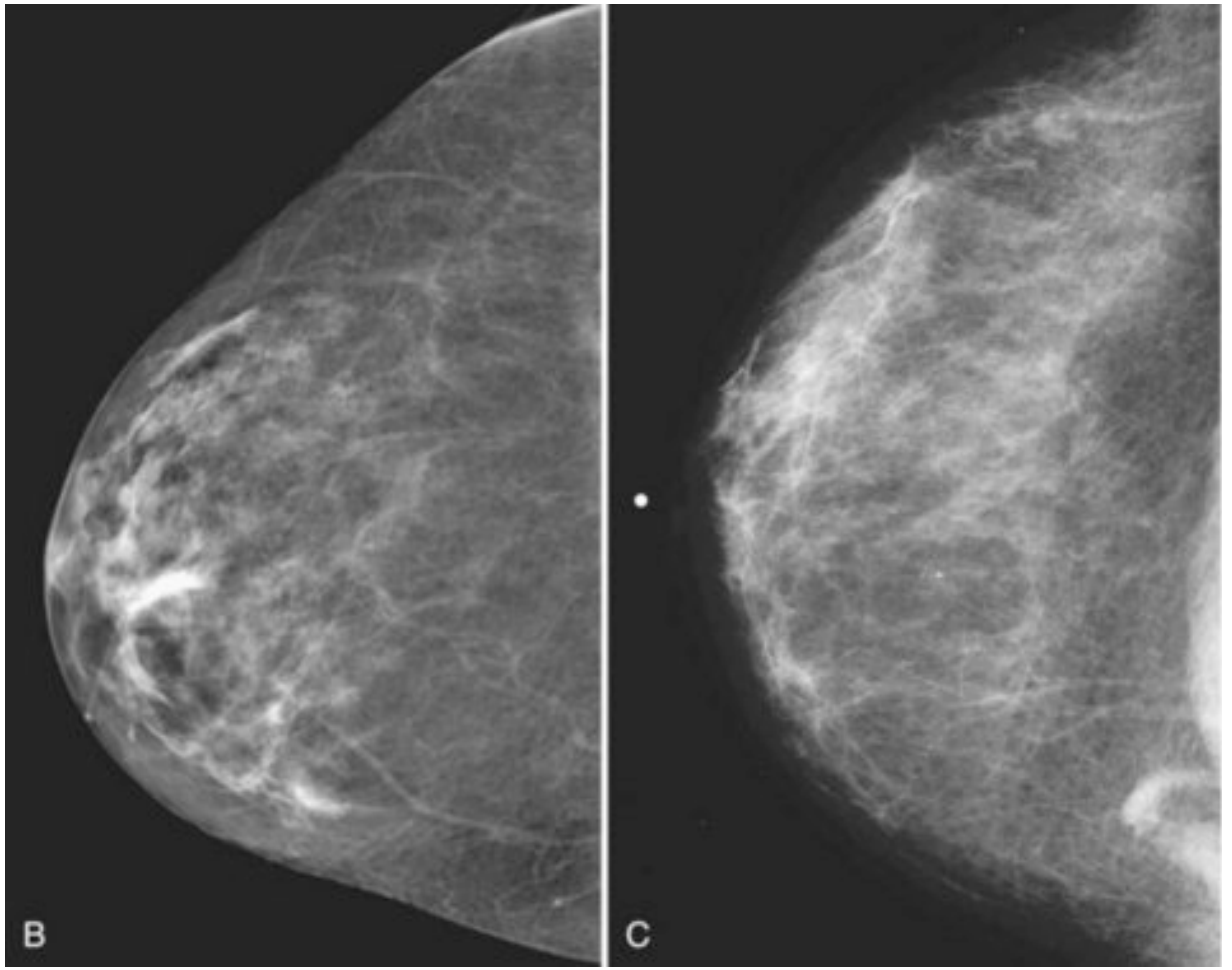
ANATOMY


Normal lymph nodes
Concave pectoralis
Normal scalloped edge of glandular tissue
Retroglandular fat
Nipple
Open inframammary fold
B

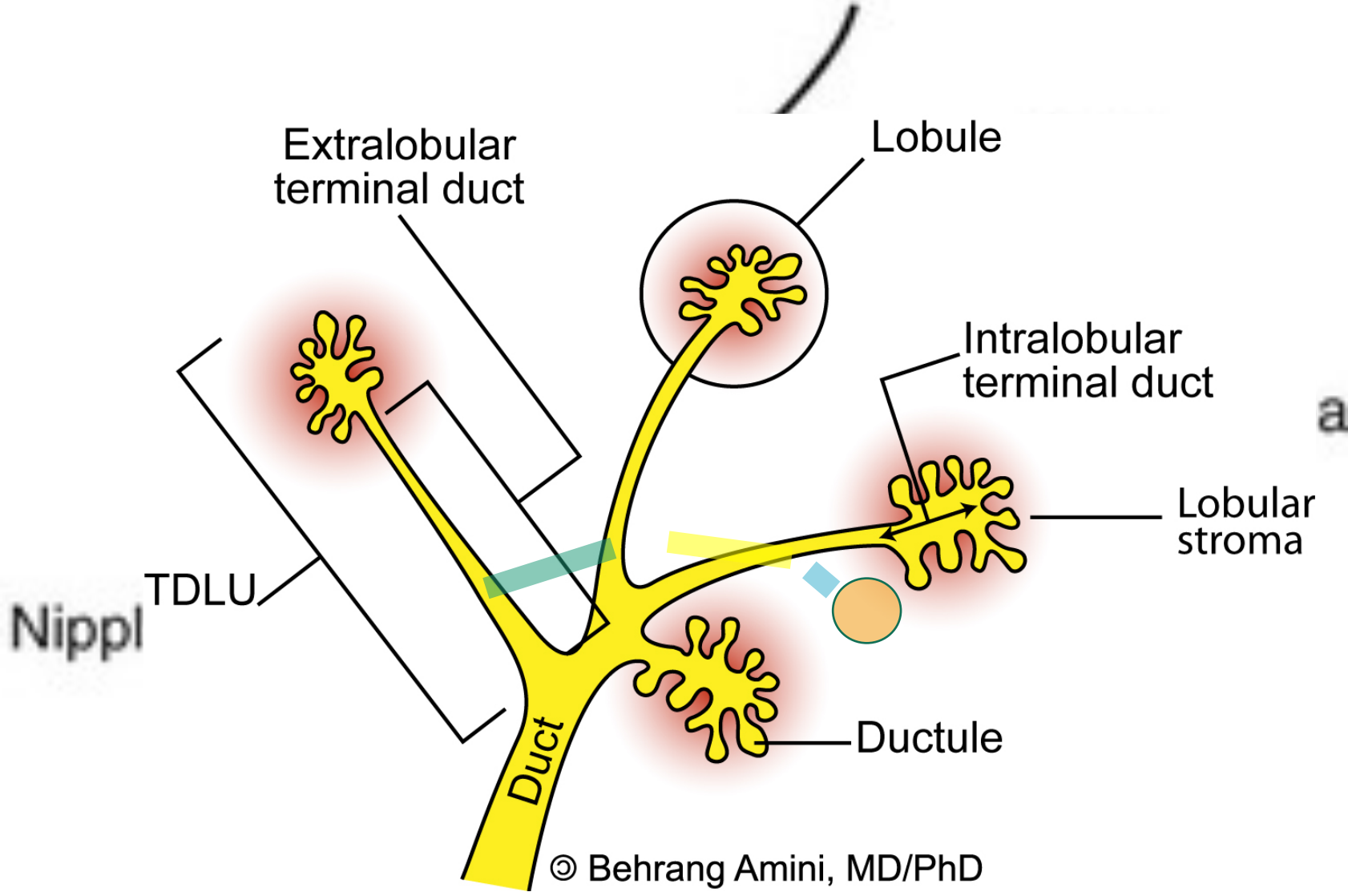

C

ANATOMY


Most residual glandular tissue
Pectoralis muscle
Retroglandular fat
Sternalis muscle (occasional)
No medial masses
A


B
C

Most breast cancer develops in the terminal ductal lobular unit (TDLU)



Breast cancer can be divided into two major groups

IN SITU

Tumor cells, they **do not** invade the basement membrane.

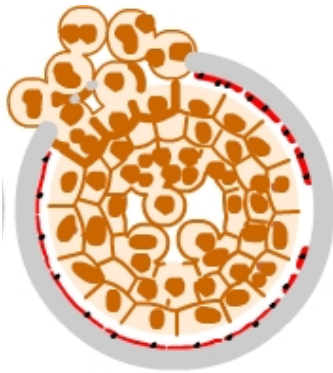
Tumor cells remain confined to the ducts or lobules.

DCIS

INVASIVE

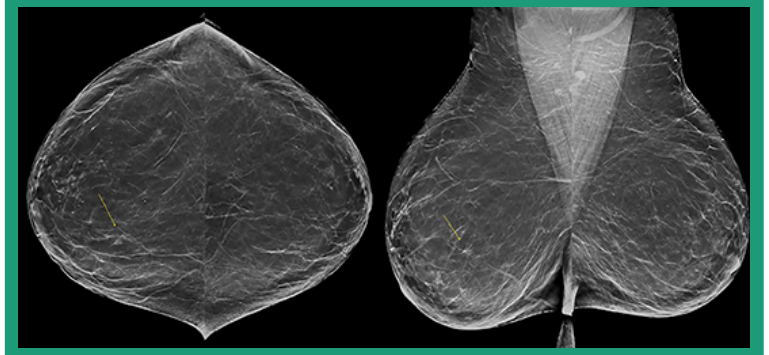
Tumor cells **invade** the breast stroma.

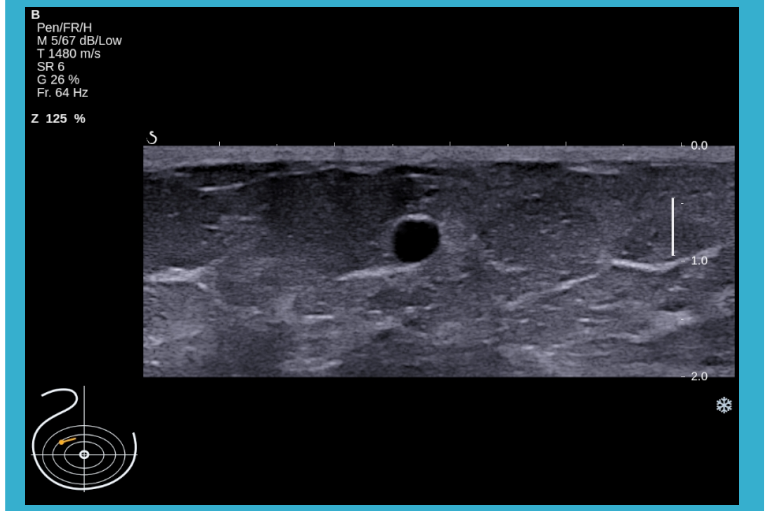
They have the potential to metastasize and result in death of the patient.

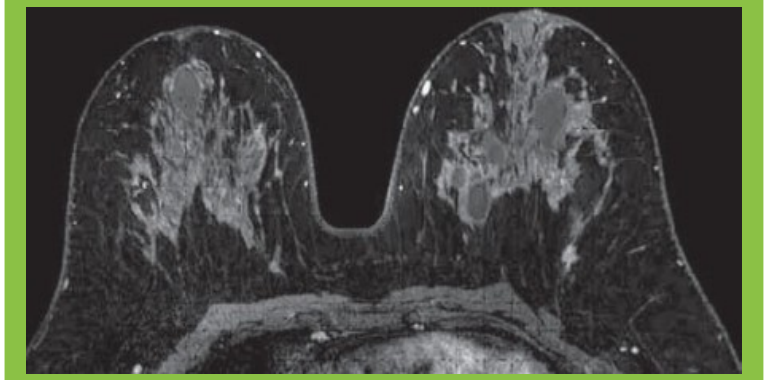


Invasive ductal carcinoma

BREAST IMAGING





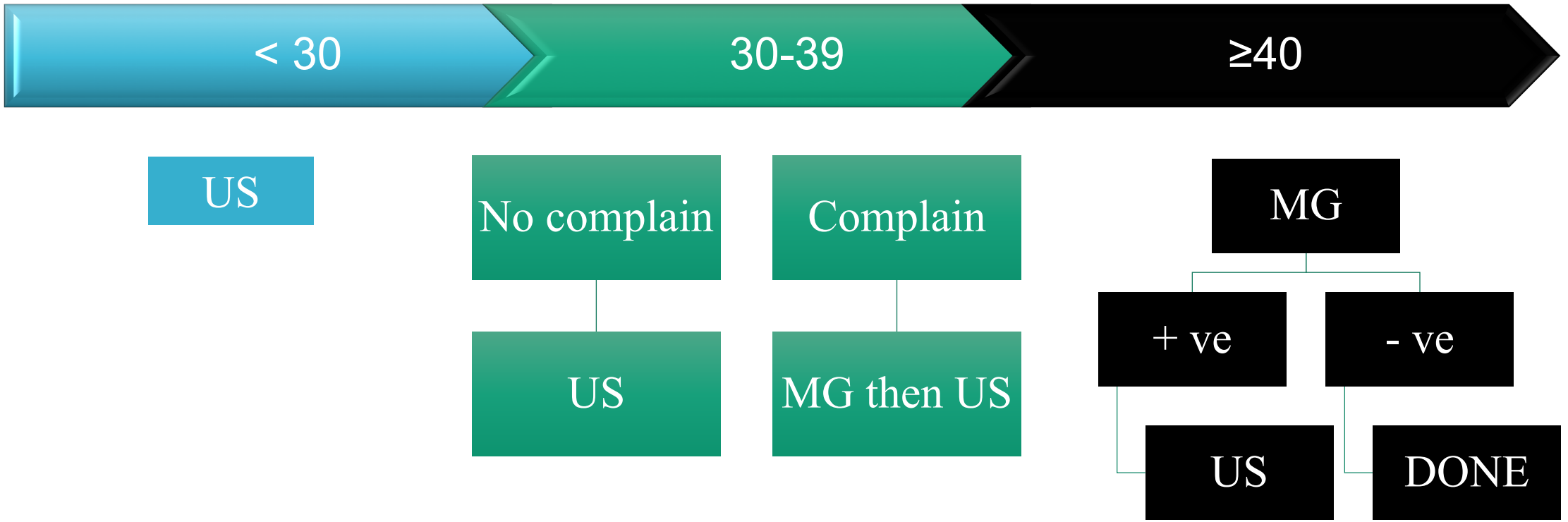


Mammogram

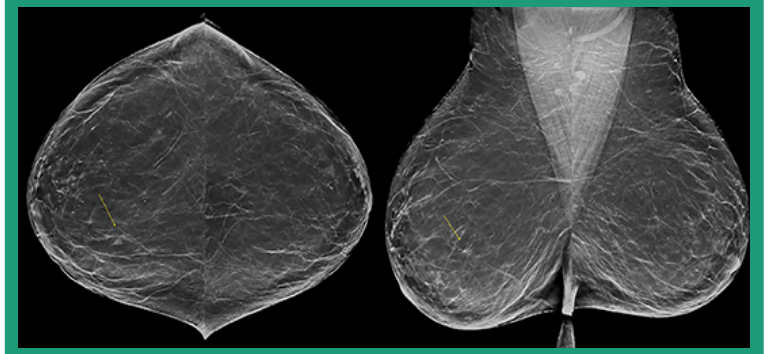
Ultrasound

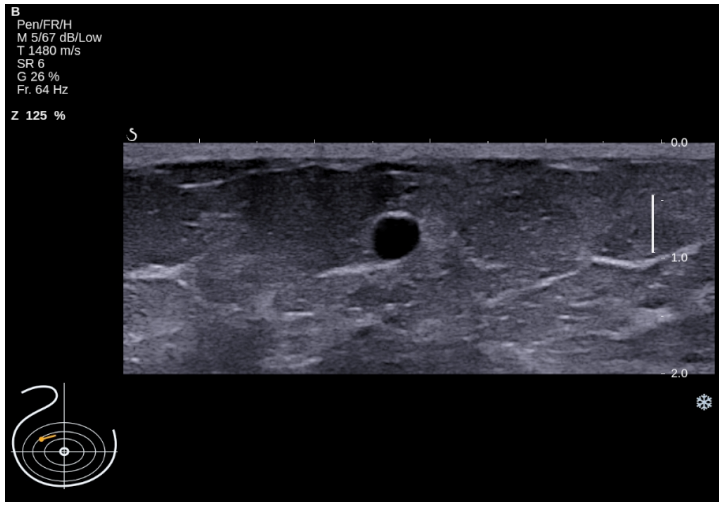
MRI

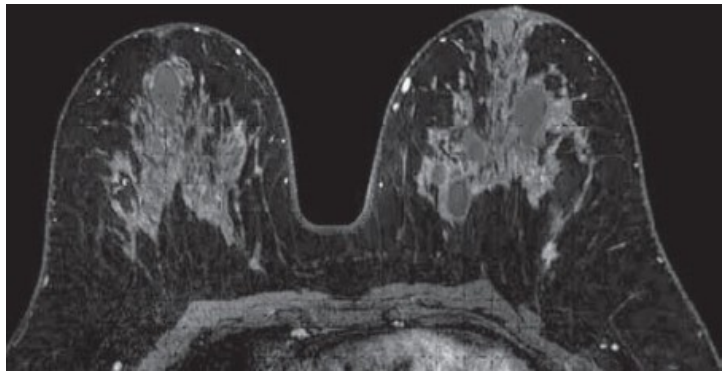
MODALITY AND AGE



BREAST IMAGING







Mammogram

Ultrasound

MRI

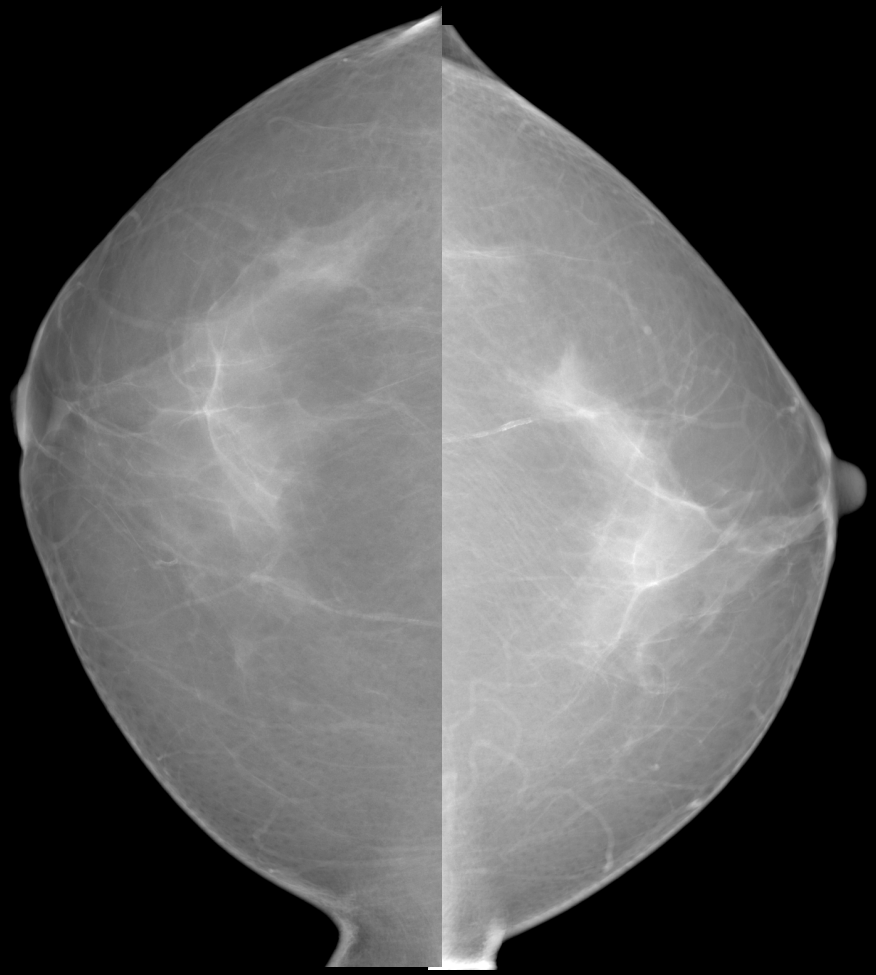
MAMMOGRAM INDICATIONS

- Screening **[No Complain]**
  1. Patients 40 Y and above.
  2. Young patient with first degree relative (Mother/ Sister) diagnosed with breast cancer.

- Diagnostic **[Complain]**
  1. Palpable mass
  2. Nipple discharge
  3. Skin changes

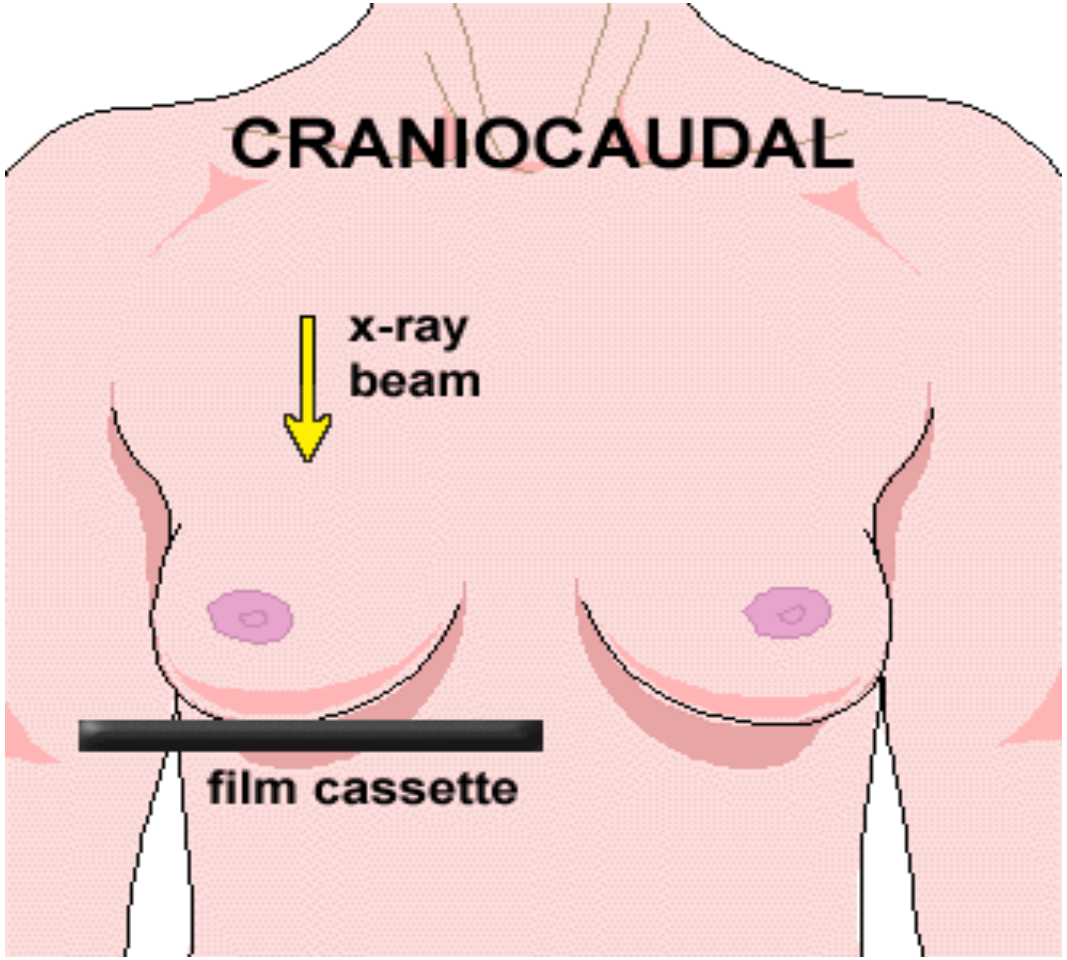
STANDARD MAMMOGRAM

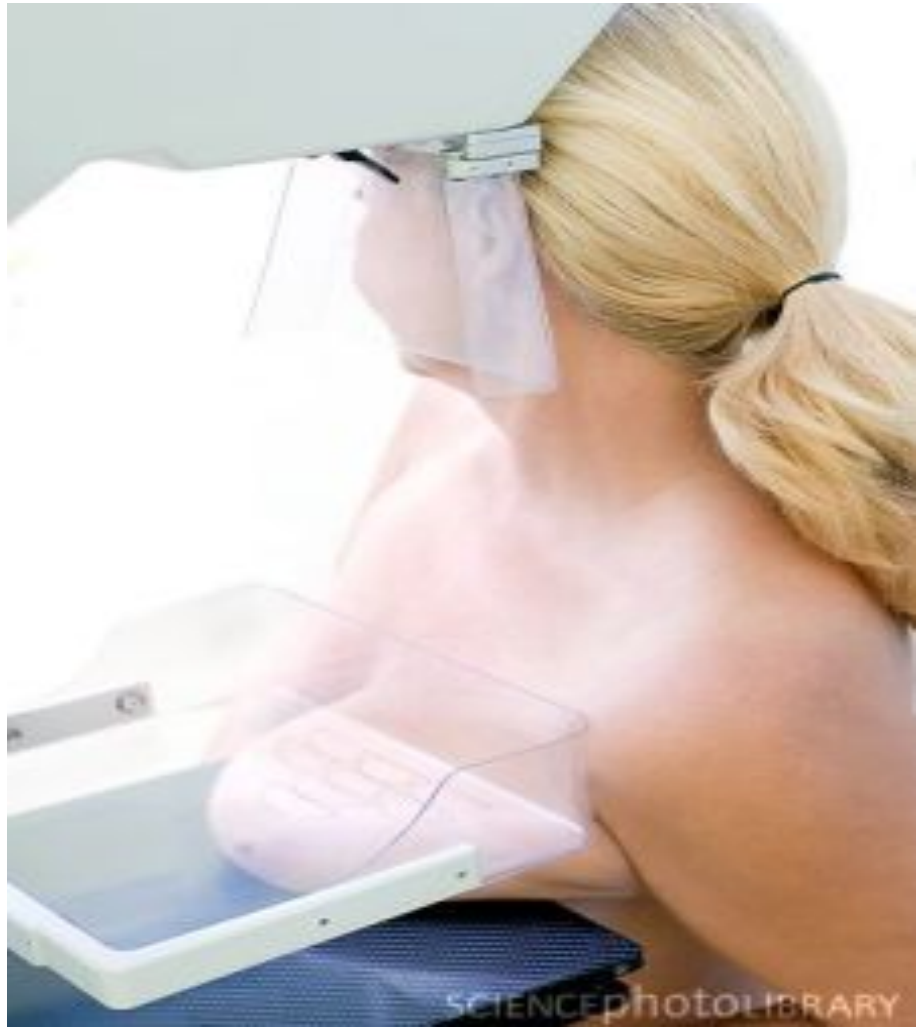
MLO



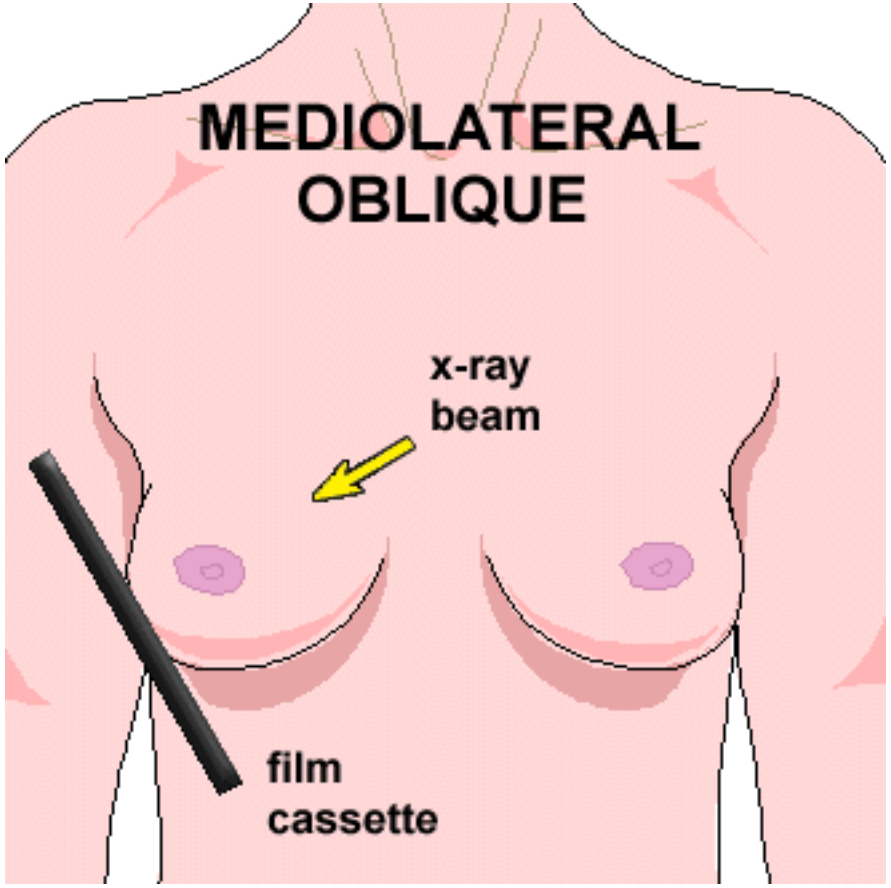
CC

CC view

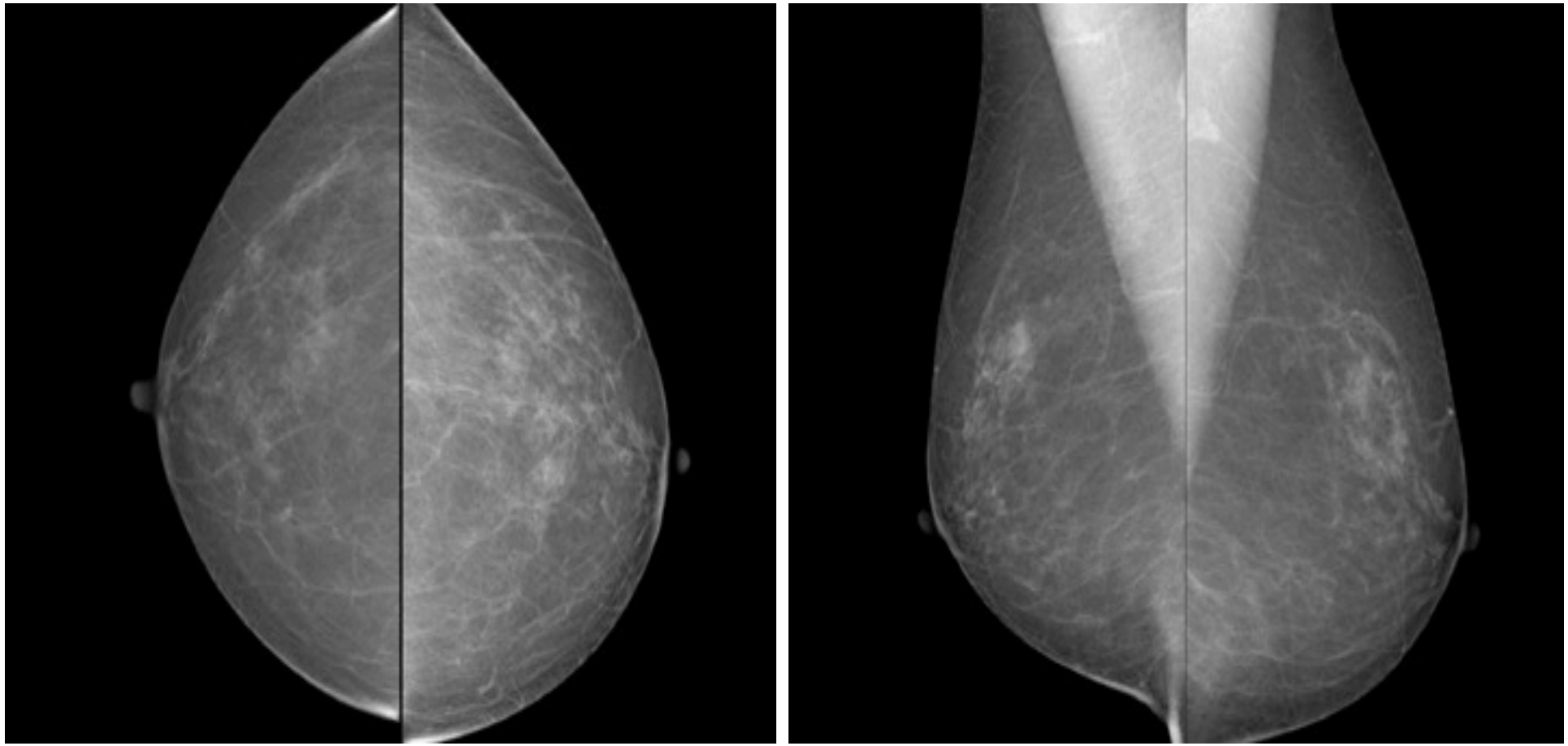

CRANIOCAUDAL
x-ray
beam
film cassette


SCIENCEphotoLIBRARY

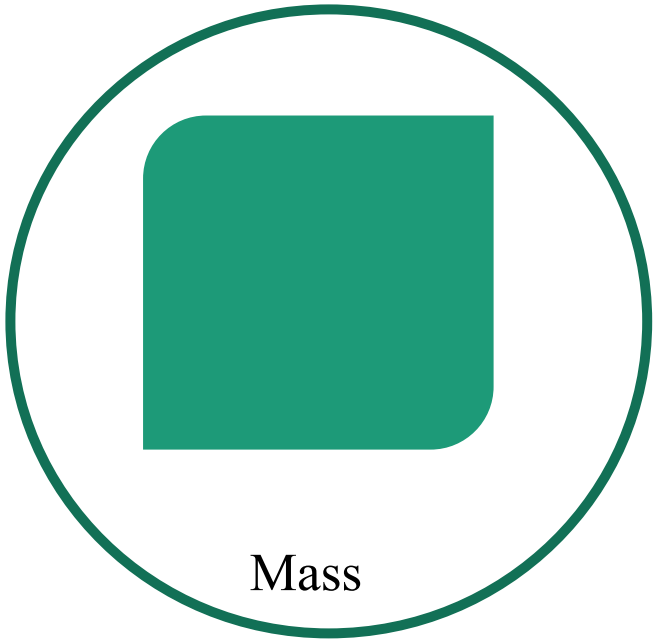
MLO view


MEDIOLATERAL
OBLIQUE
x-ray
beam
film
cassette


SCIENCEphotoLIBRARY

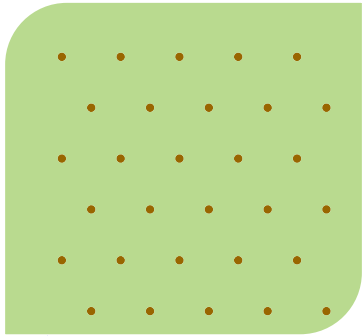


BREAST ABNORMALTY



Mass

Architectural distortion.



Calcifications.

Skin thickening

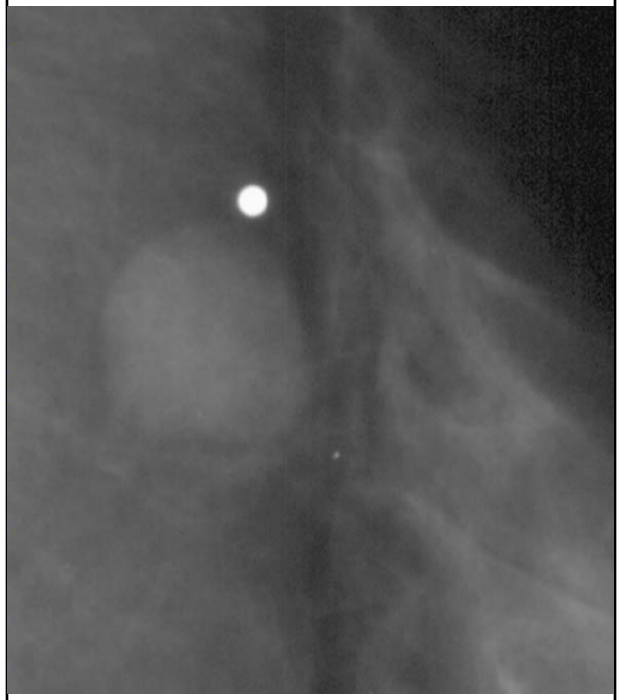
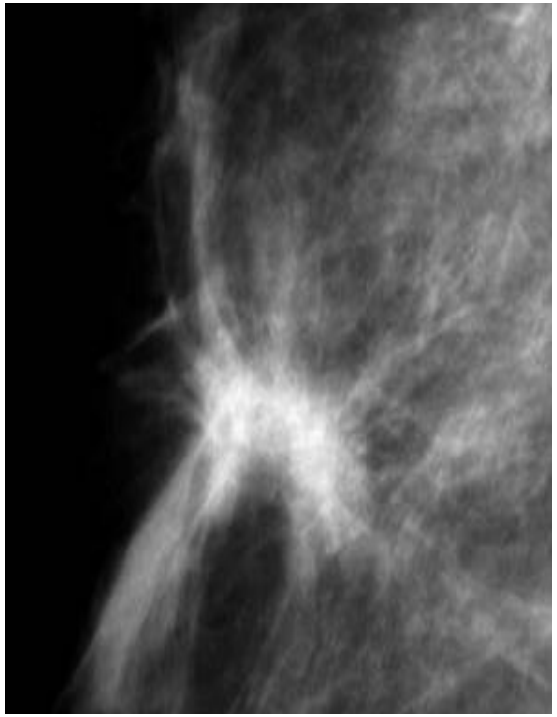
Nipple retraction

Axillary lymph nodes

MASS

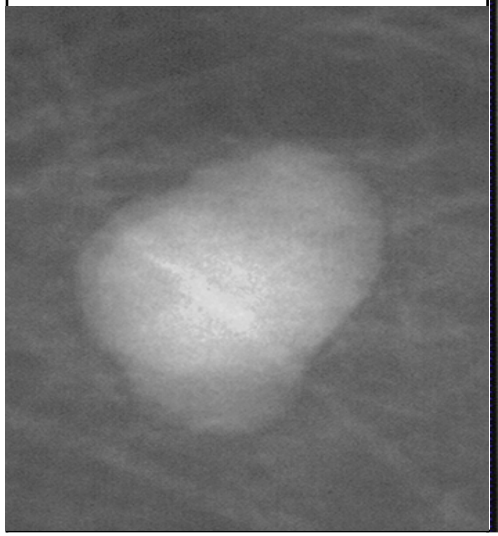
- Both views CC &MLO
- Pesrsist (spot compression view)

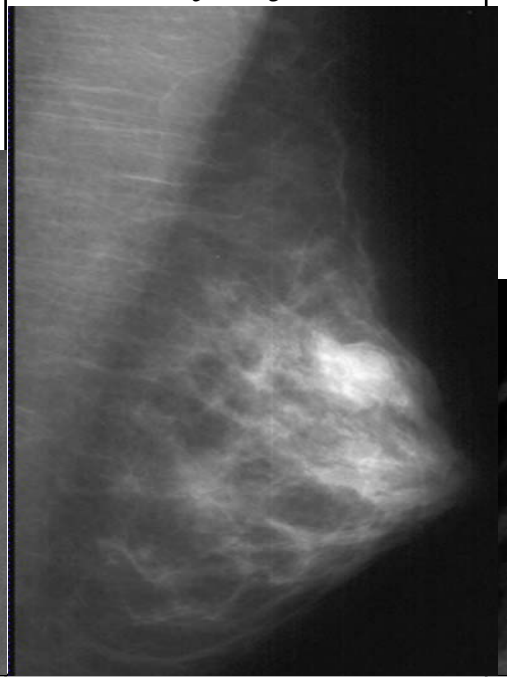
MASS SHAPE

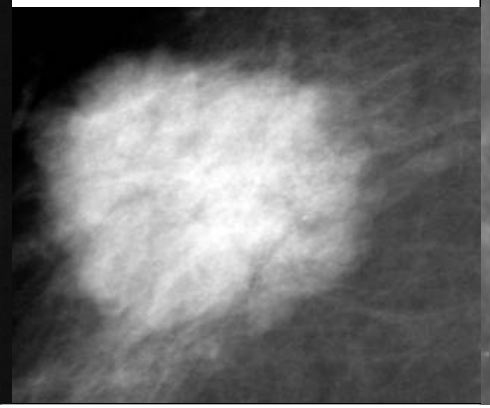
ROUNDED	OVAL	IRRIGULAR
		

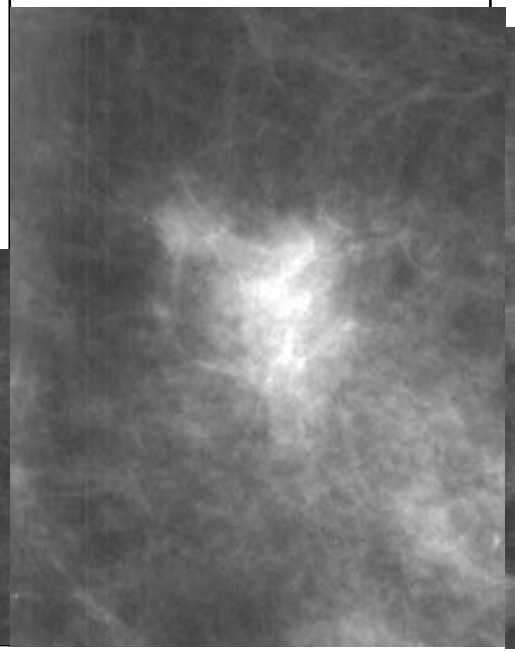
MASS MARGIN

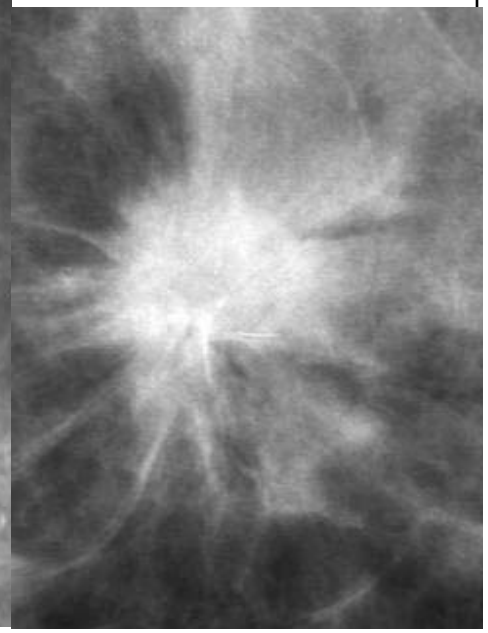
Circumscribed	Obscured	Microlobulated	Indistinct	Spiculated
Abrupt transition between lesion and tissue.	Margins (suspected to be circumscribed) hidden by adjacent or	Margin undulated with short cycle 1-2 mm.	Ill defined. Possible infiltration.	lines radiating from margins of a mass.



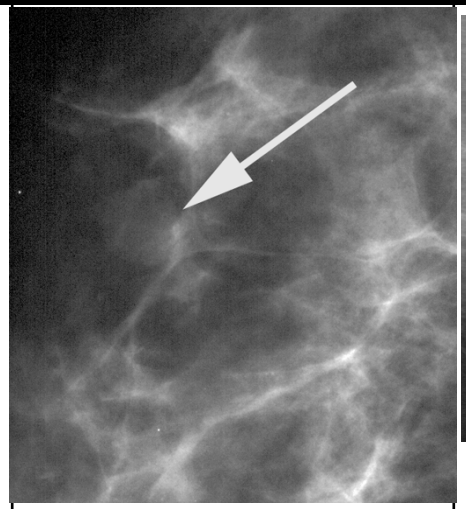
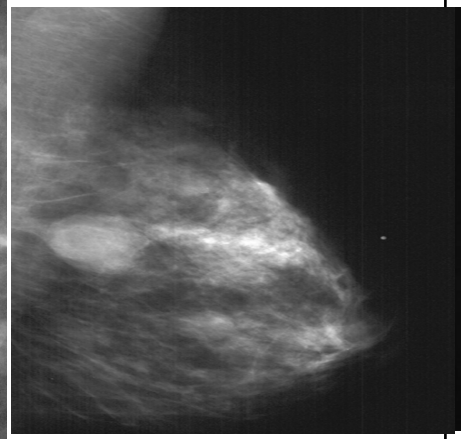
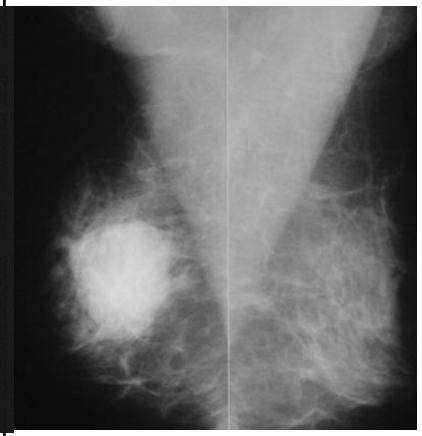








MASS DENSITY

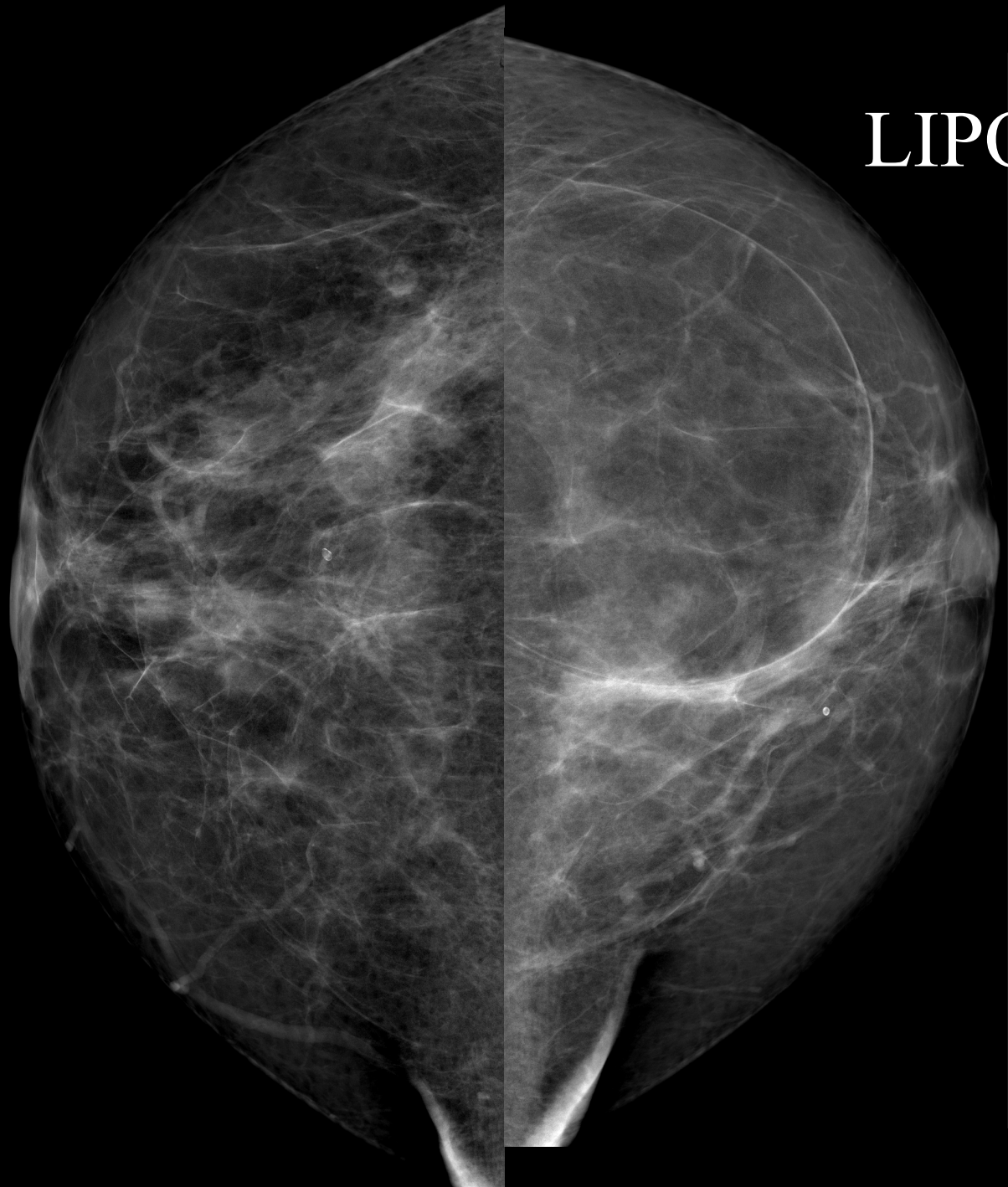
Fat only	Mixed density	Low dense	Equal dense	High dense
1. Oil cyst/fat necrosis. 2. Lipoma.	1. Hamartoma 2. Lymph node 3. Fat necrosis 4. Galactocele			

If you see fat in a mass, it is benign!!

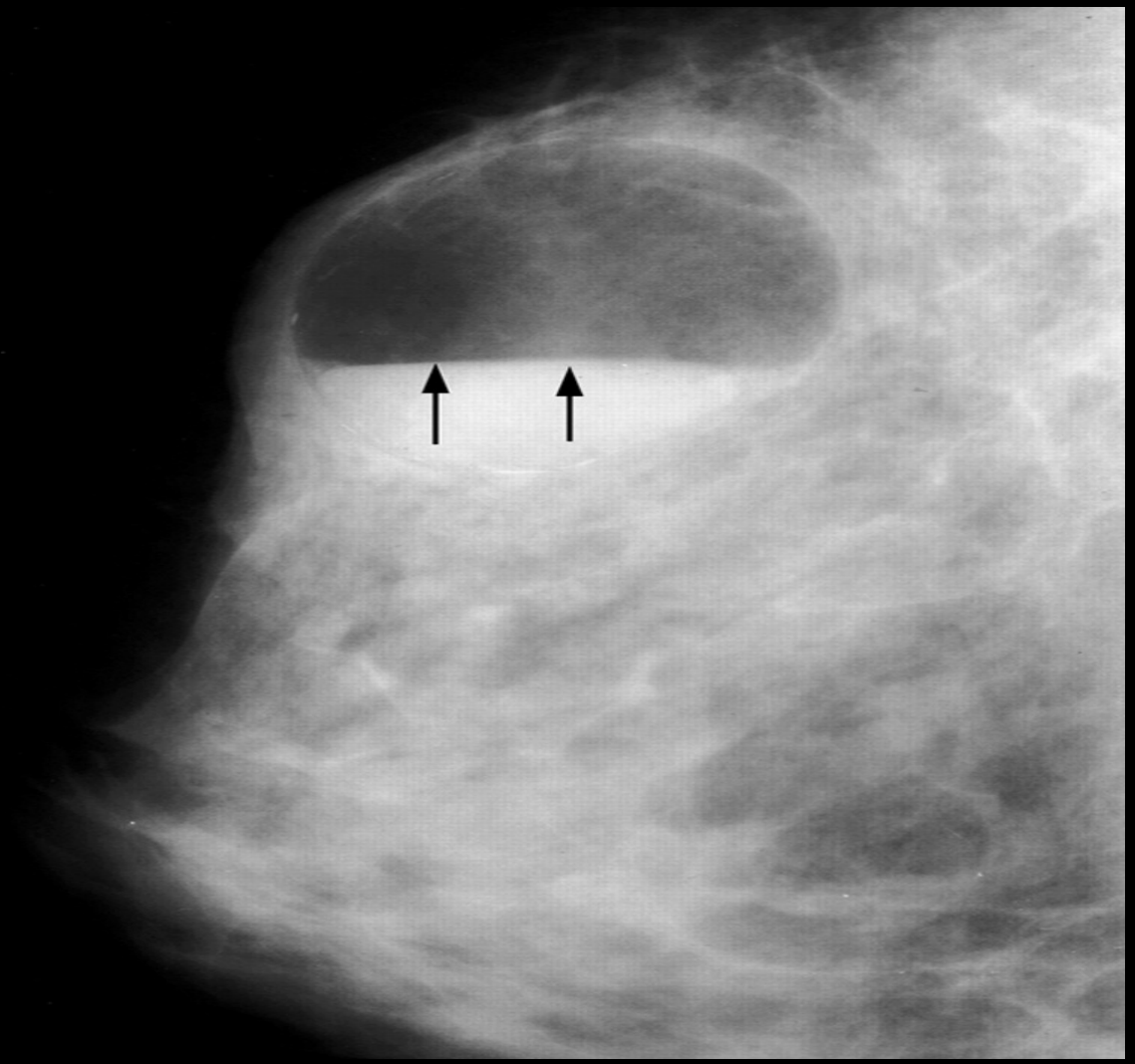
Cancer is less likely but still possible

Suspicious for malignancy

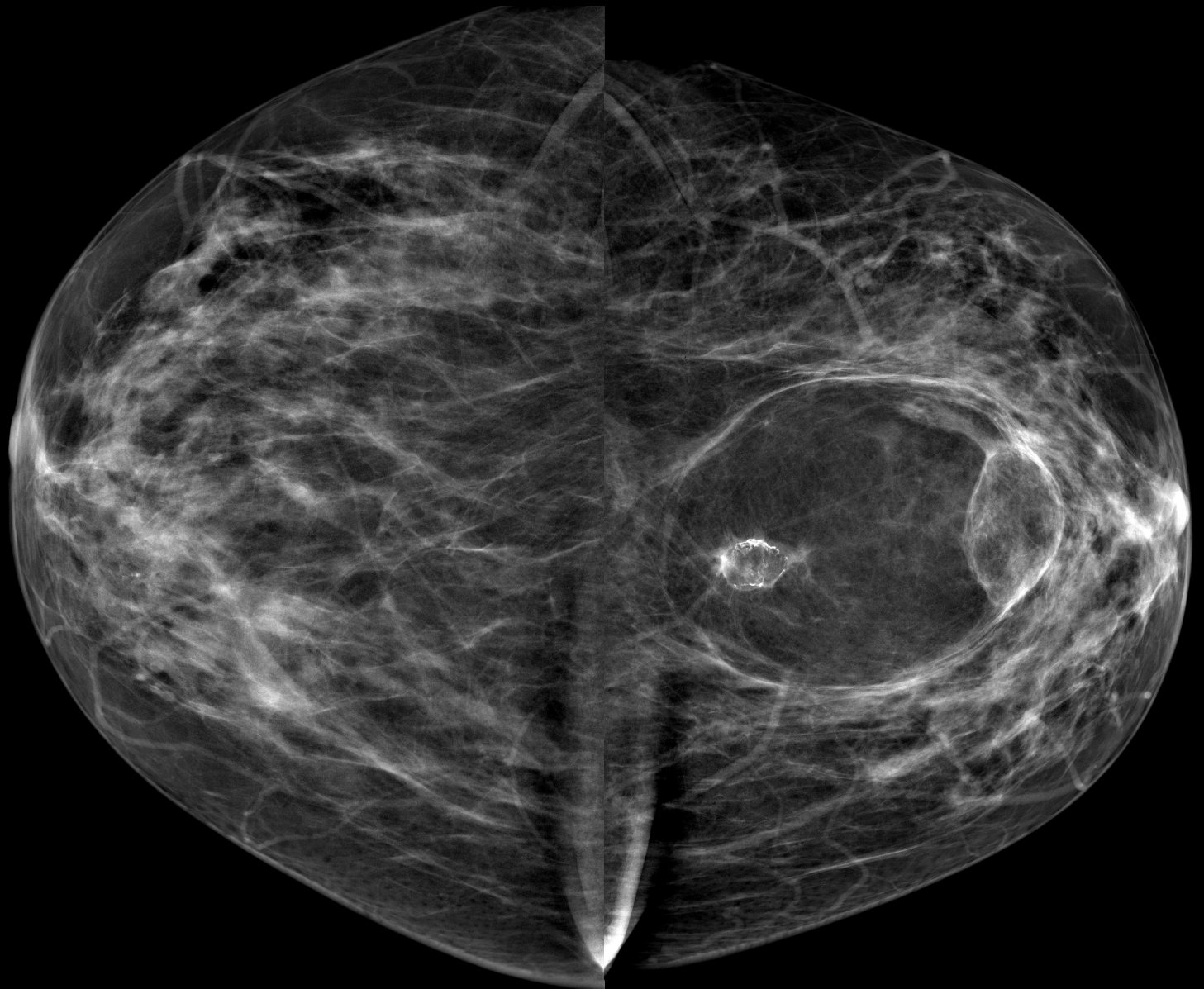
LIPOMA



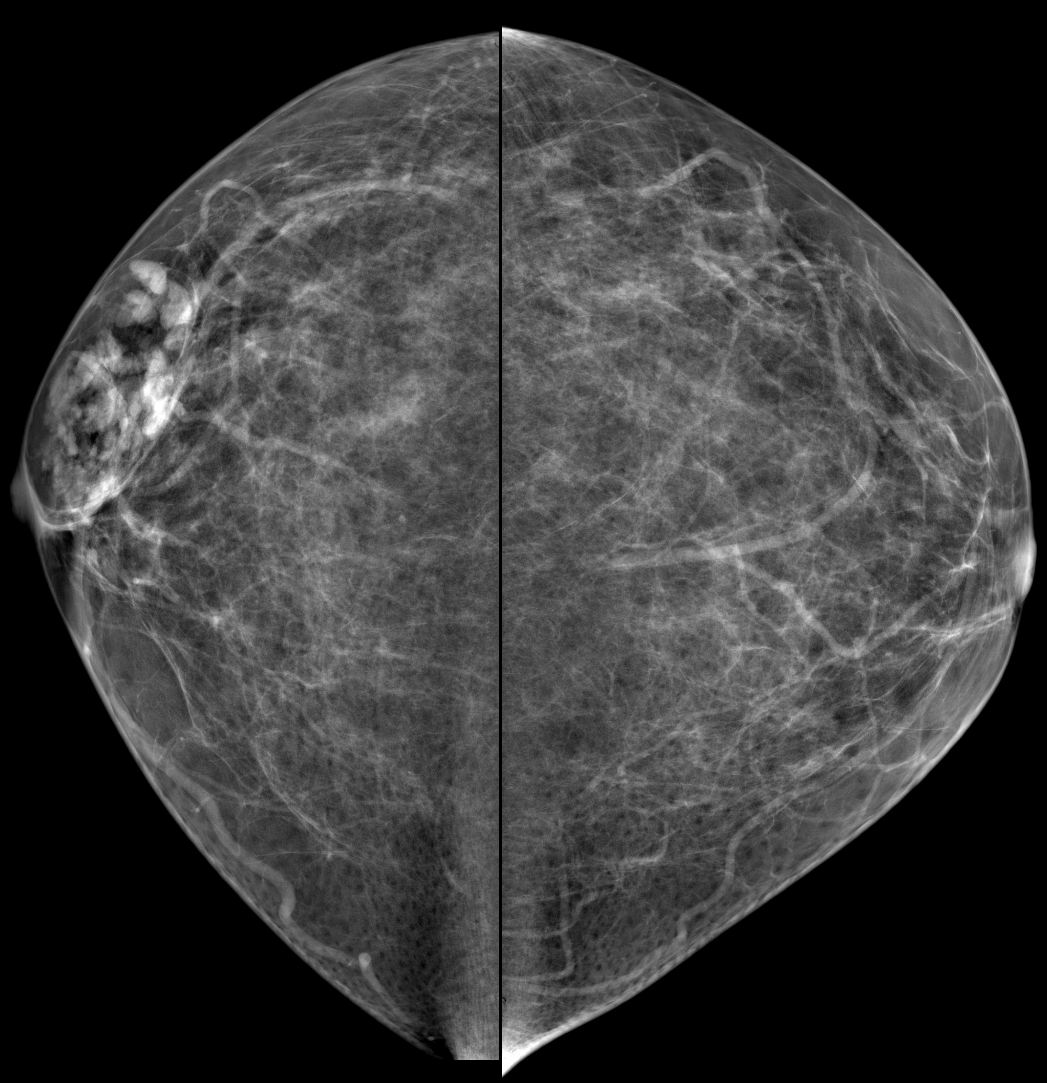
GALACTOCELE



FAT NECROSIS



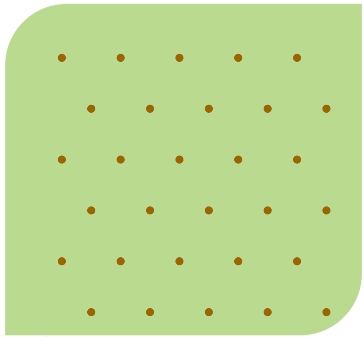
HAMARTOMA(**fibroadenolipoma)**



BREAST ABNORMALTY

Mass

Architectural distortion.



Calcifications.

Skin thickening

Nipple retraction

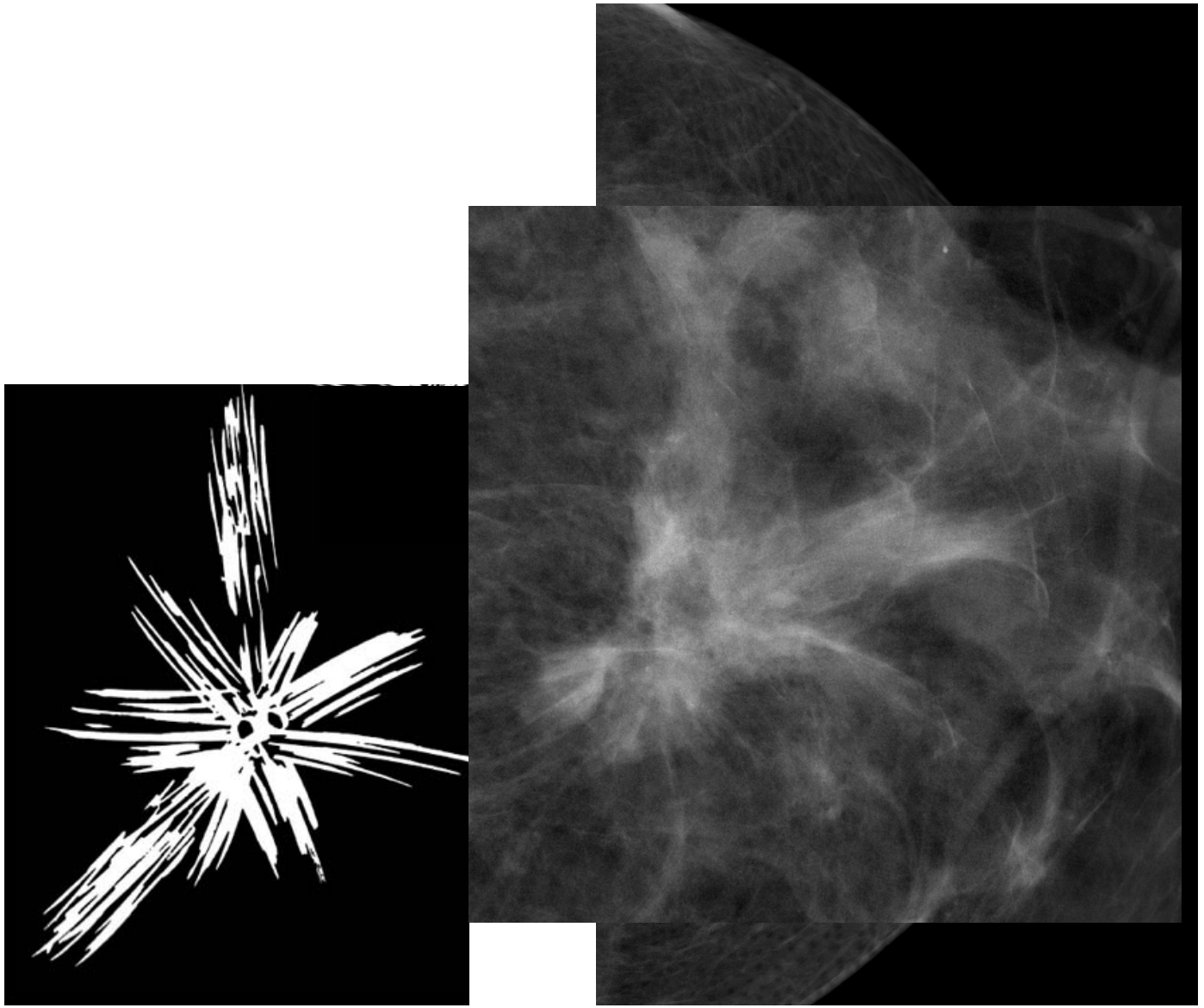
Axillary lymph nodes

ARCHTICTURAL DISTORTION

- Lines radiating from a point.
- Focal retraction/ distortion of parenchymal edge.
- Main findings or associated findings.

<u>Differential diagnosis:</u>

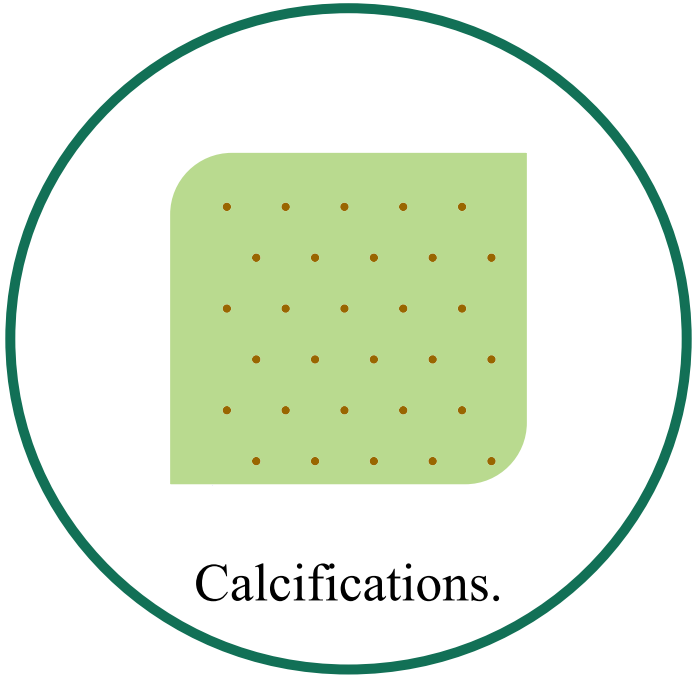
1. Breast cancer.
2. Radial Scar (complex sclerosing lesion).
3. Surgical Scar.



BREAST ABNORMALTY

Mass

Architectural distortion.



Calcifications.

Skin thickening

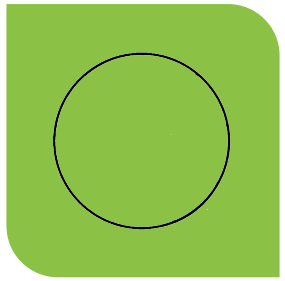
Nipple retraction

Axillary lymph nodes

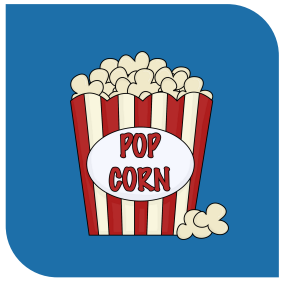
BENIGN CALCIFICATIONS

Skin

Vascular

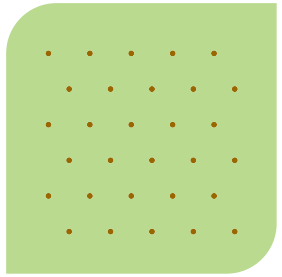


Rim



Popcorn

Rod-Like



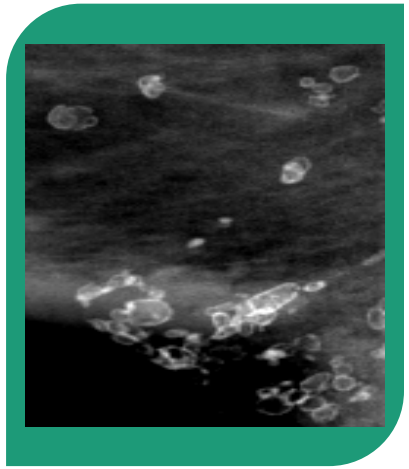
Punctate

Milk of calcium

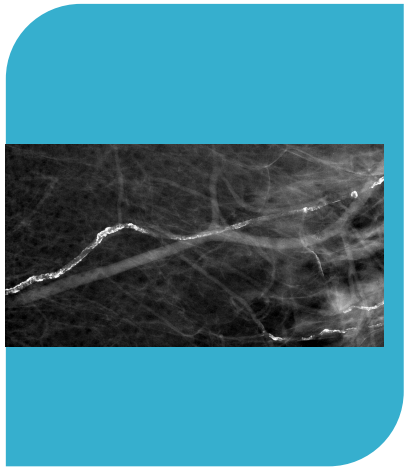
Suture

Dystrophic

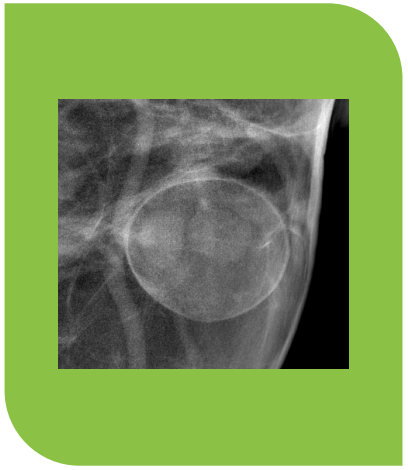
BENIGN CALCIFICATIONS



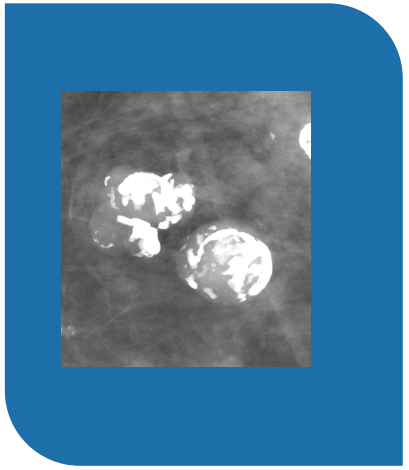
Skin



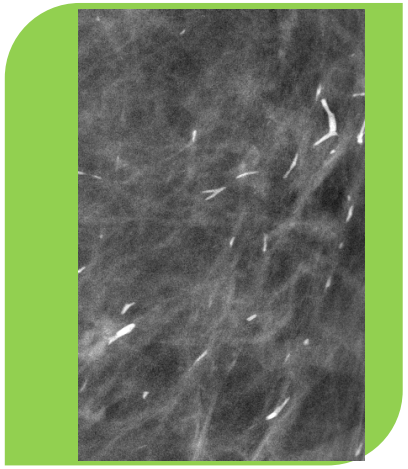
Vascular



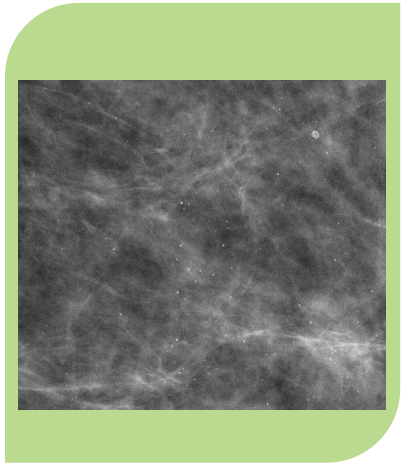
Rim



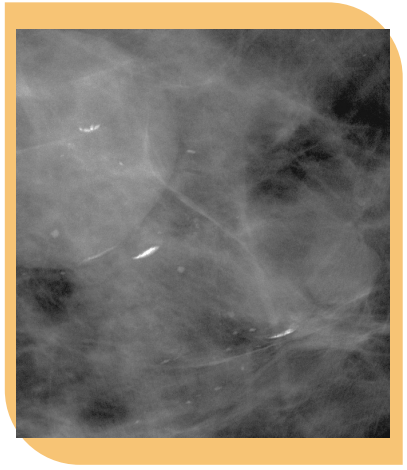
Popcorn



Rod-Like

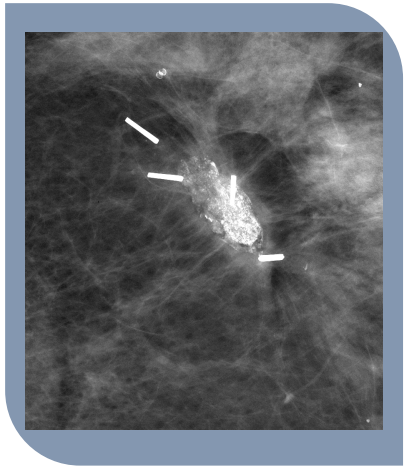


punctate



Milk of calcium

Suture



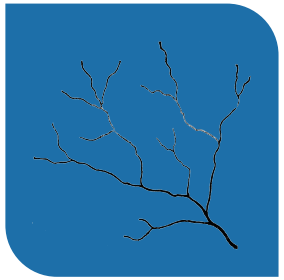
Dystrophic

Suspicious Calcifications

Amorphous

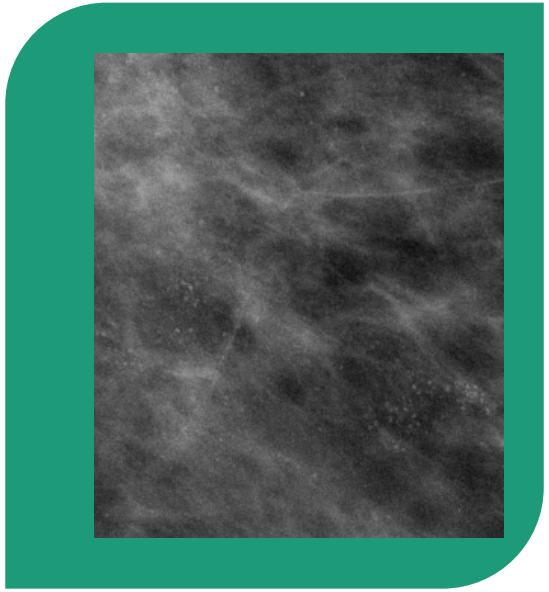
Coarse heterogenous

Fine Pleomorphic



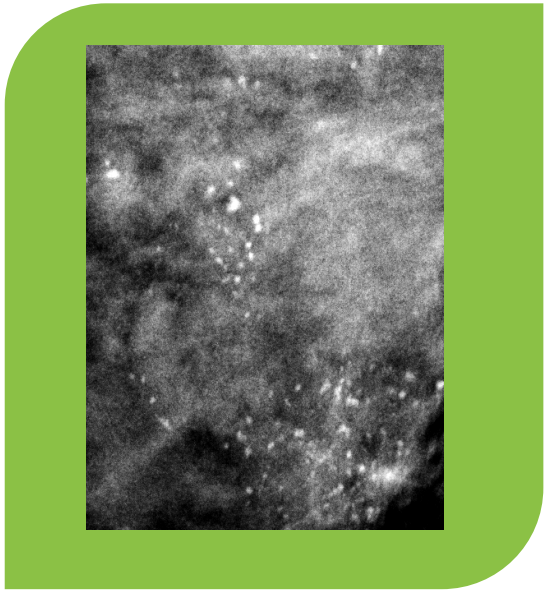
Fine Branching and linear branching

Suspicious Calcifications

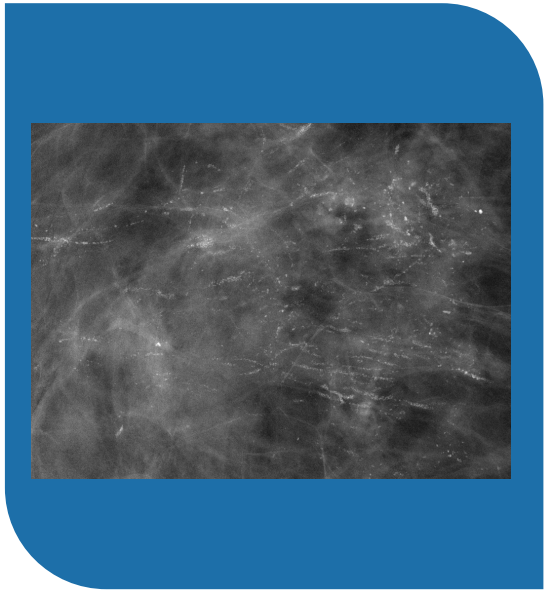


Amorphous

Coarse
Heterogenous

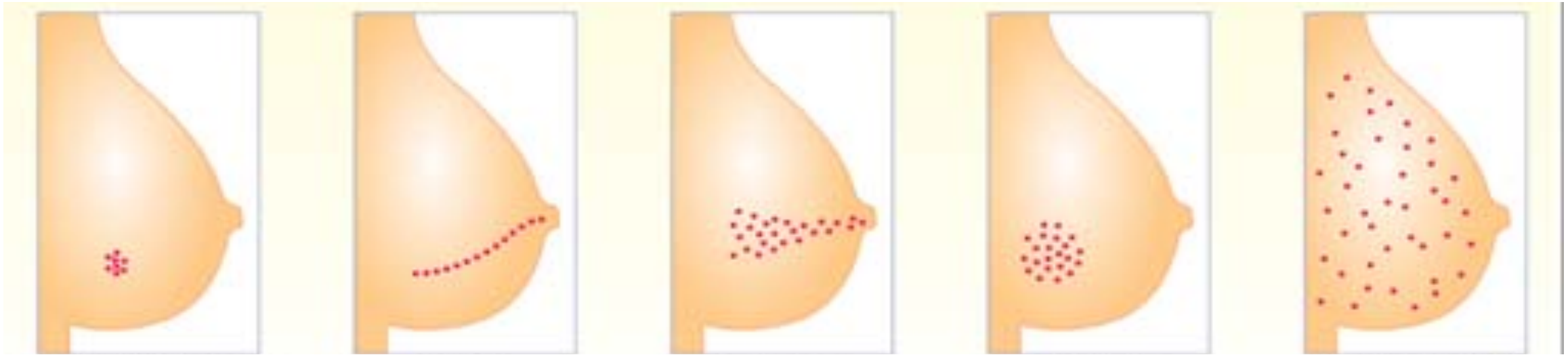


Fine
Pleomorphic



Fine Branching
and linear branching

DISTRIBUTION



Grouped

< 2 cm
5 Calcifications
or more

Linear

Segmental

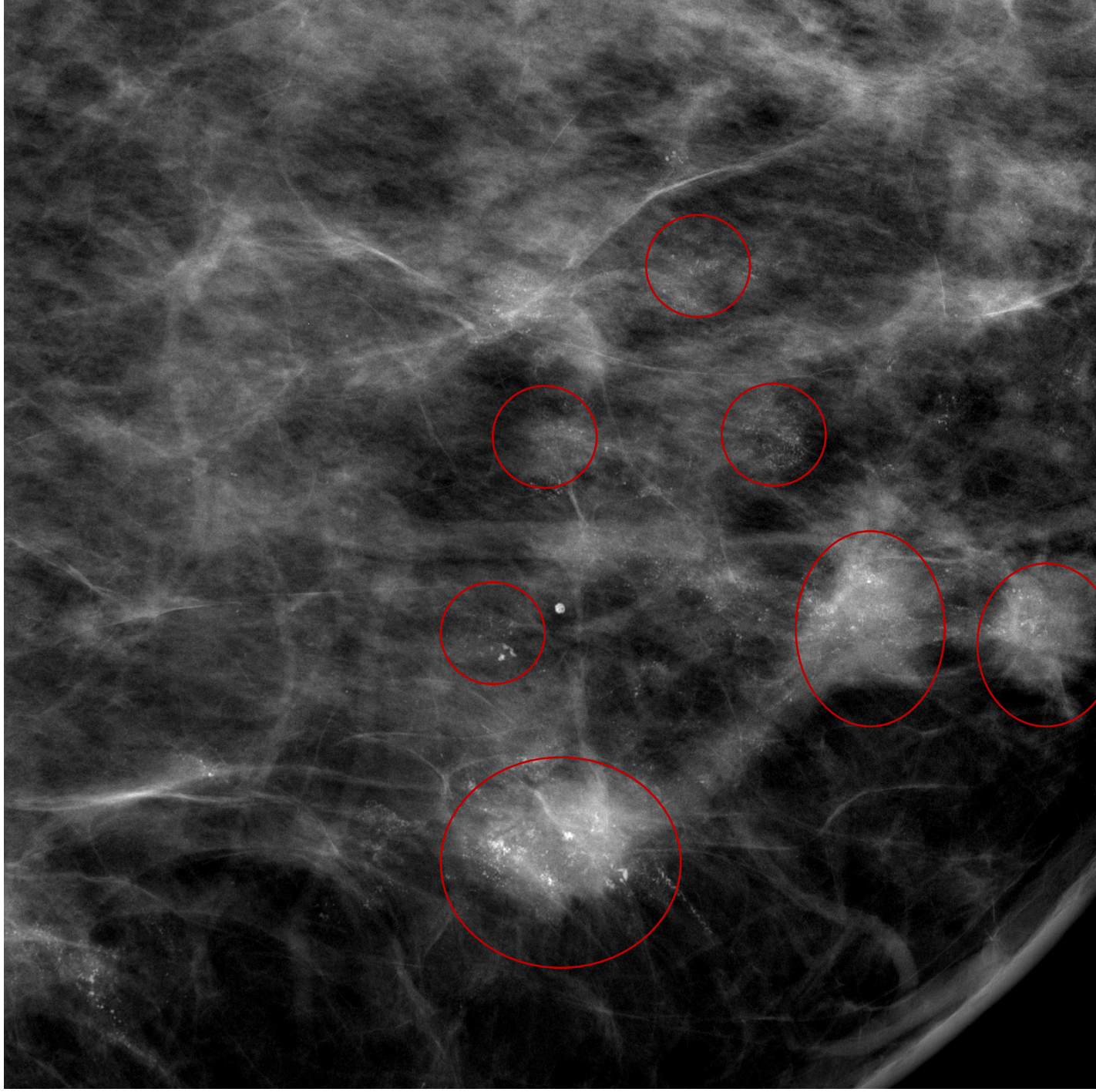
Regional

> 2 cm

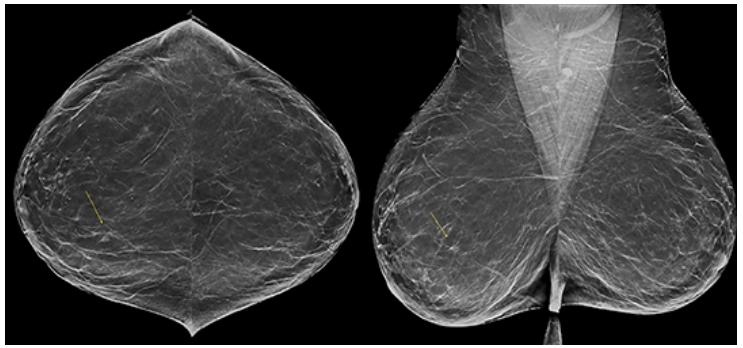
Diffused

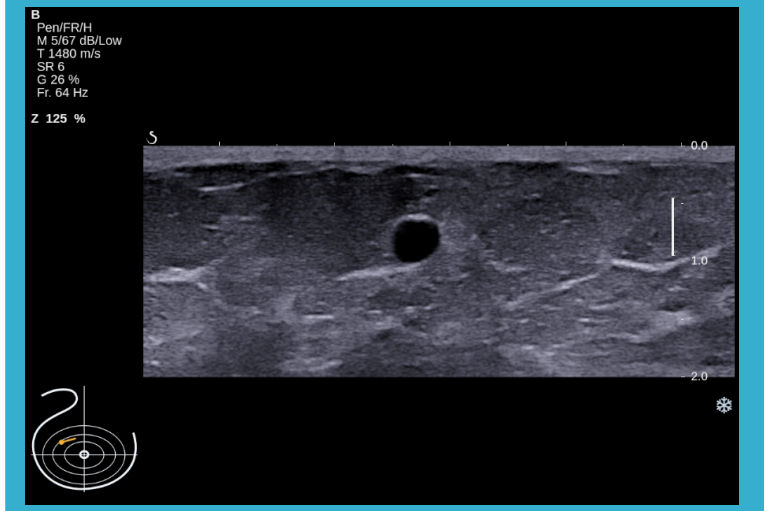
Entire breast

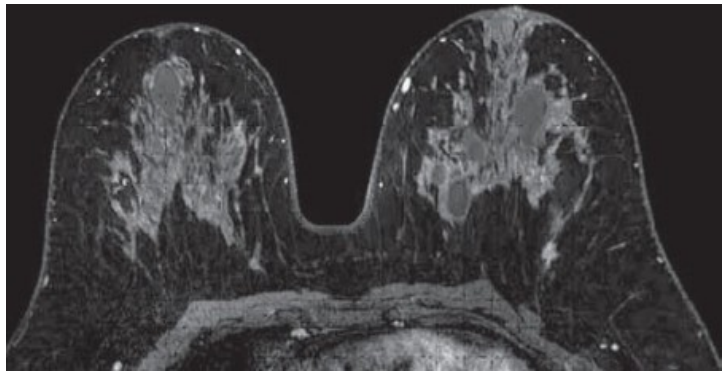
GROUPED



BREAST IMAGING







Mammogram

Ultrasound

MRI

BREAST US INDICATIONS

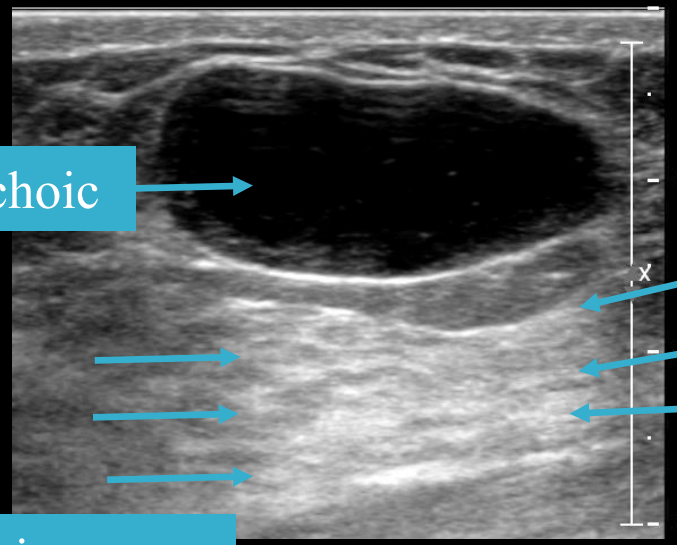
1. Differentiation of both palpable and mammographic lesions as either **cystic or solid.**
2. Evaluation of solid masses according to certain sonographic features.
3. Initial imaging evaluation of palpable breast masses in patients under 30 years and in lactating and pregnant women.
4. Screening for occult cancers in certain populations, including of women with heterogeneously or extremely dense breasts.
5. Follow-up of breast cancer treated with neoadjuvant chemotherapy.
6. Guidance for breast biopsy and other interventional procedures.

MALIGNANT VS BENIGN
SONOGRAPHIC FEATURES OF SOLID MASSES

MALIGNANT	BENIGN
Spiculation	Circumscribed, hyperechoic tissue
Angular margins	Parallel orinted –wider than taller
Hypoechogenicity	Gently curving smooth lobulations
Shadowing	Thin echogenic pseudocapsule
Calcification	
Duct extension	
Branch pattern	
Microlobulation	

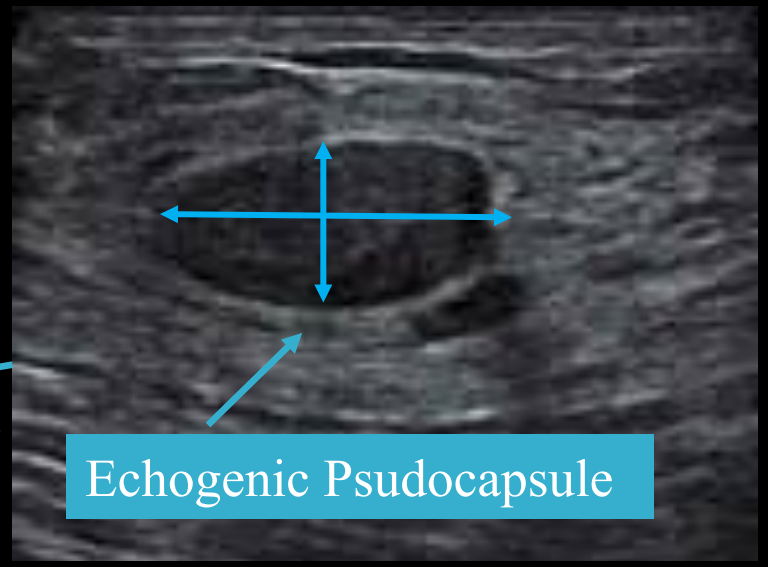
Cyst

Solid



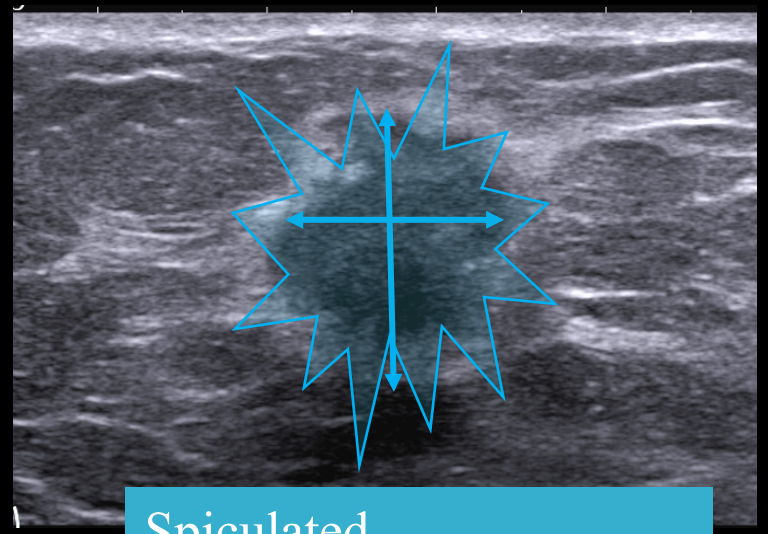
Anechoic

Posterior enhancement



Echogenic Psudocapsule

Circumscribed



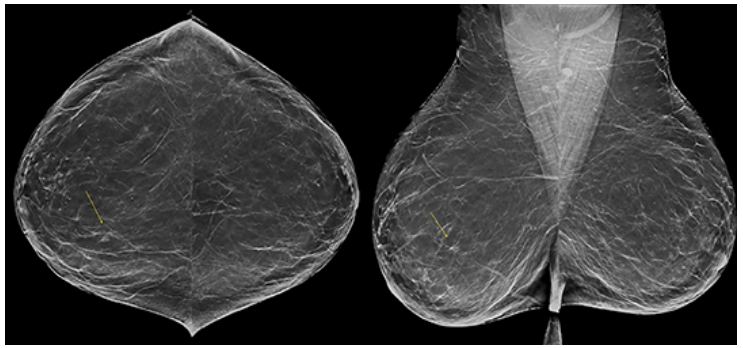
Spiculated

Shadowing

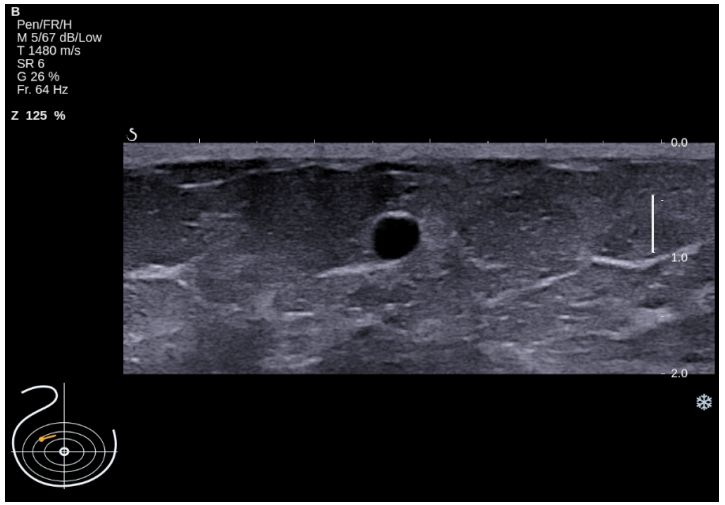
Benign

Malignant

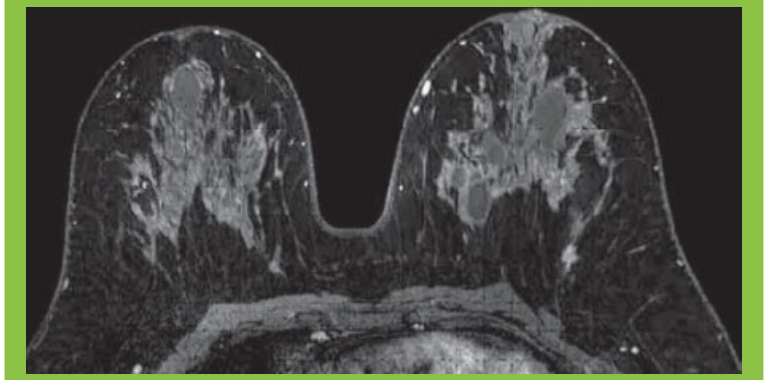
BREAST IMAGING



Mammogram



Ultrasound



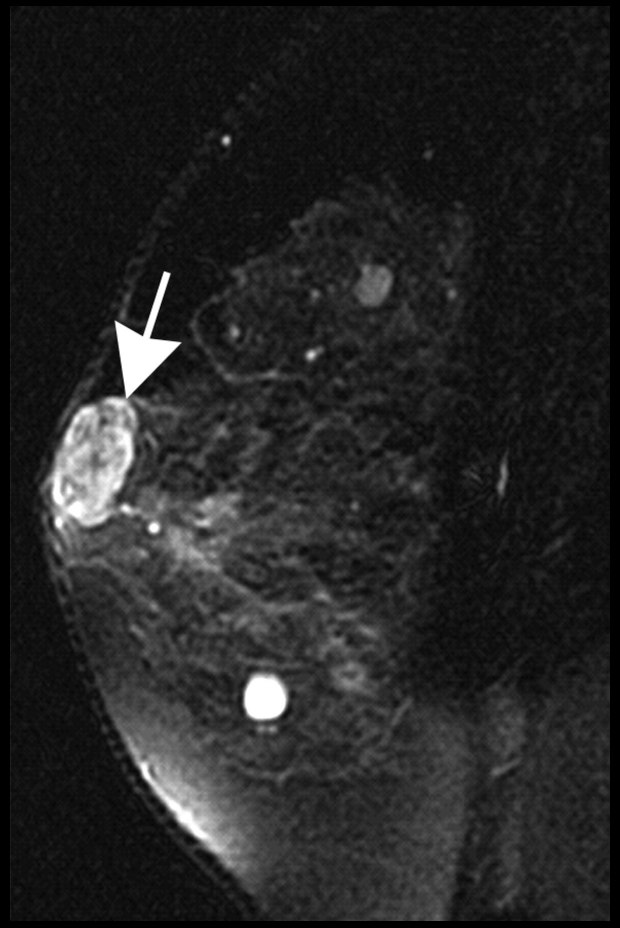
MRI

MRI INDICATIONS

1. Staging.
2. High risk patients.
3. Response to therapy.
4. Post operative to differentiate surgical scar versus recurrence
5. Occult breast cancer.
6. Assess the contralateral breast.
7. Breast implant.

MRI breast- Minimum equipment

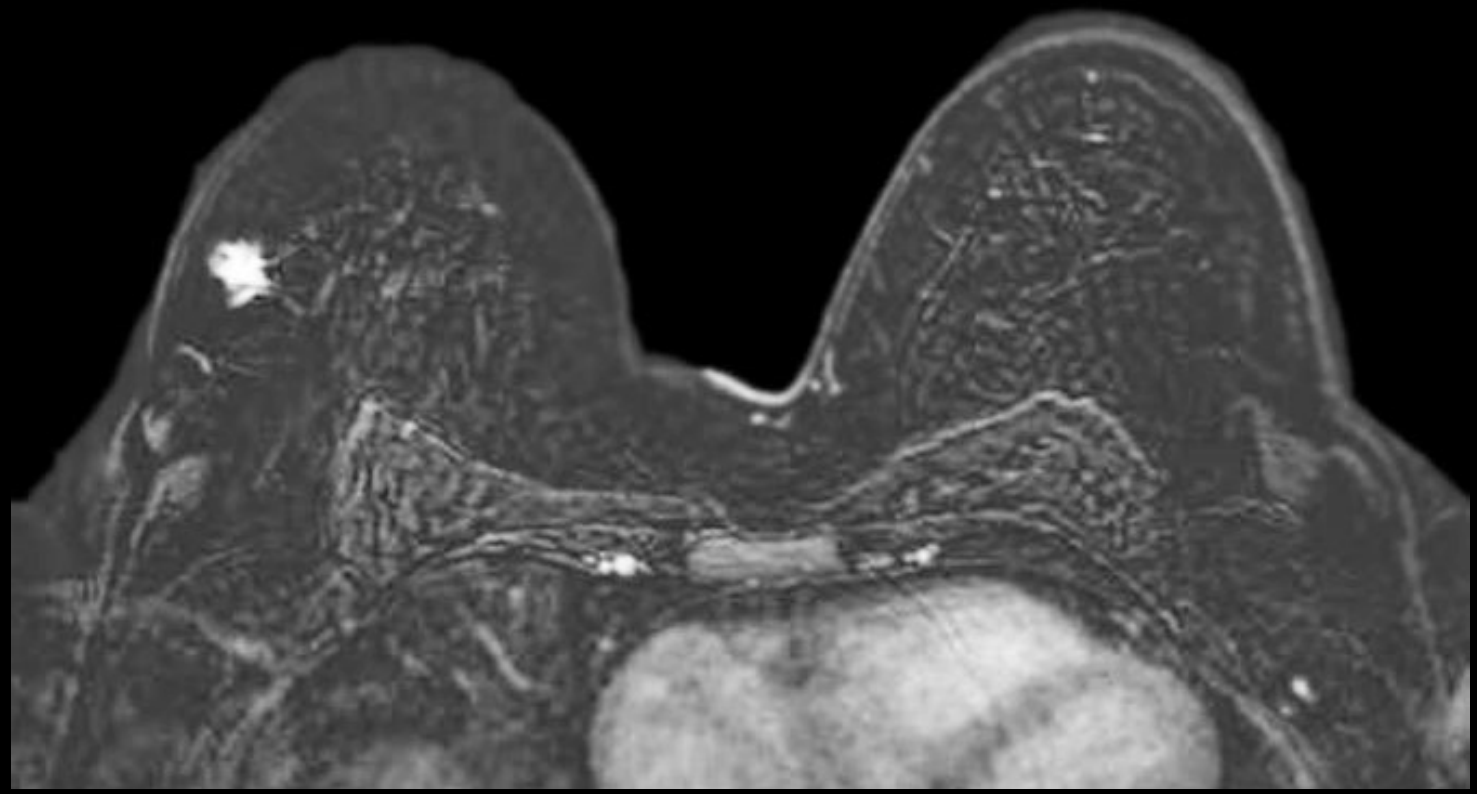
- System with field strenghts 1.5 T
- Dedicated bilateral breast surface coil
- Prone positioning.
- Images obtained prior to gadolinium and multiple phases following gadolinium administration (Dynamic).



T2 Fat Saturation

T1 fat sat with Gadolinium

Subtracted images = Enhanced – Unenhanced Images



BI-RADS
Breast **I**maging **R**eporting **A**nd **D**ata **S**ystem

0 = **Incomplete** Additional imaging/view.

1 = **Negative** Routine screening recommended.

2 = **Benign** Routine screening recommended.

3 = **Probably Benign** (< 2% malignant); six-month short interval follow-up.

4 = **Suspicious of Malignancy** (≥ 2 to 95%); biopsy should be considered.

5 = **Highly Suspicious of Malignancy** (> 95%); take appropriate action.

6 = **Known Biopsy-Proven Malignancy**

THANK YOU

Questions?