

# INTRODUCTION TO MAMMOGRAPHY

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# Introduction

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Breast anatomy

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Breast cancer

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NHS Breast Screening

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Symptomatic clinics

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Breast Imaging modalities

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Mammography

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Other modalities

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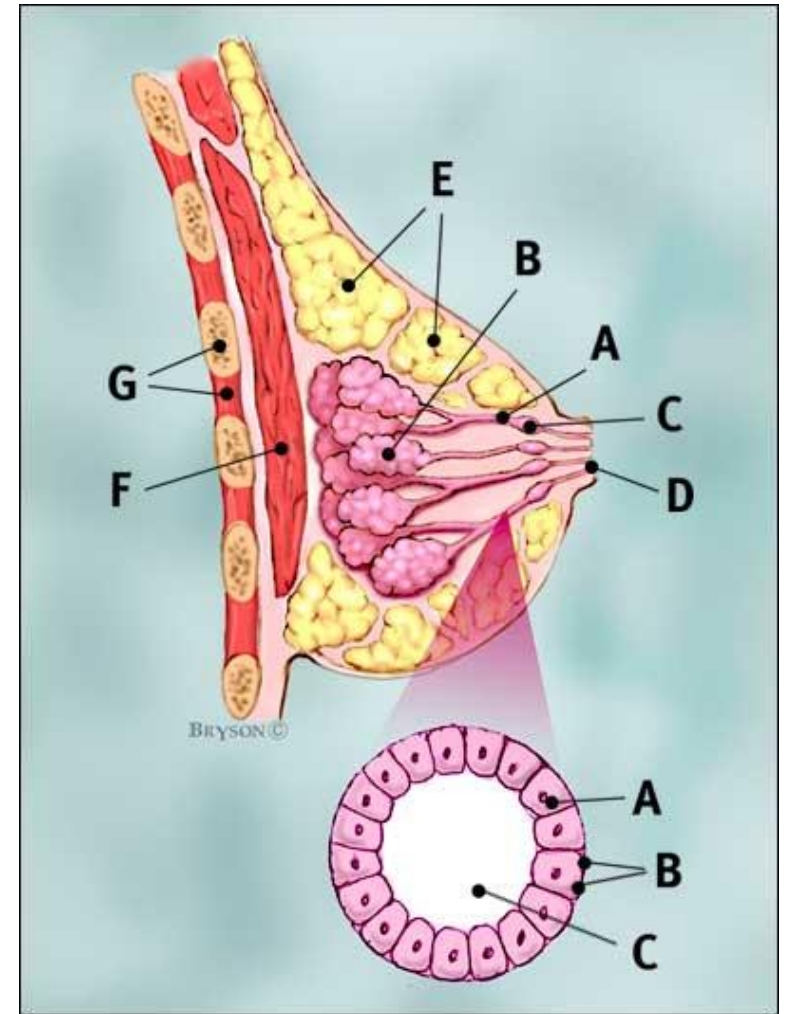
Breast biopsy

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Breast pathology images

# Breast Anatomy

- Mixed tissue types:
- Glandular, fibrous and fatty tissue
- Lobulated structure
- Young females = glandular
- Older women glandular is replaced by fat.
- Soft tissue - low inherent contrast
- Radiosensitive



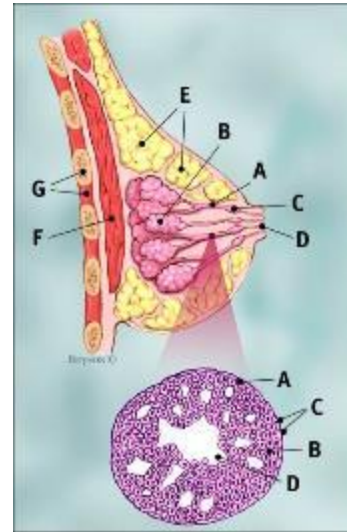
# Breast Cancer

- Carcinoma, (Cancer) of the breast starts with an uncontrolled growth of the cells of the ducts or (less commonly) the lobes of the adult breast
- There is no 'one disease', but many types of breast cancer, depending on the type of cell the cancer starts in, and how it grows.

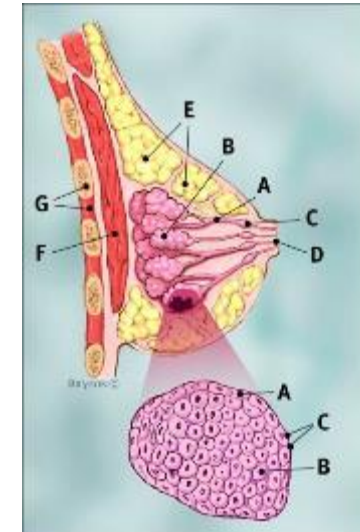
# Non-Invasive vs Invasive Breast Cancer

NON-INVASIVE (i.e., the cancer has NOT broken through the basement membrane of the cell)

DUCTAL

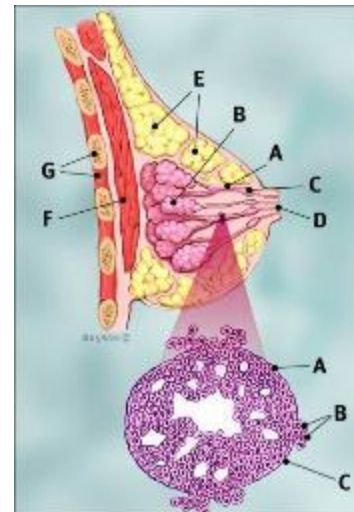


LOBULAR

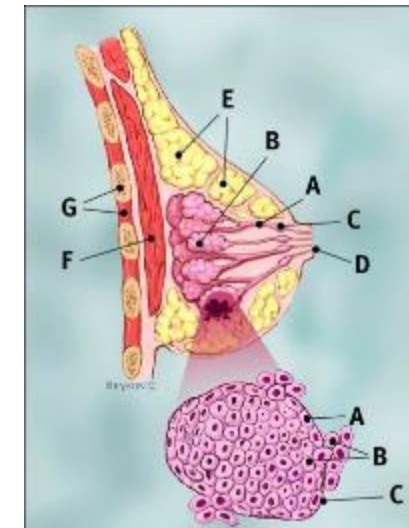


- Invasive (i.e., the cancer HAS broken through the basement membrane)

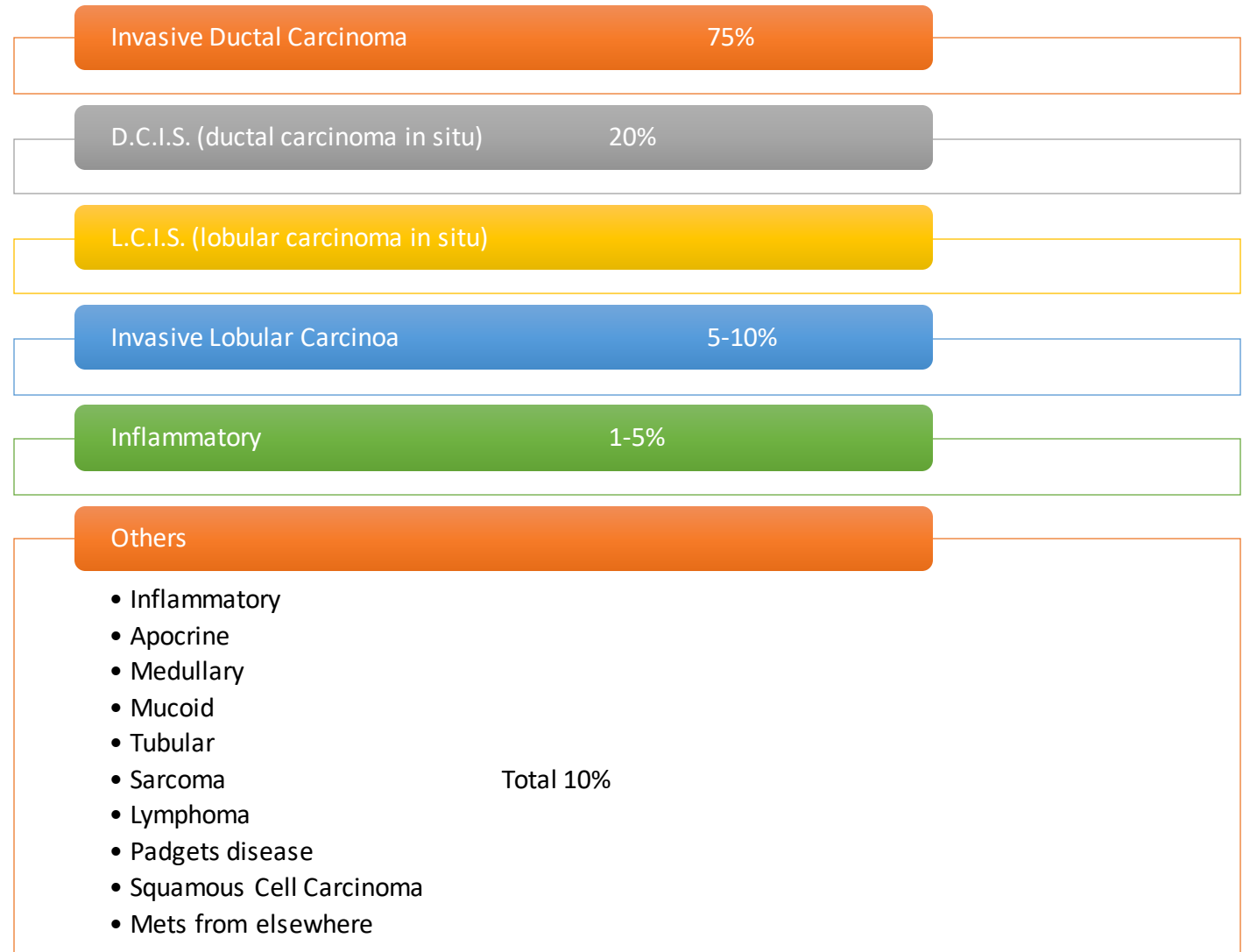
• DUCTAL



LOBULAR



# Carcinomas of the Breast



# Causes of Breast Cancer

No single cause can be identified

No immediate prospect for primary prevention

<u>AGE</u>	<u>BEING FEMALE</u>	Dense breast patterns	Family history
No children	First pregnancy over 30yrs	Early menarche	Late menopause
Obese post menopause	Previous large doses of ionising radiation (current surveillance; 25-29 MRI, 30-50 Annual Mammos if 'fatty' +/- MRI )	Relevant p.m.h. (ovarian, endometrial Ca)	From a higher 'social class'
Urban living	Lives in America or N.Europe	HRT for more than 10 years	Drinking Alcohol
	Smoking	Life stressors?	



# Causes of Breast cancer (continued)

Risks do not increase because of:

- Deodorant /Anti-perspirant
- Knocks or Bruises
- Strenuous exercise
- Shaving
- Under wired bras
- Breast Implants
- Exposure to Non-Ionising radiation (e.g., mobile phone masts, TVs and computers )
- Mammograms





# Other Breast Pathology

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Cysts

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Fibrocystic  
disease

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Fibroadenoma

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Papilloma

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Gynecomastia

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Malignancy

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Pre-menopausal disease is more likely to be benign

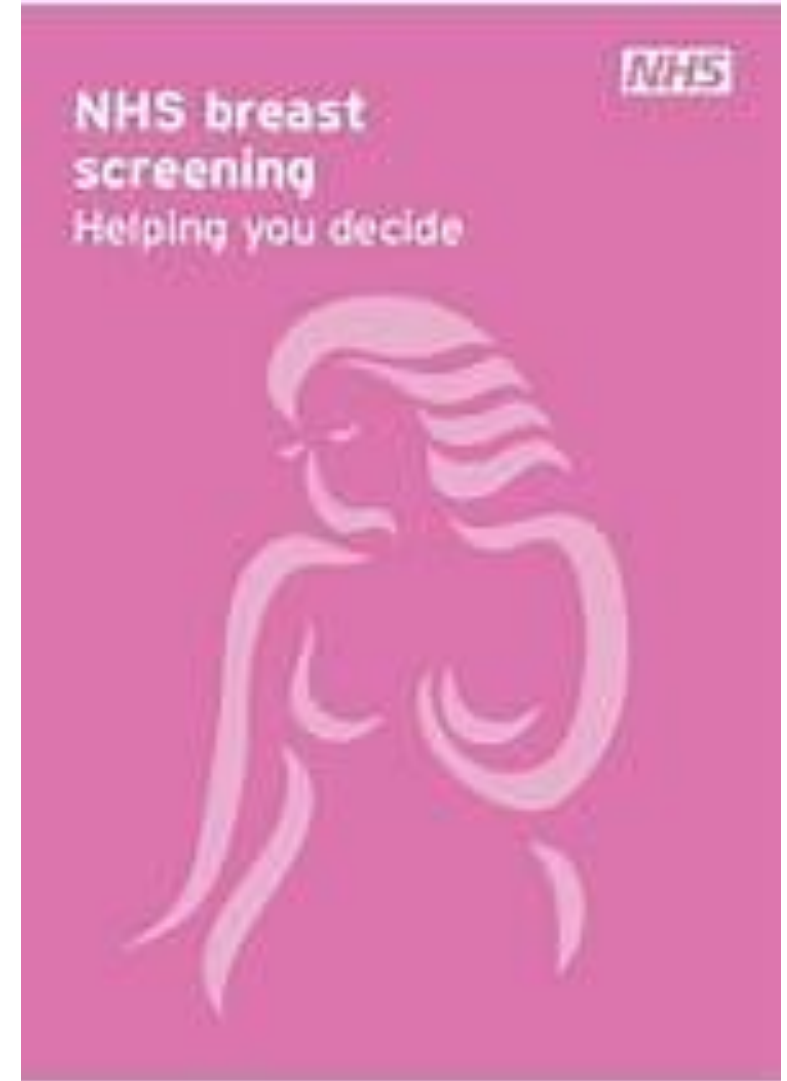
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Post-menopausal the risk of malignant disease increases

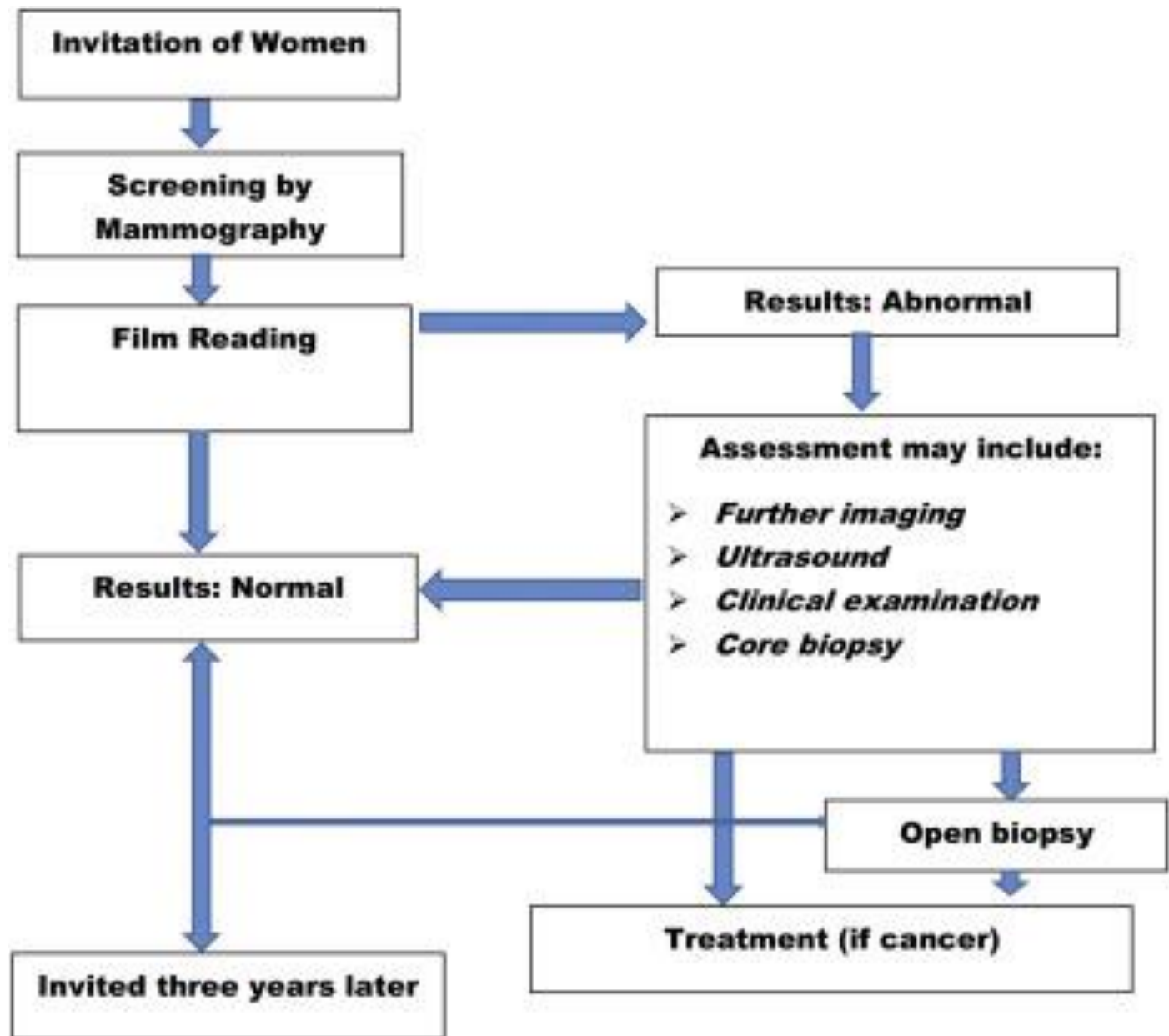
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# NHS Breast Screening programme

- All women registered with a GP in the UK aged 50 up to their 71st birthday
- Invited for breast screening every 3 years.
- Aim: Reduce mortality from Breast Cancer
- Early detection of breast cancers.
- Includes Family History, Gene carriers, Yearly follow up clinics
- Mammogram First line followed by triple assessment if required.
- ASYMPTOMATIC



# NHSBSP Patient pathway



# Breast Symptomatic Clinic

- GP referral – all ages and sexes
- Should be seen within 2 weeks
- Will see a breast clinician +/- Mammogram, Ultrasound, FNA, Breast Biopsy

**Not just a LUMP** breast cancer care

Many people think the first sign of breast cancer is a lump

Not all breast cancers show as lumps

Not all lumps are breast cancer

Some benign (not cancer) conditions appear as a lump

**Look out for**

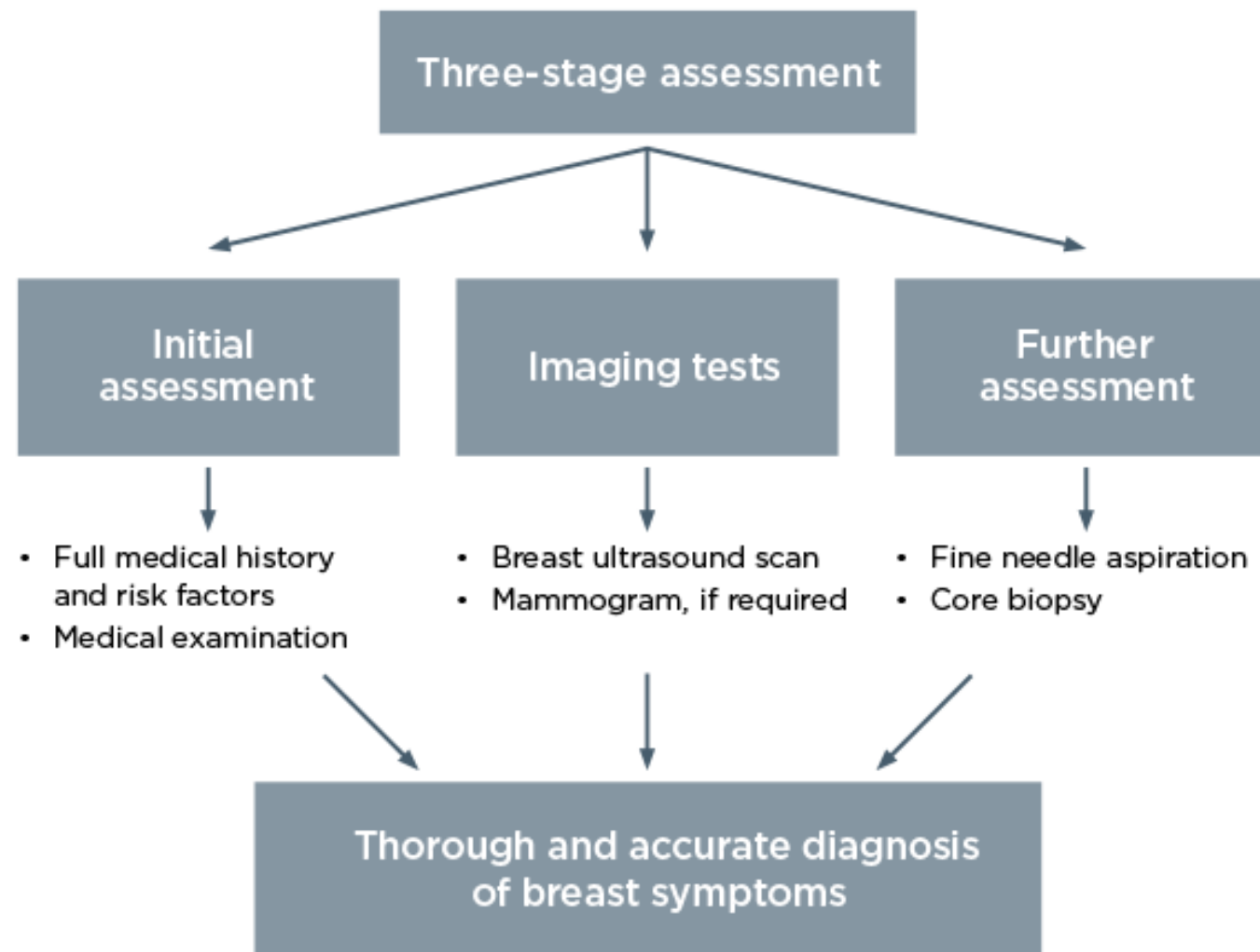
- A change in size or shape
- A lump or area that feels thicker than the rest of the breast
- A change in skin texture such as puckering or dimpling like the skin of an orange
- Redness or a rash on the skin and/or around the nipple
- A change to the nipple, for example it has become pulled in or changed its position or shape
- Liquid that comes from the nipple without squeezing
- Pain in your breast or your armpit that's there all or almost all the time
- A swelling in your armpit or around your collarbone

**If you notice any new change, go to see your doctor as soon as you can.**

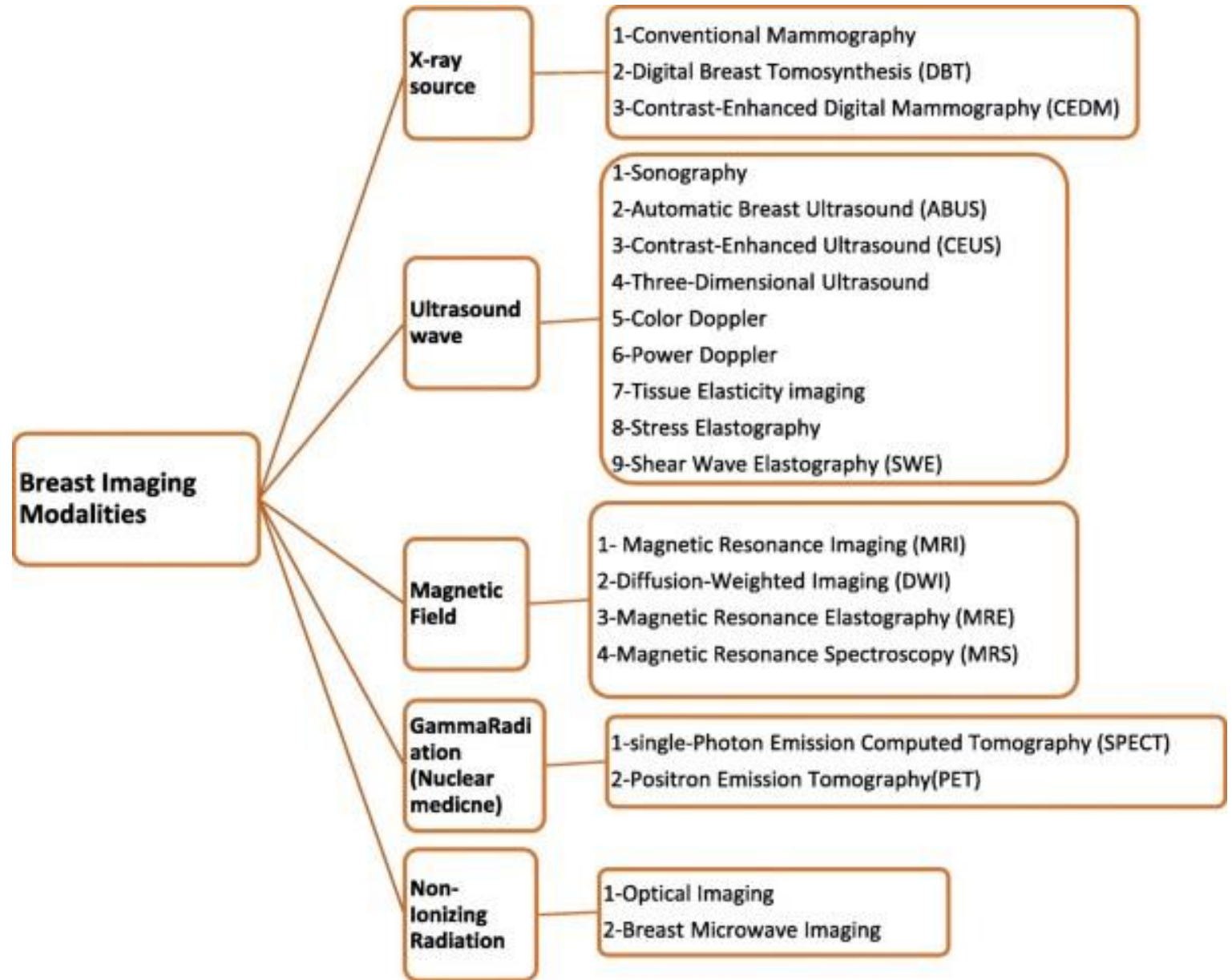
Breast Cancer Care is here for anyone who is worried about their breasts. Call our free Helpline on **0808 800 6000** or visit [breastcancercare.org.uk](http://breastcancercare.org.uk)

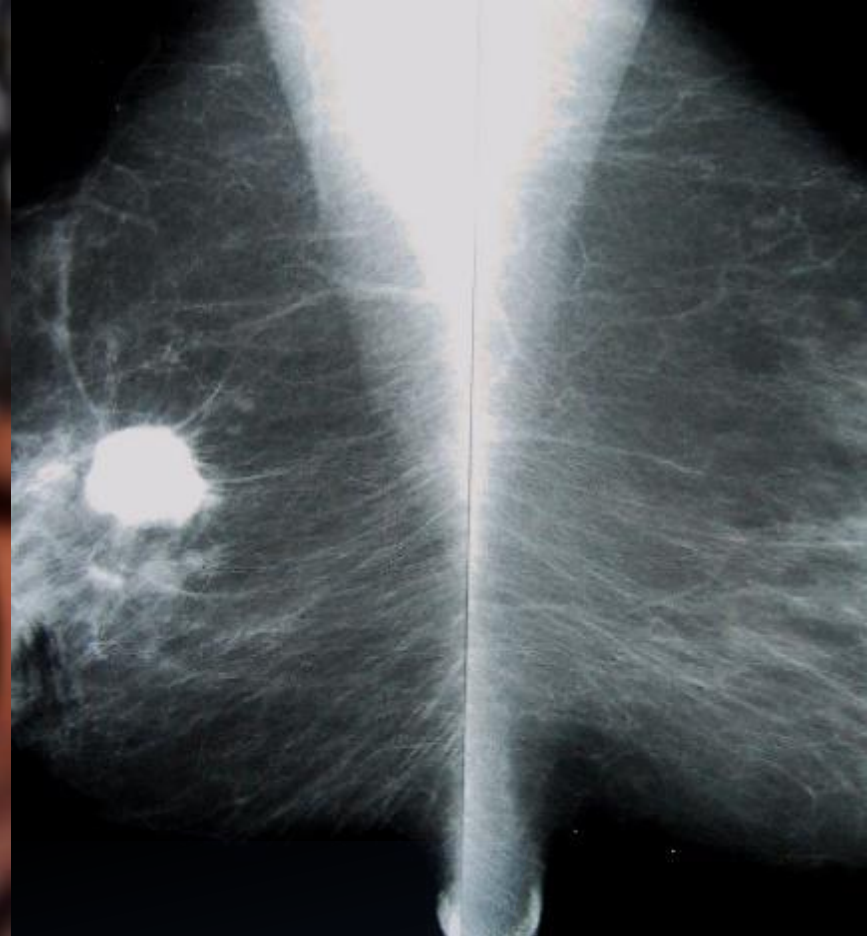
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# Symptomatic clinic patient pathway (One Stop clinic)



# Breast Imaging Modalities





What is Mammography?

# Mammography

Soft Tissue Radiological Examination of the breast

Breast = tissues with small differences in density

High contrast sensitivity required

Low energy x-rays

24kV – 34kV

Scattered radiation can reduce contrast: -Grid

QUALITY ASSURANCE



# Quality Assurance (Quality control)



# Mammography Indications

- Screening of Asymptomatic women
- Follow up after unilateral mastectomy
- Investigations of benign breast diseases
- Investigation of breast lumps
- Investigation of occult primary with secondaries
- Male breast Evaluation

# Patient Preparation

- Explanation and reassurance
- Informed consent
- Undress above the waist
- Check not wearing talc / deodorant. WHY?

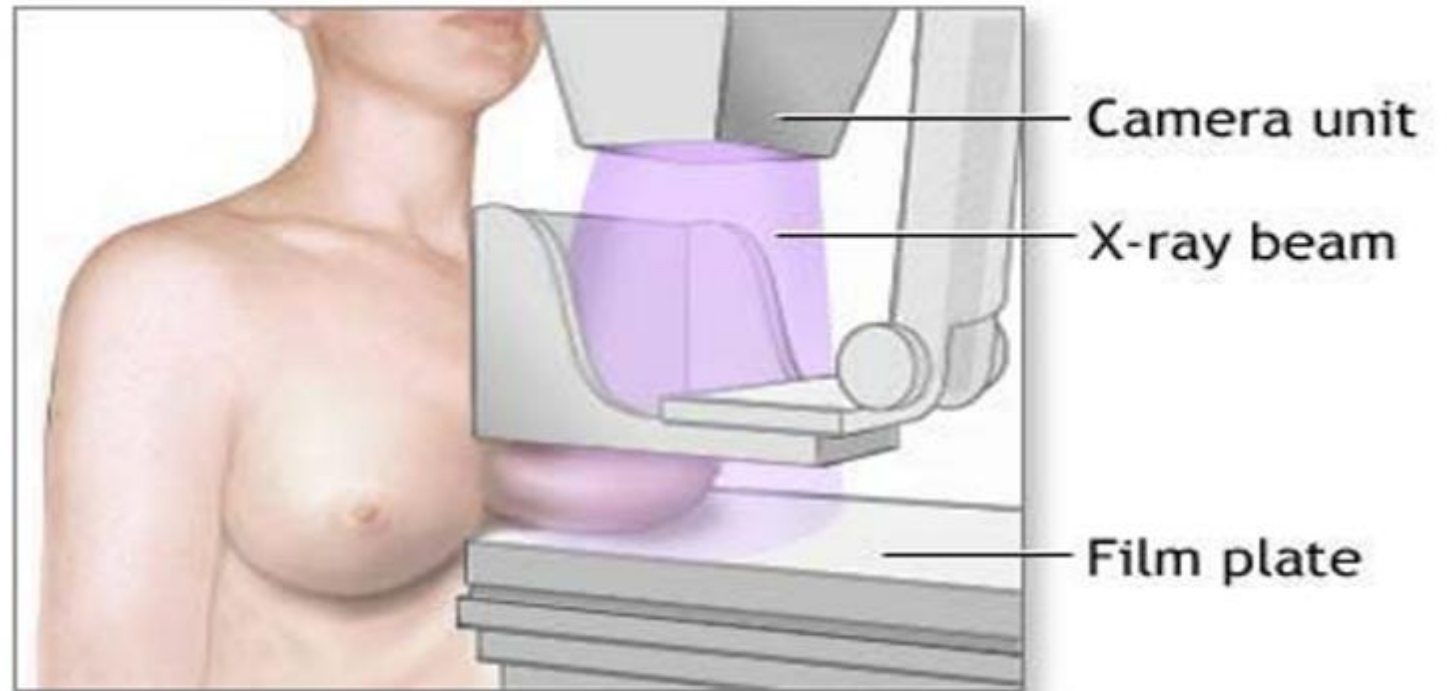
## AFTERCARE

- How to obtain results / inform of next stage in the procedure



# Breast Compression

- Reduces Geometric unsharpness
- Improve contrast
- Diminishes motion unsharpness
- Reduces Radiation dose
- Separates superimposed breast tissue



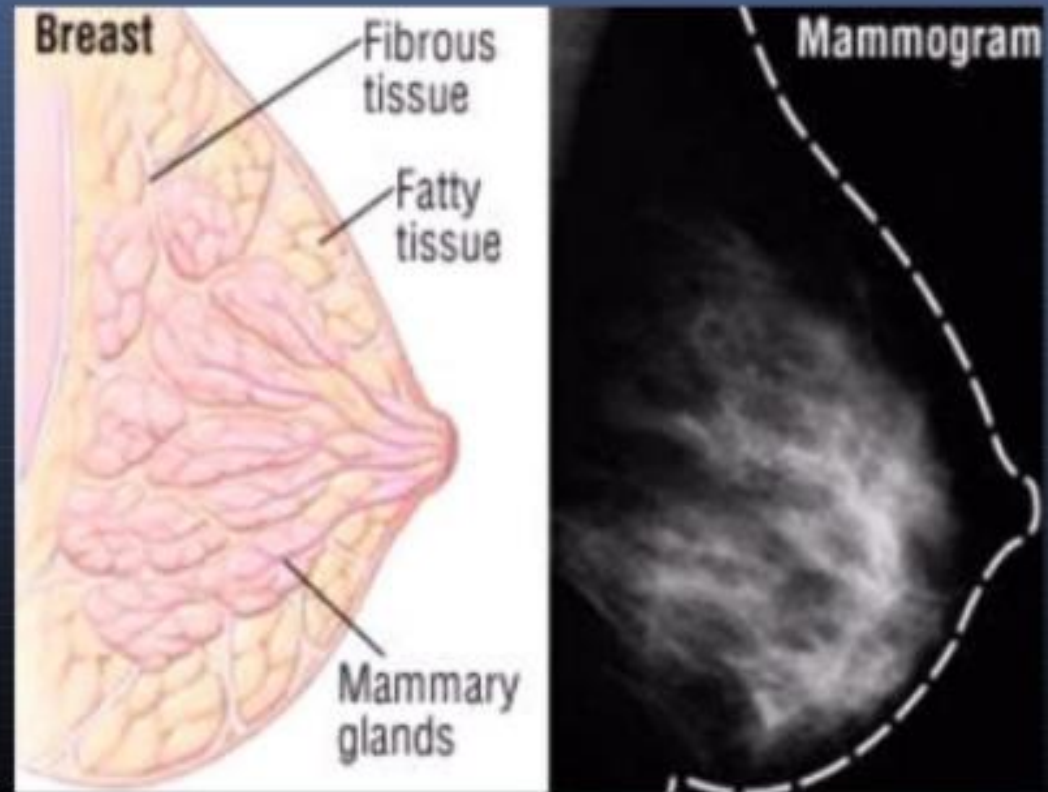
In mammography, each breast is compressed horizontally, then obliquely and an x-ray is taken of each position

# Client communication



# Radiological Appearance of breast tissue

Breast on mammography:



# Routine mammogram:

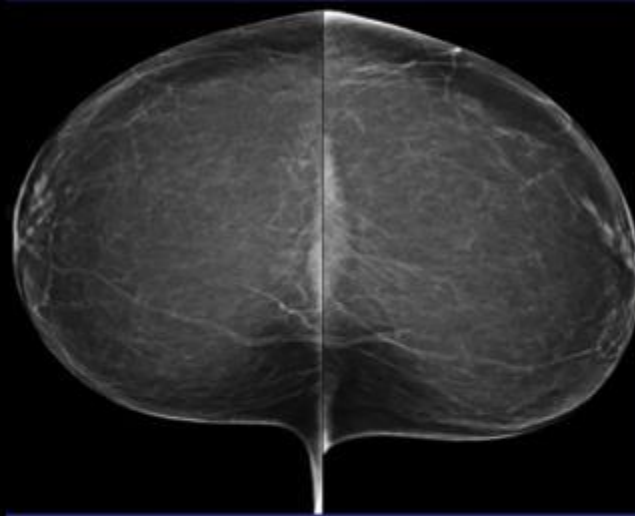
Combined 2 view  
study

CC and MLO view

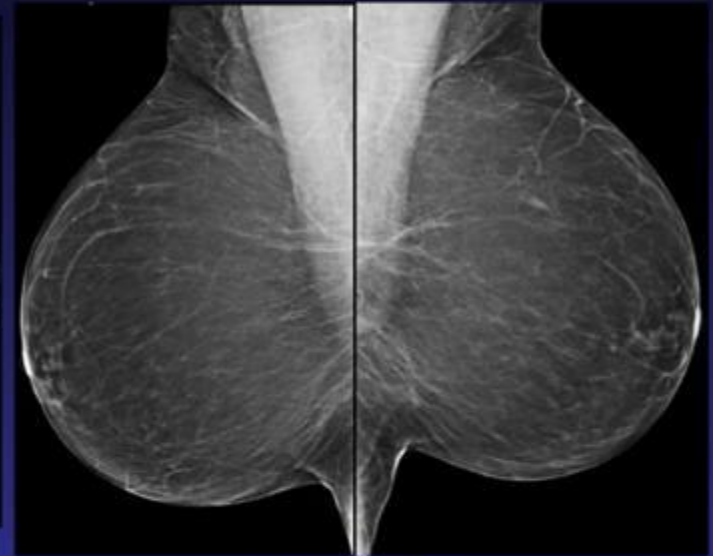
Complementary = each  
demonstrated specific  
area well and others  
not so well

Together = complete  
image of breast tissue  
for most patients

## Standard Views



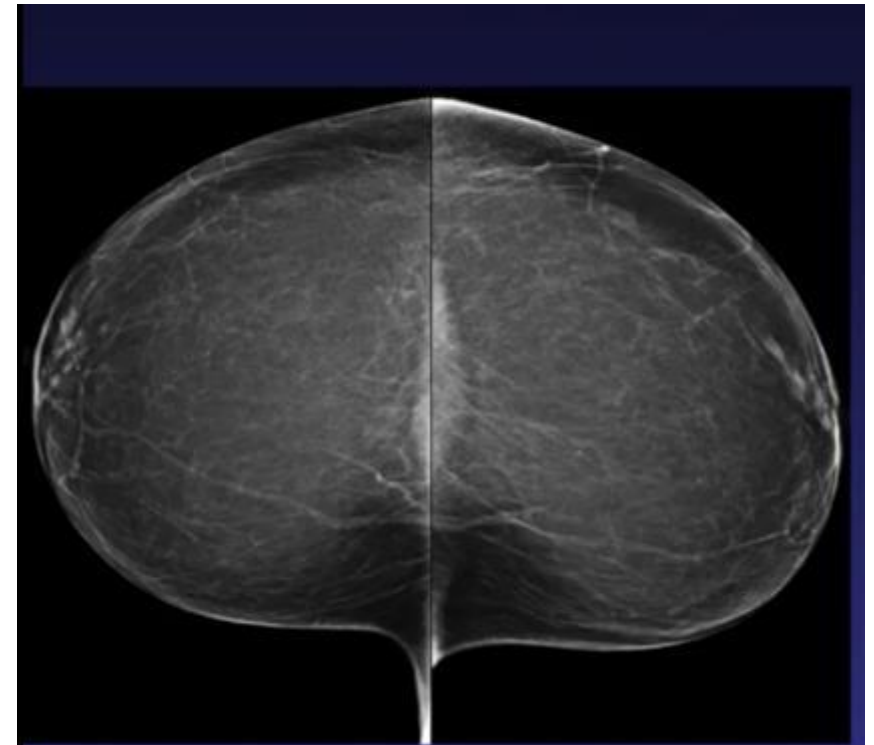
CC



MLO

# Cranio Caudal

Subareolar, central, medial,  
and posteromedial breast  
tissue



CC



# Medio-lateral oblique

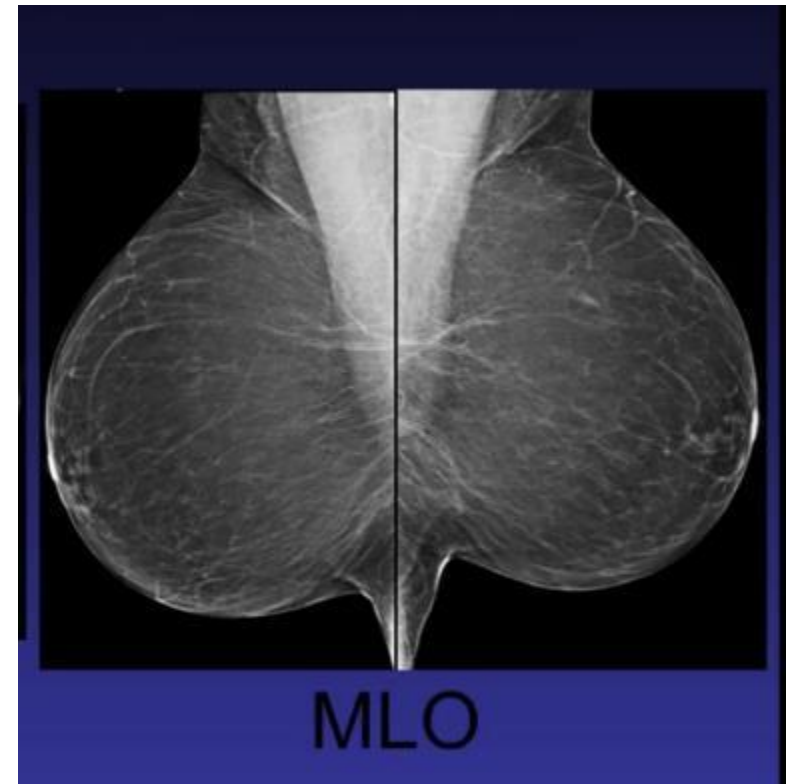
Tube angled to run parallel to the pectoral muscle

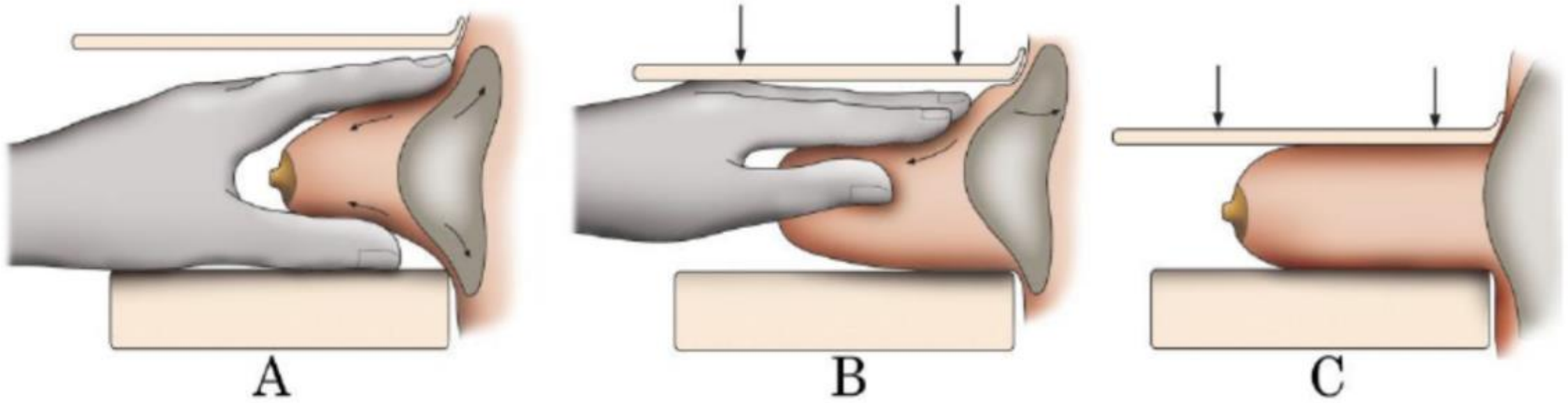
From a 45° average, the angle can be increased for tall slim women, (50° -60° +)  
Or decreased for short plump women (35° -45°)

The angle for each patient can only be decided by careful observation of her body shape

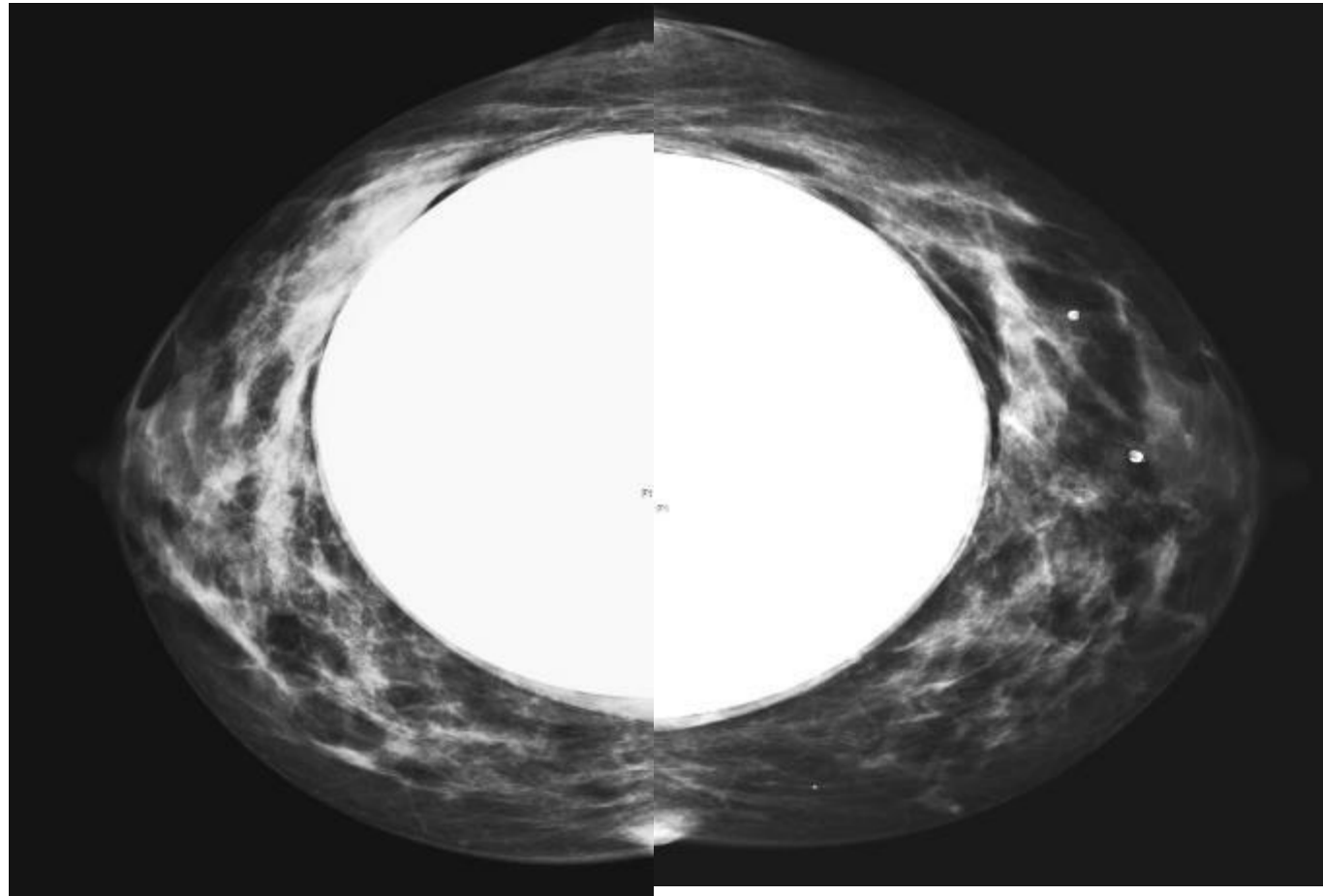


- Lateral, central, superior, and inferior breast tissue.

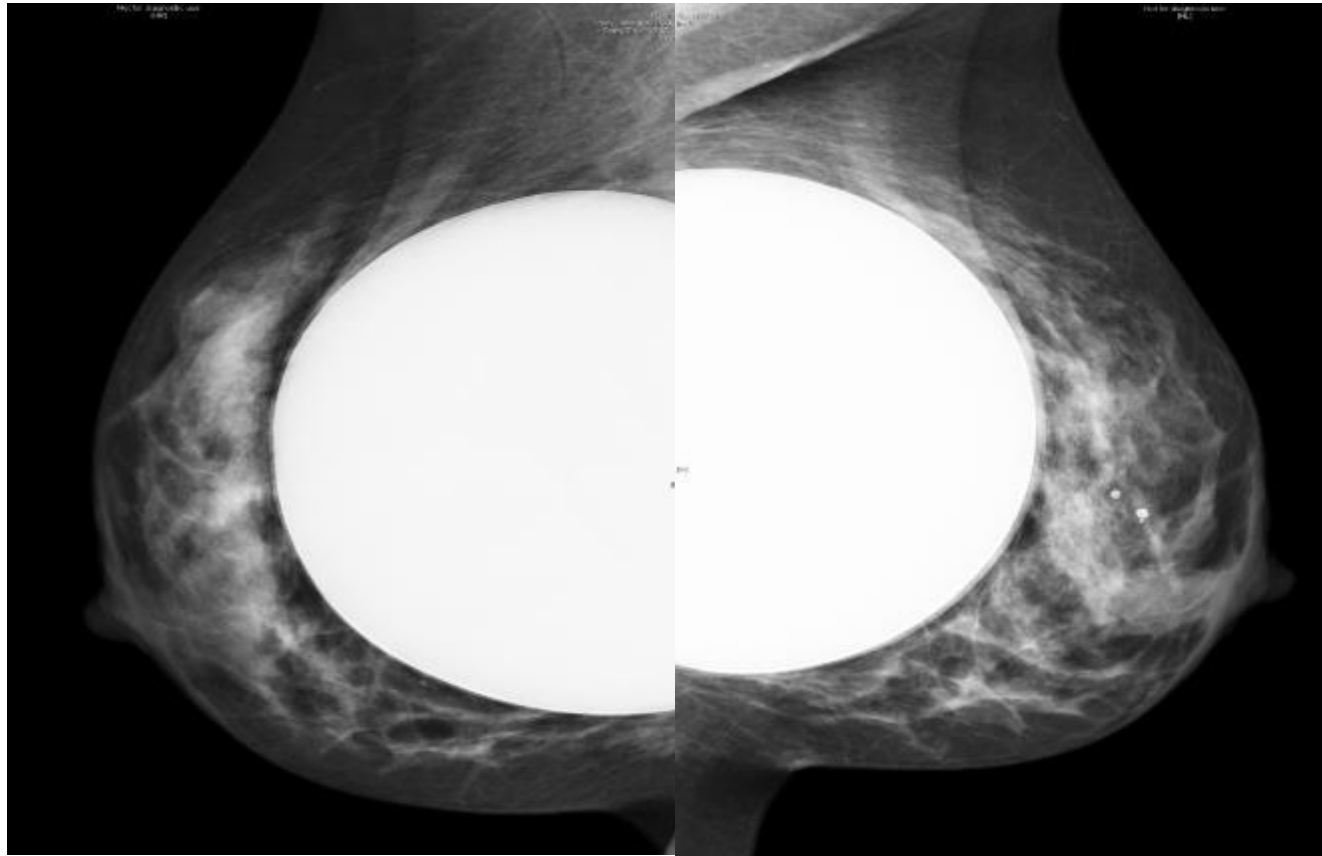




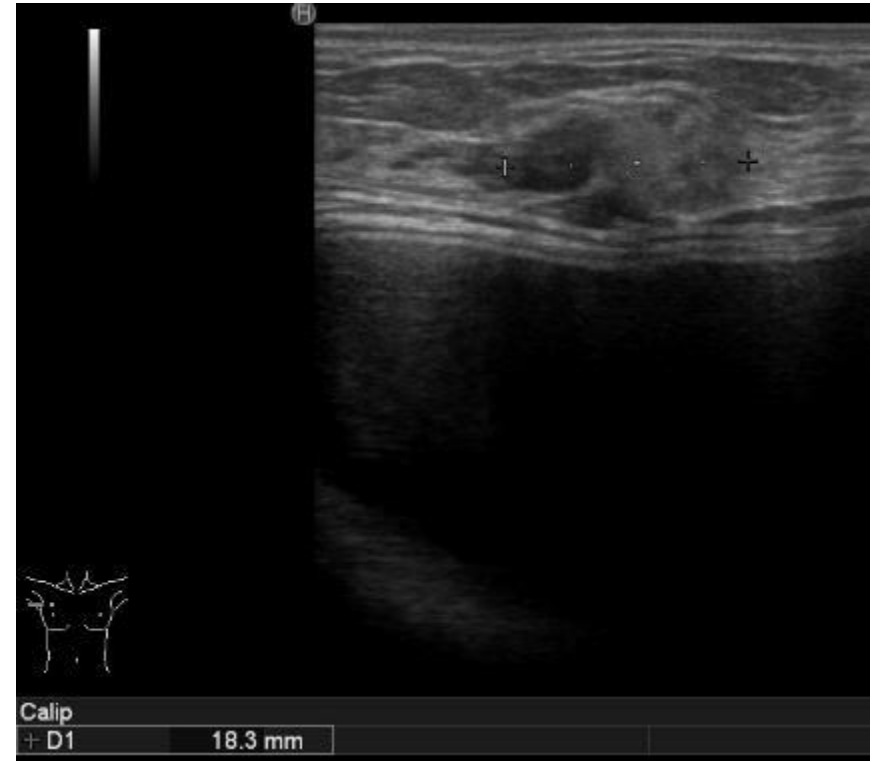
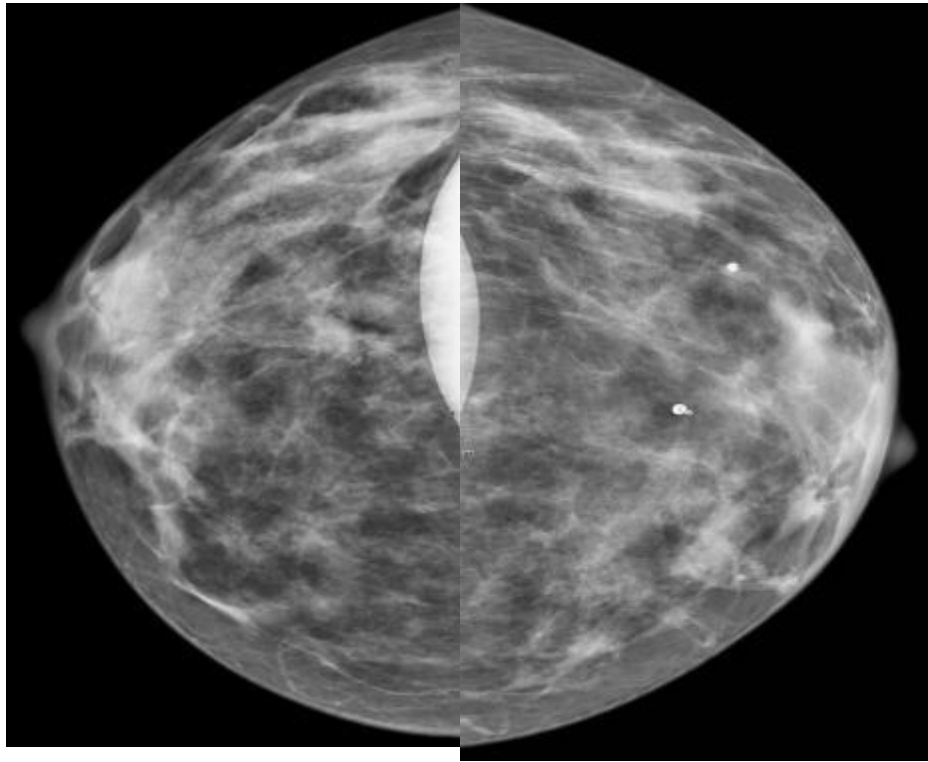
The Augmented breast  
– Eklund Technique



Routine CC view



Routine MLO view



Eklund CC View

# Supplementary views:



LAT  
Left Axillary Tail



LCV  
Left Cleavage



LFB  
Left From Below



LLM  
Left Lateromedial



LLMO  
Left Lateromedial  
Oblique



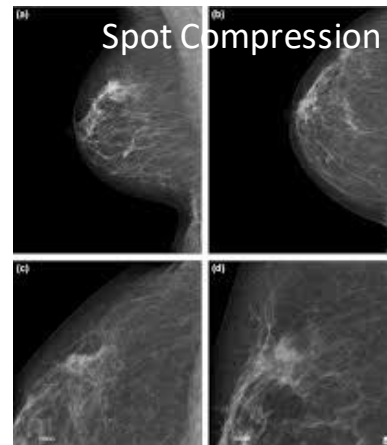
LML  
Left Mediolateral



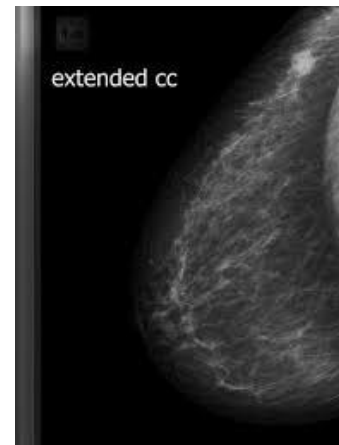
LRL  
Left Roll Lateral



LRM  
Left Roll Medial



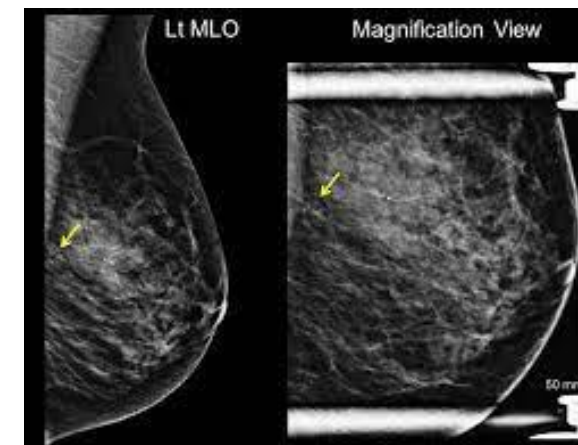
Spot Compression



extended cc



Cleavage view



Lt MLO

Magnification View

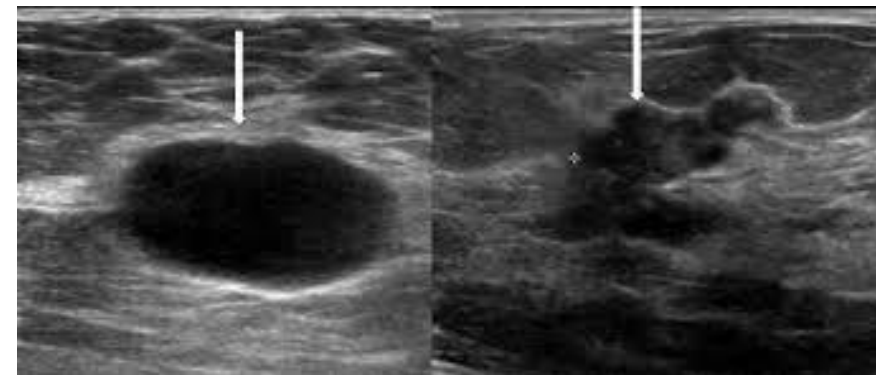
50 mm

# Ultrasound

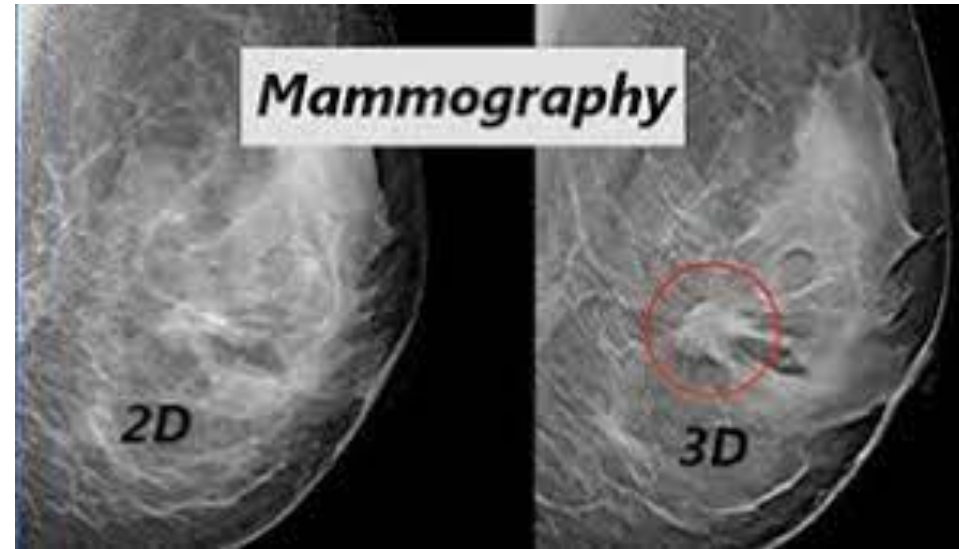
- Aids in assessment of abnormalities +/- detected by mammography.
- Determines the vascularity of lesions
- Better characterizes location,, dimension and characteristics of lesions
- Indications
  - Under 40
  - Palpable +/- +/- symptomatic breast/axilla lumps
  - Mammographic abnormality
  - Breast Inflammation
  - Nipple changes +/- Discharge
  - Augmented breast
  - Follow up
  - Strong family history of Cancer.

SIGNIFICANCE

Exam mode	Cancers detected	Sensitivity	Diagnostic yield (per 1,000)
Mammography	23	40%	3.6
Mammography + whole-breast US	46	81%	7.2



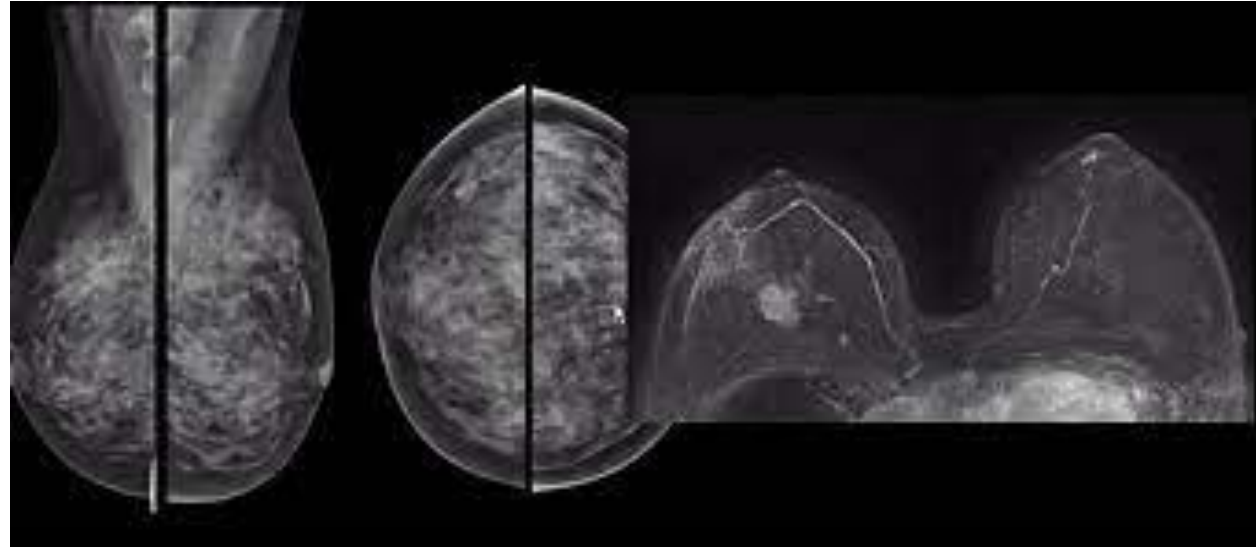
# Digital Breast Tomography



- Conventional mammography provides morphological information
- Superimposition of breast tissue leads to some lesions being obscured limiting sensitivity and specificity
- Digital mammography enabled the development of modalities with the potential for improving early detection
- These include tomosynthesis and contrast-enhanced digital mammography (CEDM).

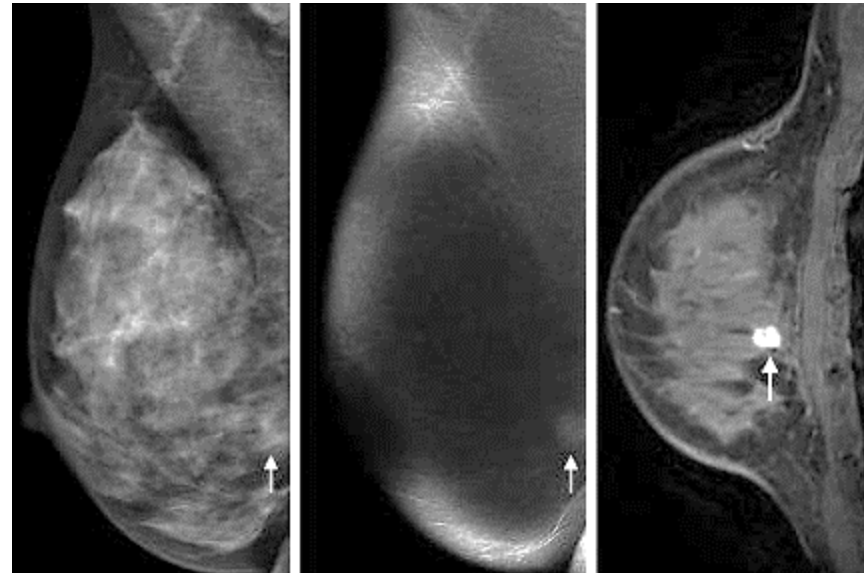
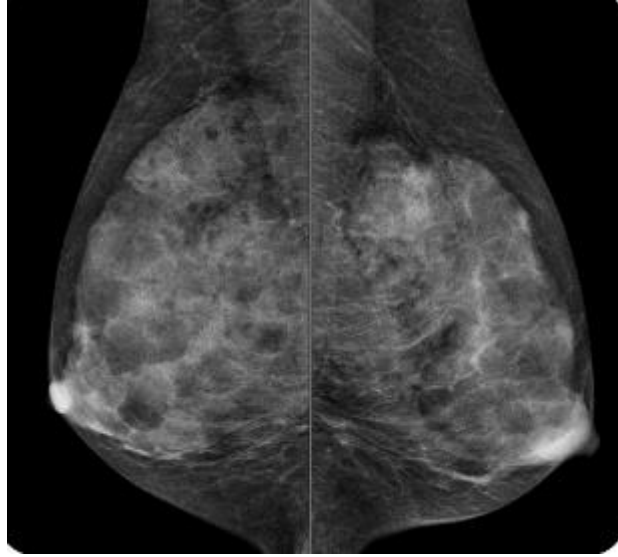


# MRI

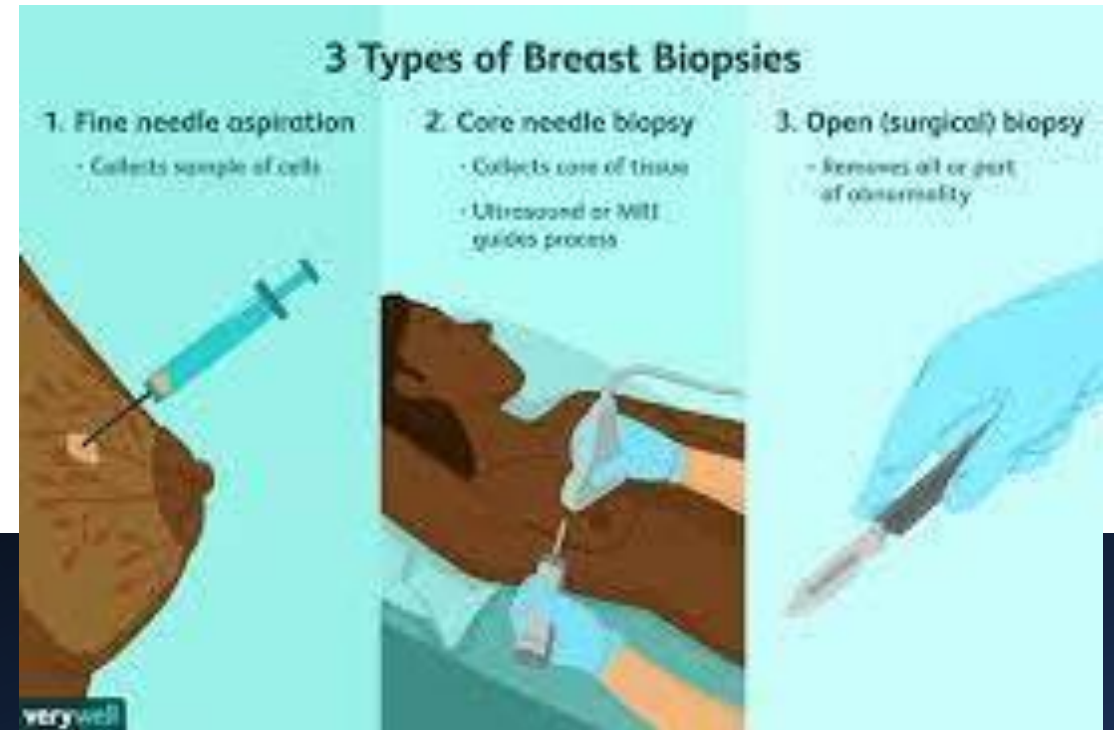


- MRI is considered to be the most sensitive breast imaging technique
- MRI use is limited due to higher cost, limited access and concerns regarding the short and long-term effects of gadolinium administration

# Contrast Enhanced Spectral Mammography (CESM)



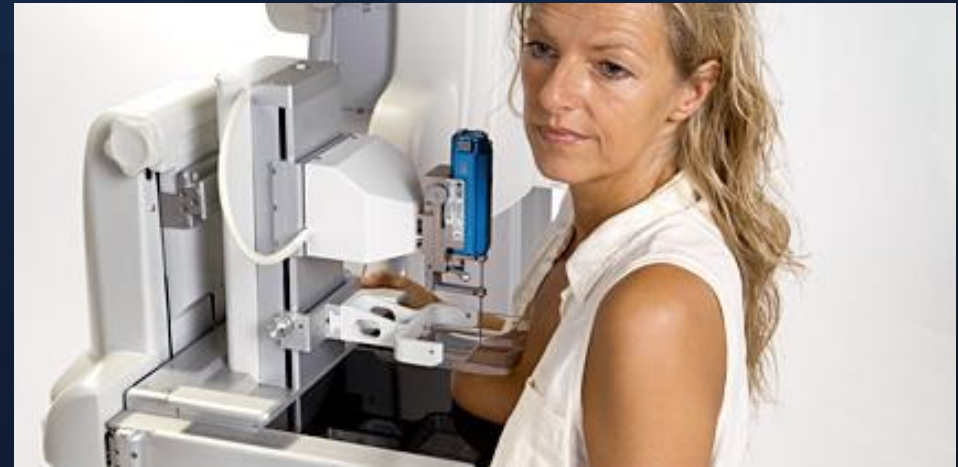
# Breast Biopsies



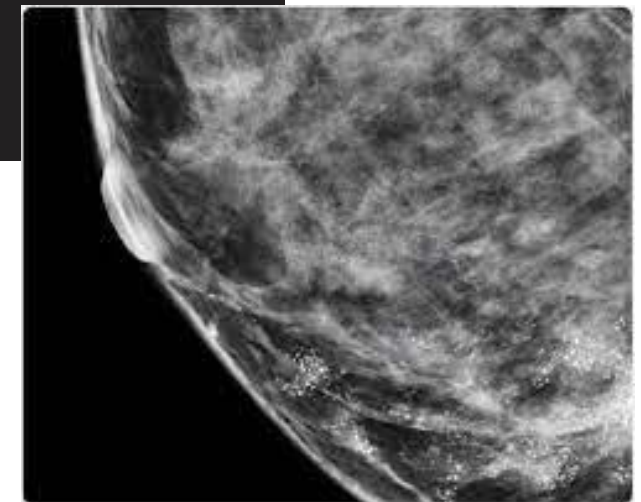
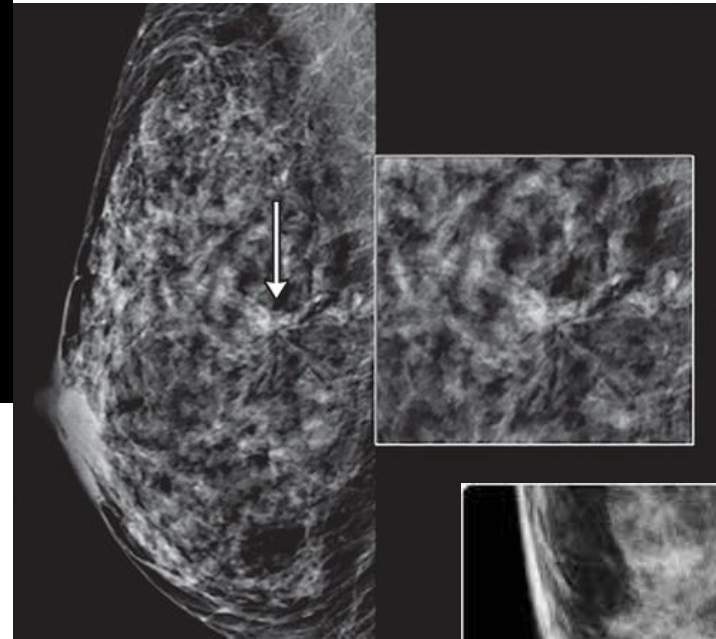
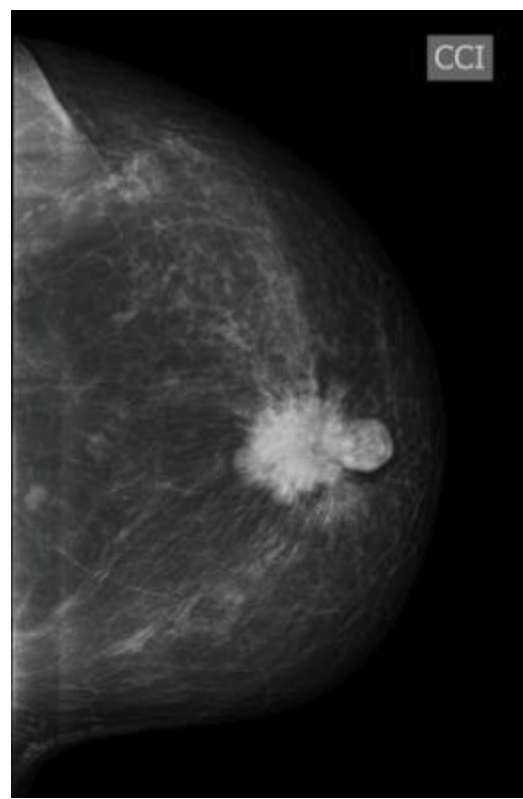
# Stereo - prone



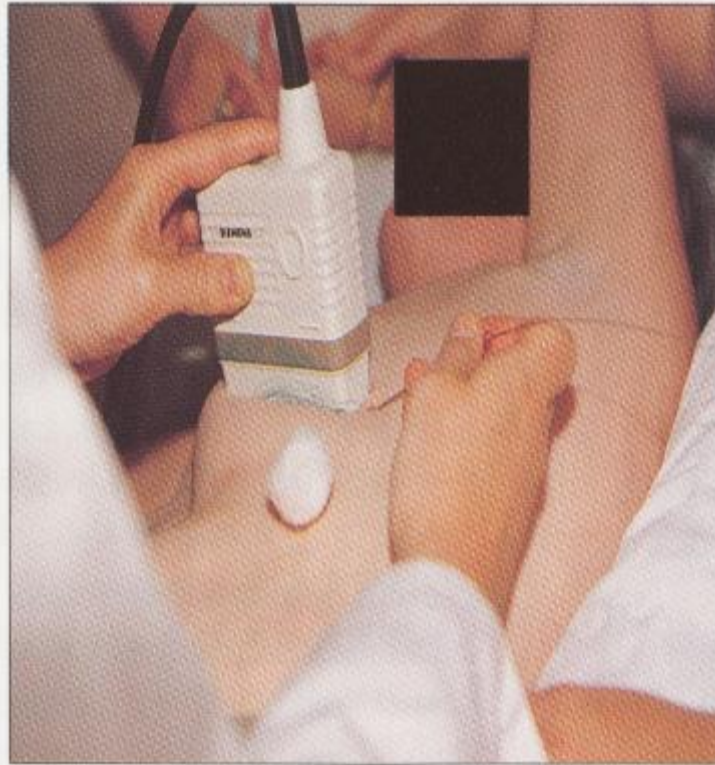
# Stereo - upright



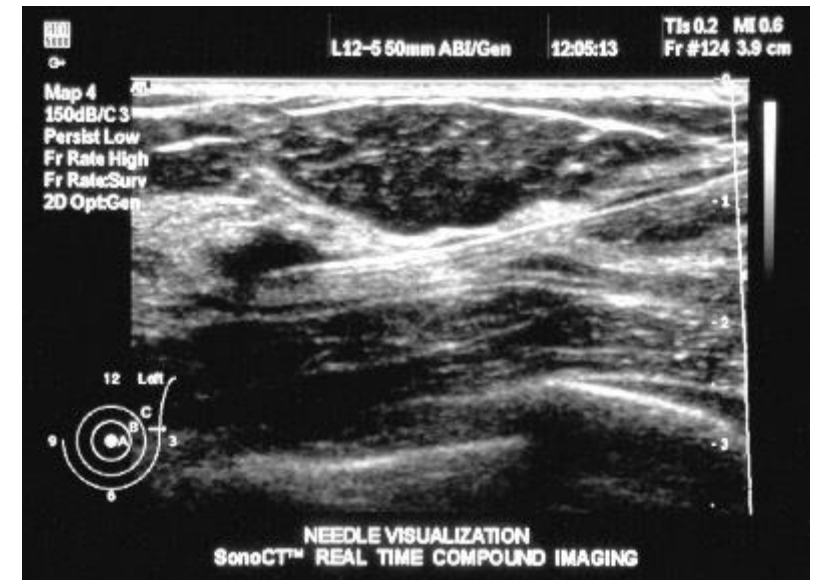
Stereo for:  
Masses/  
Distortion /  
Calcification



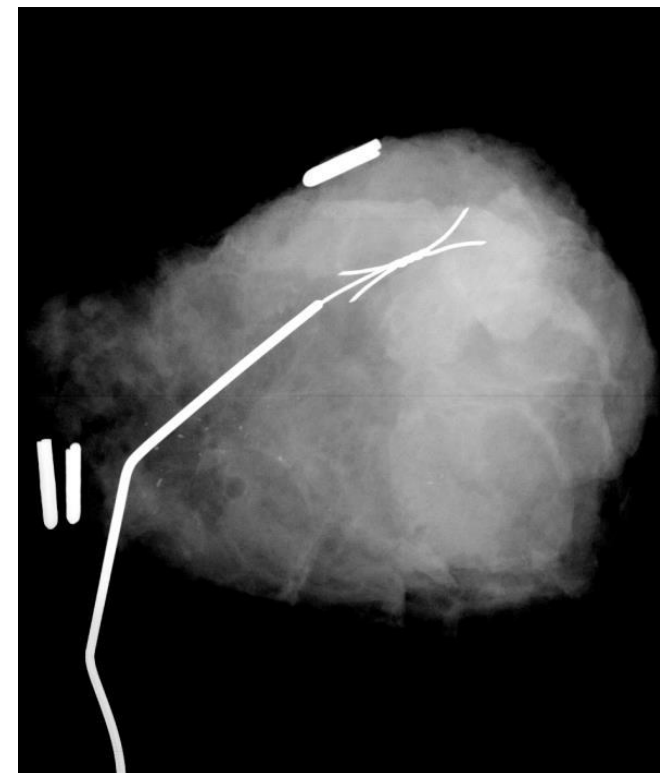
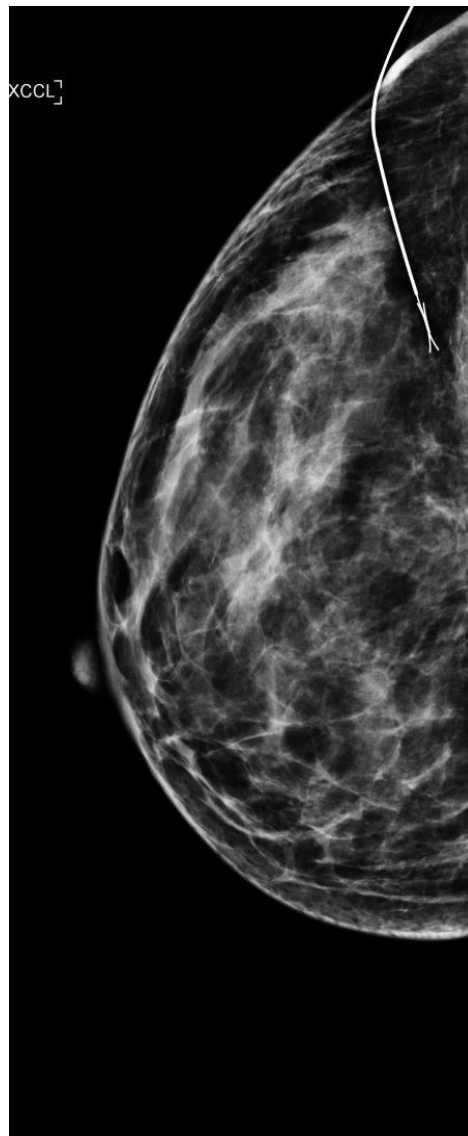
# Ultrasound localisation



6.2 Ultrasound-guided needle placement.



# Localisation biopsy

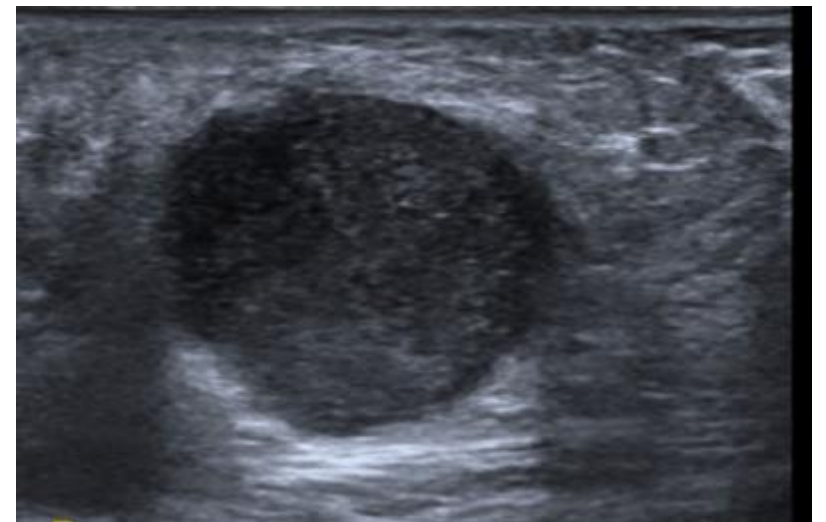
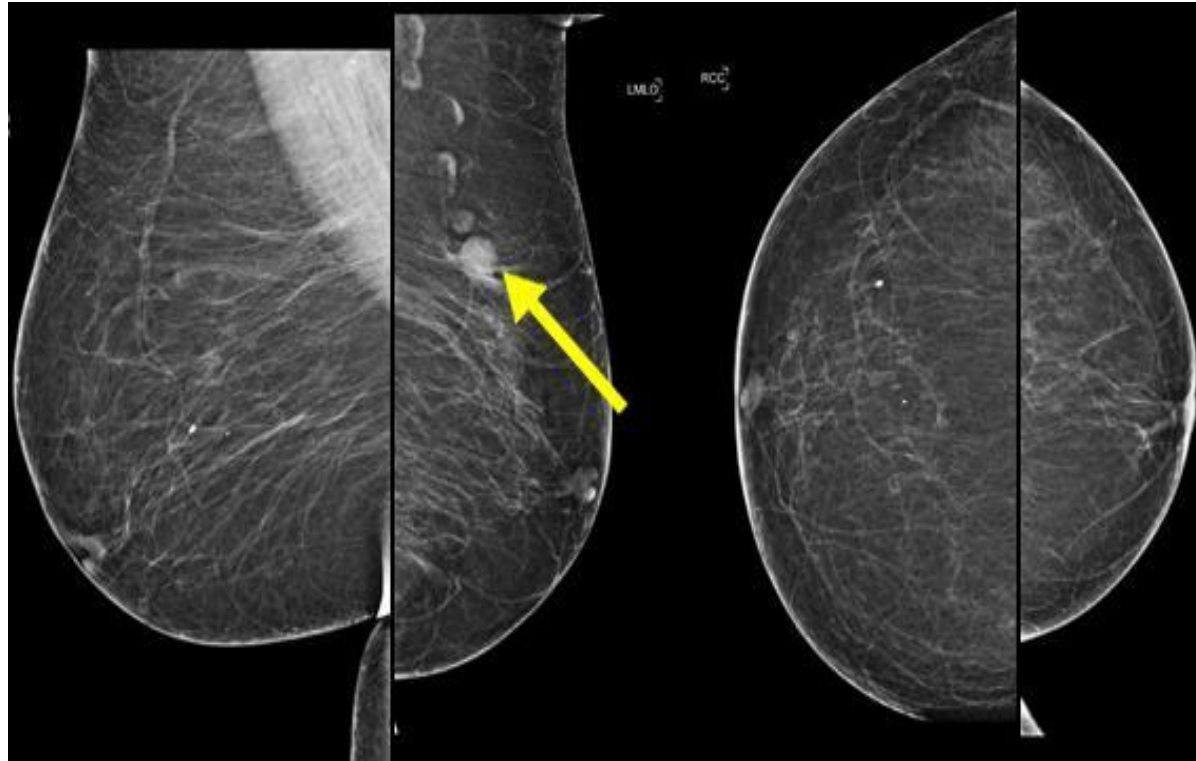




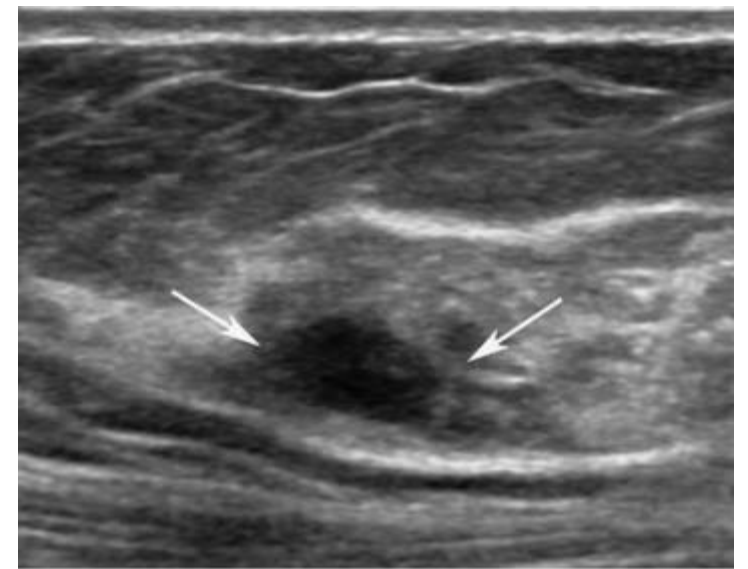
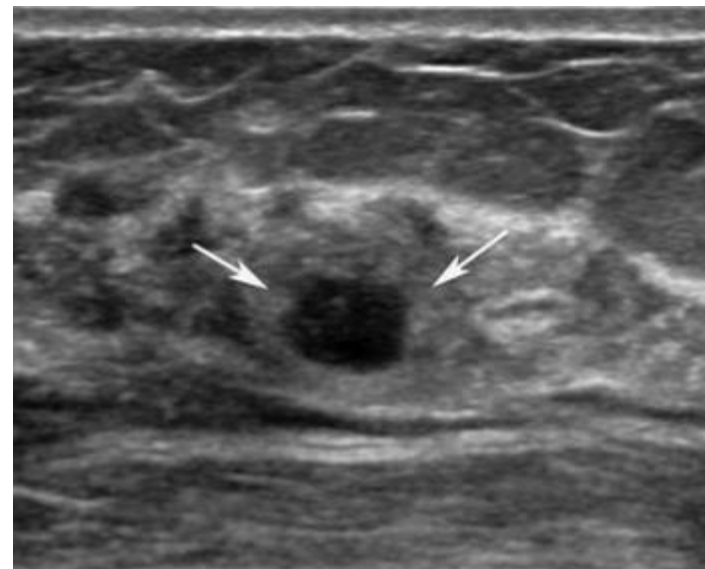
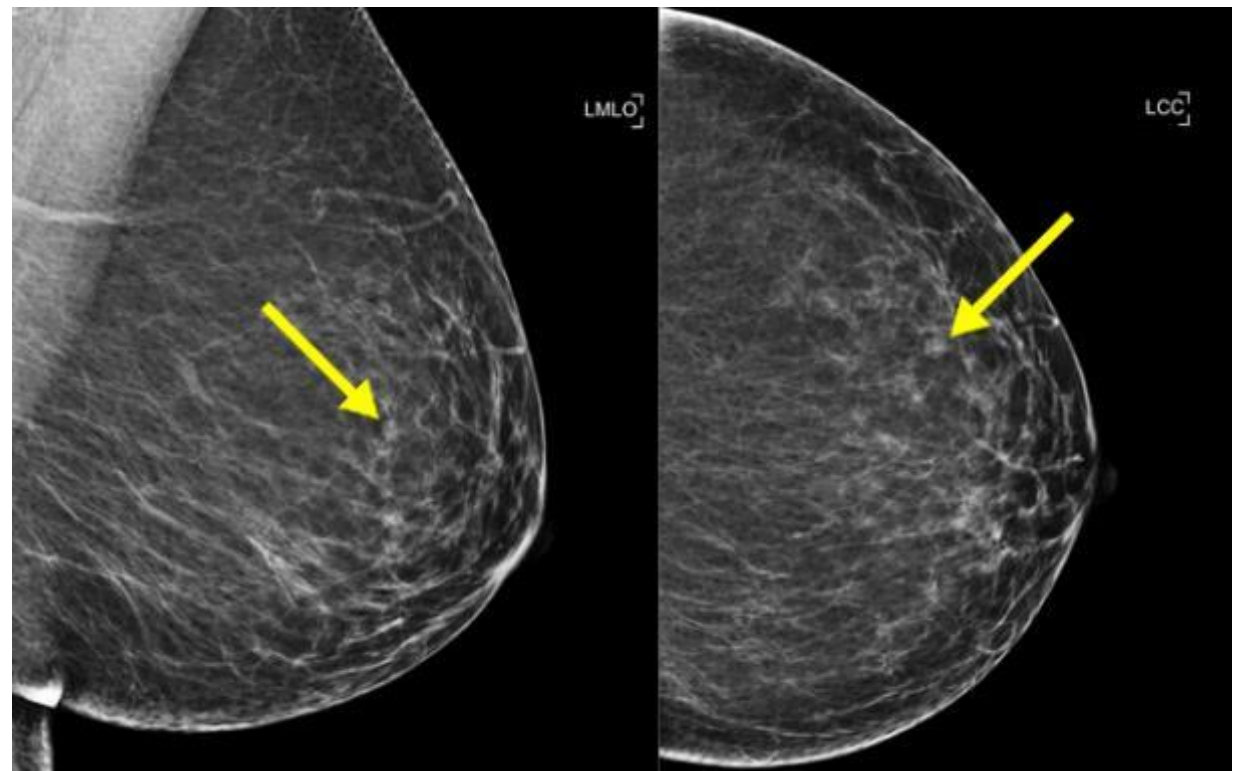
# MRI - vacuum



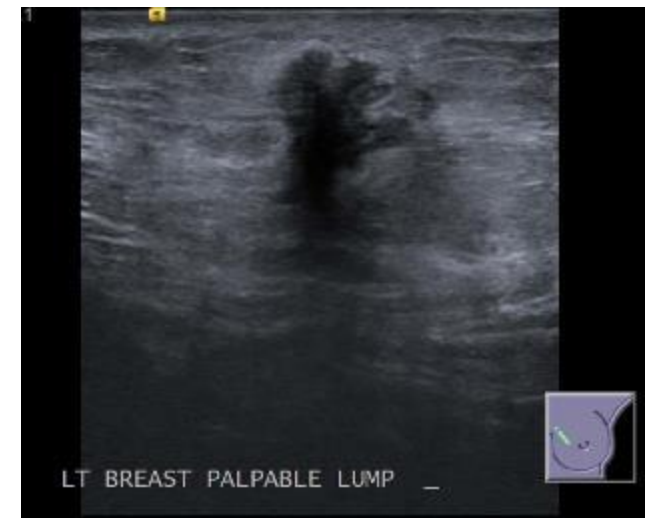
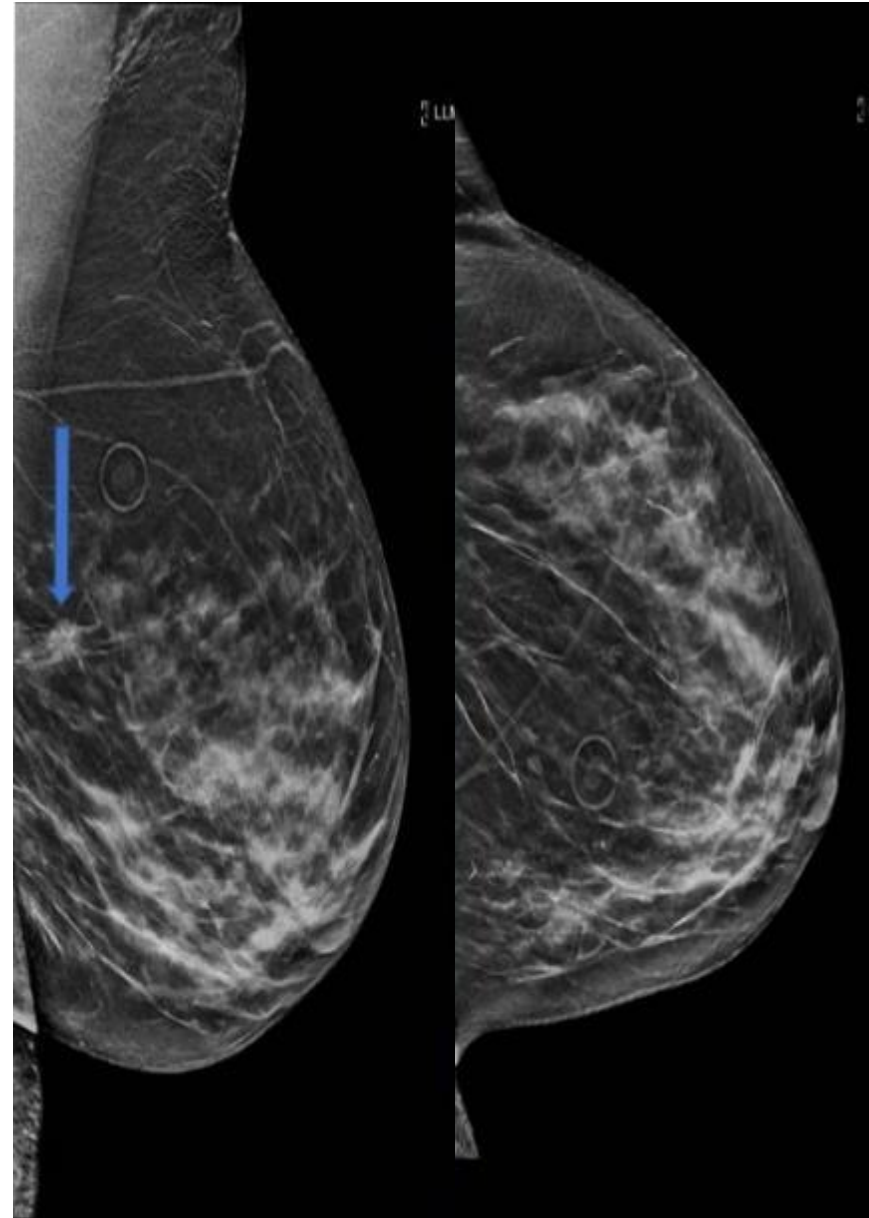
# Pathology 1



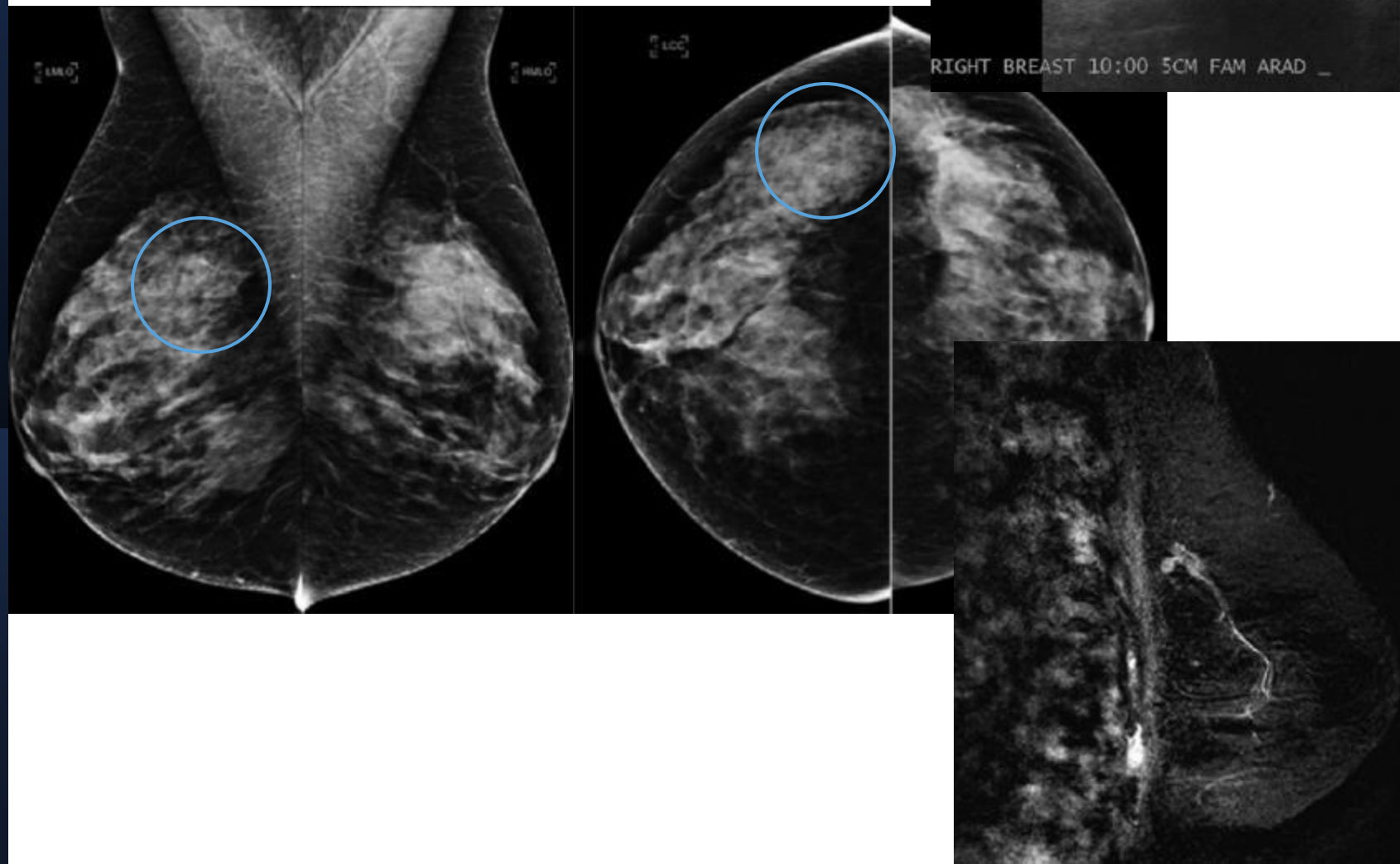
# Pathology 2



# Pathology 3



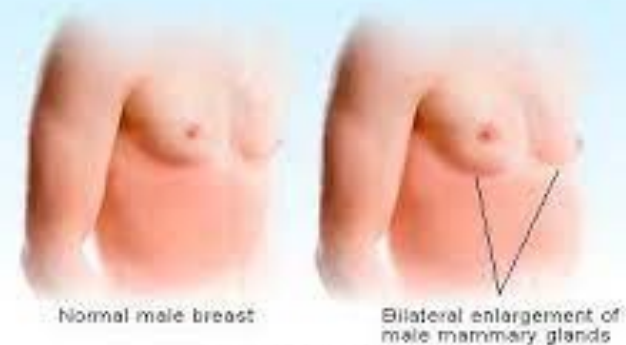
# Pathology 4



# Pathology 5



## Gynecomastia



# Any Questions?

