SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF RADIOGRAPHY AND IMAGING

TECHNOLOGY

COURSE NAME : MODERN IMAGING TECHNIQUES AND

RECENT TRENDS IN IMAGING

UNIT : MAMMOGRAPHY

TOPIC : TECHNIQUES,POSITIONING AND PROCEDURES

FACULTY NAME: MRS.G.HELANA JOY

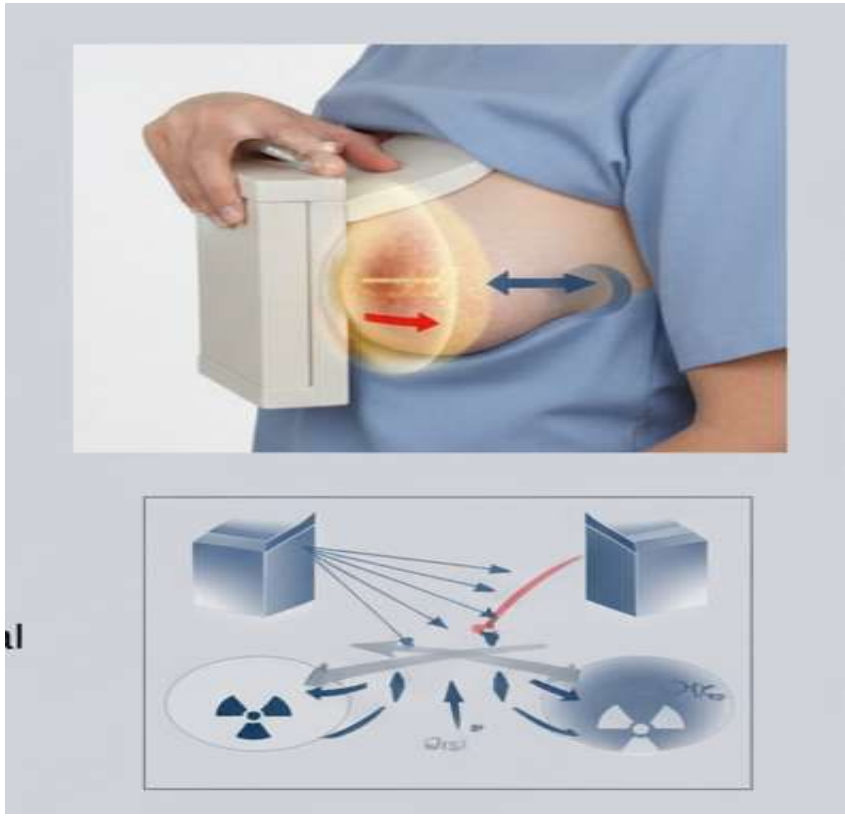
INTRODUCTION - DEFINE

Mammography is a specialized medical imaging technique using low-dose X-rays to visualize breast tissue.

- **Purpose:** Primary screening tool for early breast cancer detection; also used for diagnostic evaluation of symptoms or abnormal screening results.
- **Goal:** Detect non-palpable lesions, especially microcalcifications and masses, often before they can be felt.

PATIENT IMMOBILIZATION & COMPRESSION

- **Principle: Compression** is fundamental for both immobilization and image quality.
- **Purpose of Compression:**
- **Immobilization:** Minimizes motion blur, crucial for sharp images.
- **Uniform Density:** Spreads out breast tissue, reducing superimposition and making structures easier to penetrate and visualize



PATIENT IMMOBILIZATION & COMPRESSION

- **Reduced Dose:** Decreases breast thickness, allowing for lower exposure factors.
- **Reduced Scatter:** Brings the tissue closer to the image receptor (IR), improving contrast.
- **Separation:** Helps to separate overlapping glandular tissue.
- **Technique:** Technologist applies adequate, firm compression ($15-20$ pounds of force) to achieve maximum, uniform thickness reduction.
- **Crucial Note:** Compression must always be tolerable for the patient.

IDENTIFICATION AND LABELING TECHNIQUES

Purpose:

- Ensure accurate patient and image identification to avoid errors.
- Maintain traceability for medical records and follow-ups.

Required Information (Standard Labels):

- Facility Name/Location
- Patient Name and ID
- Date of Examination
- View/Projection Code (e.g., CC, MLO)
- Technologist's ID
- Exposure Factors (often automatically recorded)

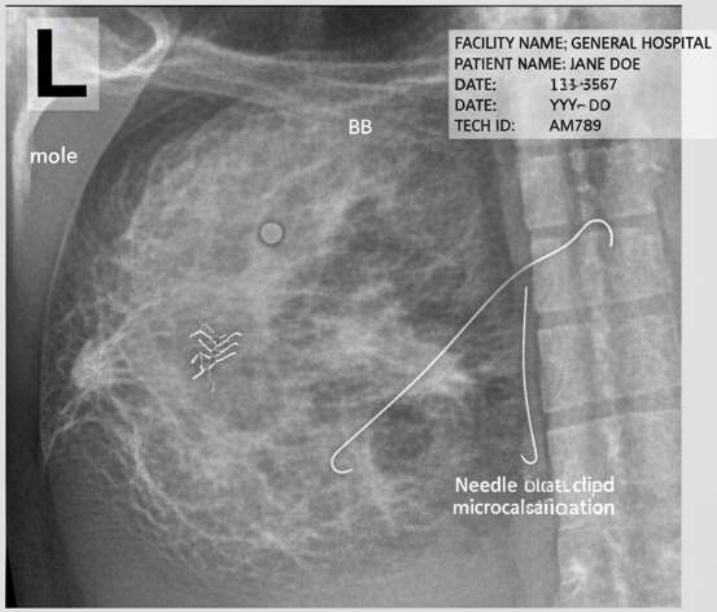
IDENTIFICATION AND LABELING TECHNIQUES

Laterality Marker: A distinct lead **'R'** or **'L'** must be placed in the image to unequivocally indicate the side of the body.

Accessory Markers:

•**Skin Lesion Markers:** Small radio-opaque markers (e.g., BBs, moles) used to mark palpable findings or skin lesions, ensuring they aren't confused with internal abnormalities.

•**Post-Surgical Markers:** Used to identify the location of previous biopsies or lumpectomies (e.g., needle localization wires, clips).



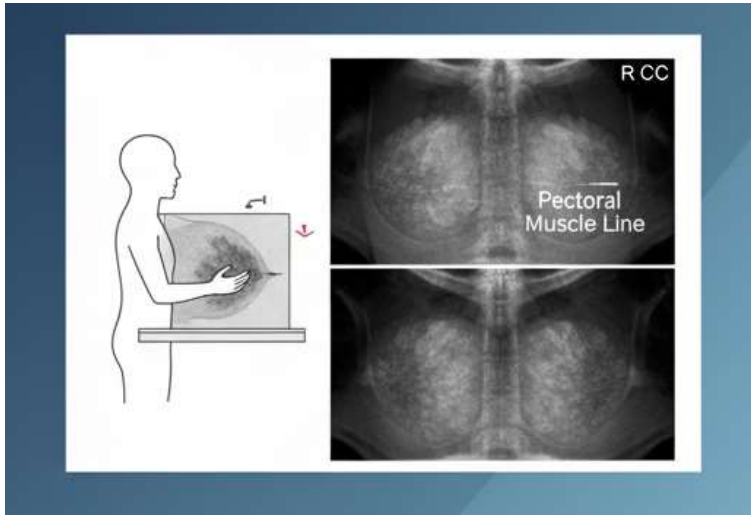
POSITIONING TECHNIQUES: STANDARD SCREENING VIEWS

Goal: Maximize visualization of all breast tissue, especially the posterior and lateral aspects.

•Standard Screening Views (The Two-View Series):

1.Craniocaudal (CC) Projection:

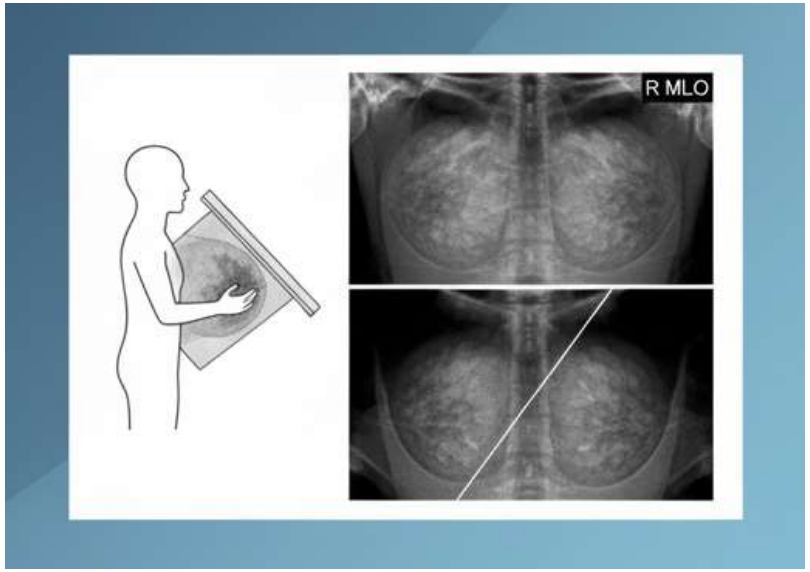
- **•Goal:** Image central, medial, and subareolar tissue.
- **•Position:** IR parallel to the floor; breast pulled out onto the IR; nipple in profile; Pectoral muscle inclusion is a quality indicator (visible in ~$30-40$% of CCs, indicates good posterior tissue inclusion).



POSITIONING TECHNIQUES: STANDARD SCREENING VIEWS

2. Mediolateral Oblique (MLO) Projection:

- **Goal:** Image the largest amount of breast tissue, particularly the upper-outer quadrant and axillary tail. **The most critical view.**
- **Position:** C-arm angled ($40-60^\\circ$ depending on patient body habitus); Pectoral muscle must extend down to the level of the posterior nipple line (PNL); Nipple in profile.

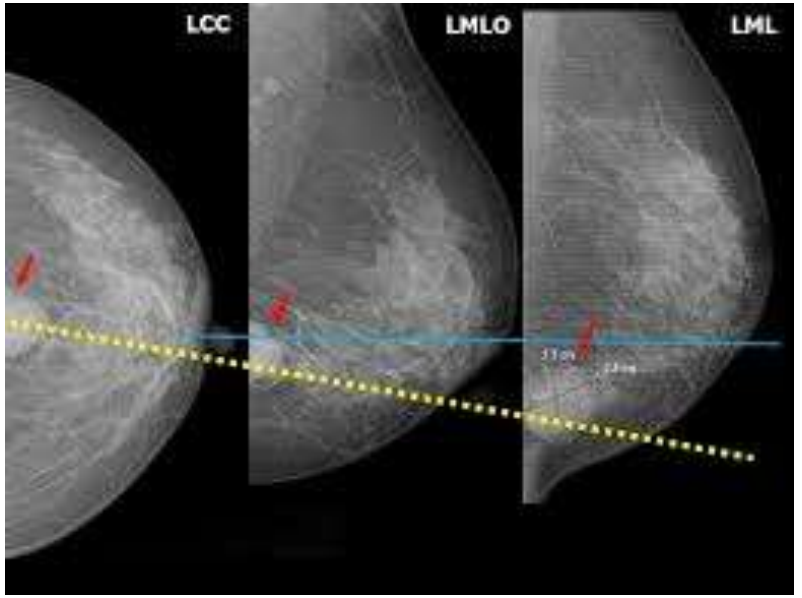


POSITIONING TECHNIQUES: SUPPLEMENTAL/DIAGNOSTIC VIEWS

Purpose: To further evaluate findings from standard views, localize lesions, or image areas not fully visualized.

Examples:

•**Lateral Views (Mediolateral [ML] or Lateromedial [LM]):** Used to localize lesions seen only on the MLO view (lesions move *down* on ML or *up* on LM relative to their MLO position). Also used for pre-operative localization.

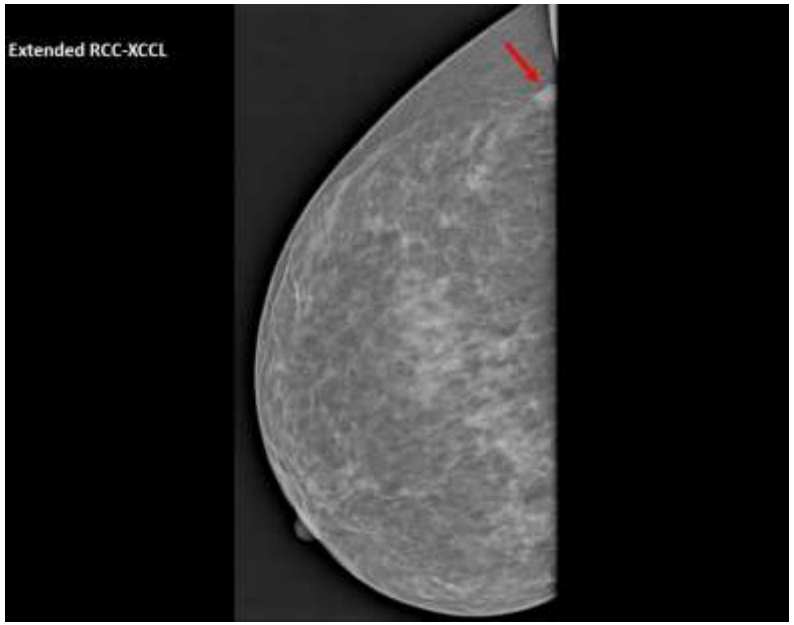


POSITIONING TECHNIQUES: SUPPLEMENTAL/DIAGNOSTIC VIEWS

•**Exaggerated Craniocaudal Lateral (XCCL):** To image far lateral breast tissue not seen on the standard CC.

•**Spot Compression:** Uses a smaller compression paddle to apply increased, focal compression to a specific area of interest. This spreads out overlapping tissue.

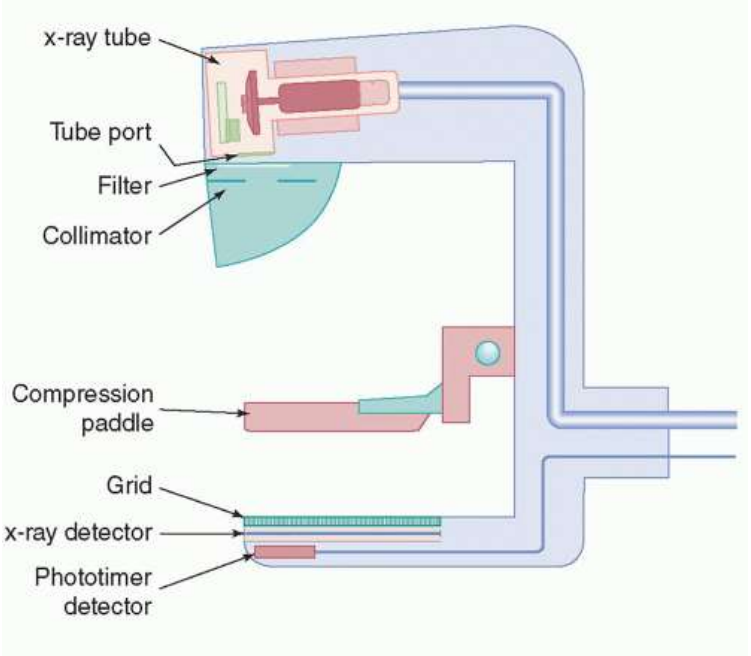
•**Magnification View:** Uses an air gap technique and a small focal spot to magnify small structures (e.g., microcalcifications), improving detail.



EXPOSURE FACTORS AND EQUIPMENT

Target Material: Typically **Molybdenum (Mo)**, **Rhodium (Rh)**, or **Tungsten (W)** for producing low-energy X-rays optimized for soft tissue.

Filtration: Specialized filters (e.g., Mo, Rh, or Aluminum) match the target material to remove unwanted high-energy photons and harden the beam appropriately.



KEY EXPOSURE FACTORS

kVp (Kilovoltage Peak):

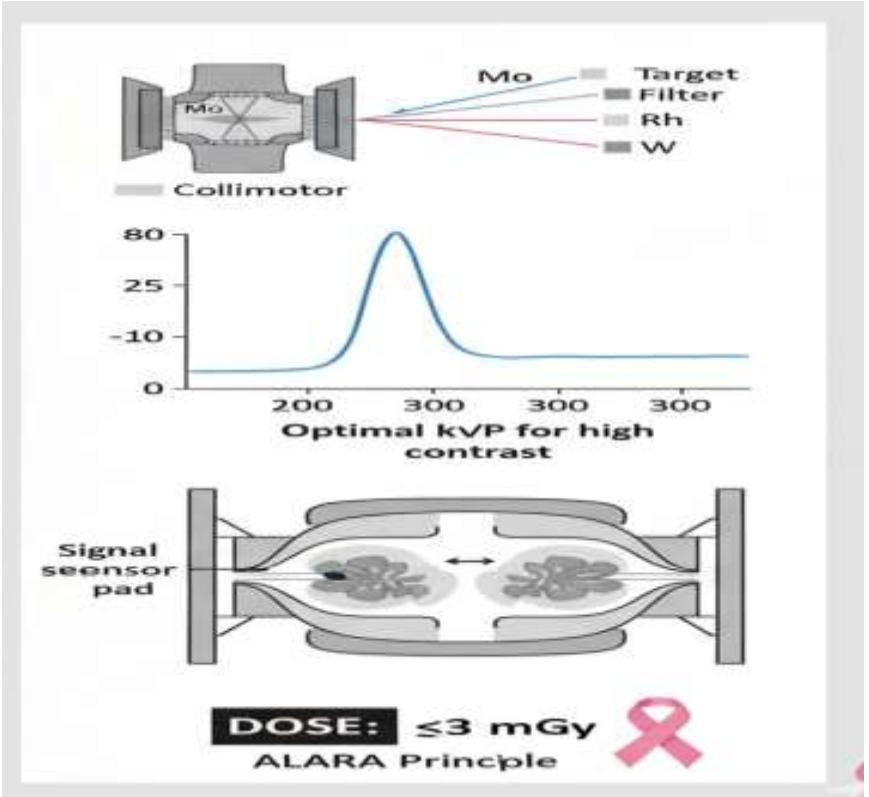
- Typically 25–32 kVp for optimal contrast in soft tissue.
- Lower kVp enhances contrast for calcifications and masses.

mAs (Milliampere-Seconds):

- Controls radiation dose and image density.
- Adjusted based on breast thickness and density.

Automatic Exposure Control (AEC):

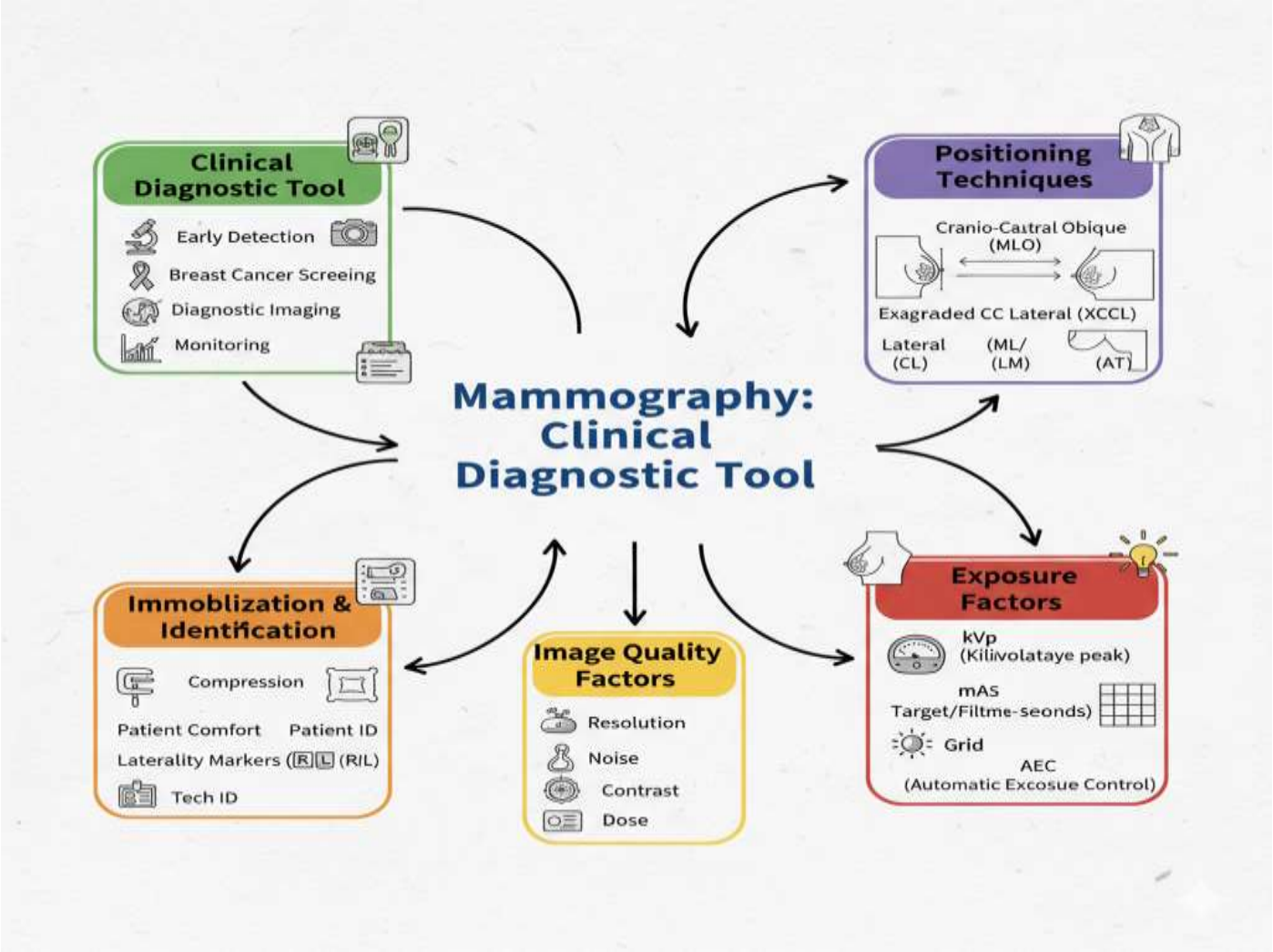
- Automatically adjusts mAs based on tissue density.
- Ensures consistent image quality while minimizing dose.



DOSE

The average glandular dose per view should adhere to the **ALARA** principle (As Low As Reasonably Achievable), typically limited to <3 mGy (milligray).

SUMMARY


Clinical Diagnostic Tool
Early Detection
Breast Cancer Screeing
Diagnostic Imaging
Monitoring
Positioning Techniques
Cranio-Caitral Obique (MLO)
Exagraded CC Lateral (XCCL)
Lateral (CL)
(ML/ (LM)
(AT)
Mammography: Clinical Diagnostic Tool
Immoblization & Identification
Compression
Patient Comfort
Patient ID
Laterality Markers (R L (RIL)
Tech ID
Image Quality Factors
Resolution
Noise
Contrast
Dose
Exposure Factors
kVp (Kiiivolataye peak)
mAS Target/Filtme-seonds)
Grid
AEC (Automatic Excosue Control)

References:

- **Mammography Quality Standards Act (MQSA) Regulations.**
- **Bushberg, J. T., et al. (2020). *The Essential Physics of Medical Imaging*.**
- **https://www.ncbi.nlm.nih.gov/books/NBK546557/**
- **https://pmc.ncbi.nlm.nih.gov/articles/PMC7187399/**