Top 10 Positioning Tips I Learned from the Mammo Queen

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Relevant Knowledge, Applicable Outcomes

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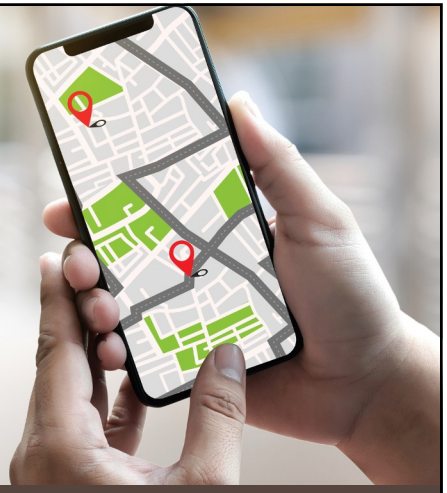
From Memorization to Real Understanding



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Scientific Data

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Evidence, Analysis, and Results

Source: Bassett et al., 1994, Huppe et al., 2017 and Pal et al., 2018

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	Bassett et al (1994)	Huppe et al (2017)	Pal et al (2018)
Objectives	Evaluate image quality & positioning for Film-Screen	Evaluate image quality & positioning of FFDM & DBT compared to FS	Achieve sustained improvement in mammography positioning
Modality	Film-screen	FFDM + DBT	FFDM + DBT
Method	• Hands-on instruction in standardized methods for breast positioning • Image evaluation after hands-on training • Agreed upon image criteria	• Hands-on instruction in *updated* standardized positioning training for FFDM & DBT • Image evaluation after hands-on training compared with FS data	• Established quantitative measures of positioning performance criteria • Positioning training, feedback and coaching
Key Insights	• Provides baseline, objective criteria for CC & MLO positioning quality • 68% improvement in image quality after standardized positioning training	• Updated FFDM & DBT standardized positioning training includes more breast tissue • Inclusion of more skin folds	• Applying structured QI framework shows meaningful improvements

Source: Bassett et al., 1994, Huppe et al., 2017 and Pal et al., 2018

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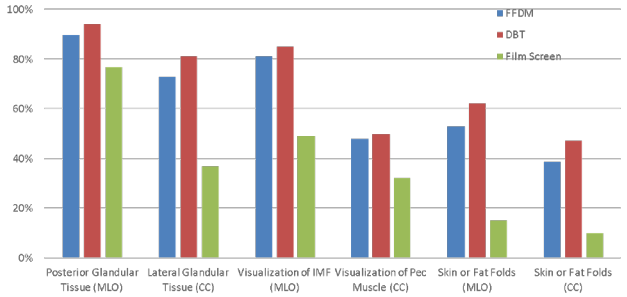
Criteria Met After Standardized Training*



Source: Huppe et al., 2017

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Standardized Positioning Techniques

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First Step to Final Image

- Each step matters
- Every step in the positioning method shapes the image produced
- Newton's Third Law: For every action, there is a reaction

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Quick Steps for the CC (Left)

___ 1. Elevate breast/IMF (until the PNL is perpendicular to the chest wall)
___ 2. Adjust IR height (so top edge is parallel with elevated IMF)
___ 3. Pull the breast onto the IR with both hands (left hand on top; right hand on bottom) and at the same time ask the patient to step forward into the machine (no leaning) and have them turn their face towards you
___ 4. Switch hands, so your right hand is on the top (palm down) and anchor the breast with the base of your right thumb.
___ 5. Lift the opposite/contralateral breast onto the IR with your left hand, palm facing up; then ask the patient to turn their right hip forward.
___ 6. Guide the patient's head forward and around the face shield, if possible
___ 7. Place your left elbow and forearm at the mid thoracic region (where their bra clasp would be) and gently push the patient forward
___ 8. Relax patient's left shoulder with your left hand, if possible
___ 9. Pull superior breast tissue forward by placing the base/edge of your right thumb on top of the breast against the chest wall, then apply compression while continuing to "push" the patient forward

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Source: Mammography Educators

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Quick Steps for the MLO (Left)

___ 1. Stand perpendicular to the patient with your sternum pressing against patient's right humerus
___ 2. Lift patient's left shoulder/arm up over the corner of the IR with your right hand in the patient's axilla. At the same time, your right hand should "meet" your left hand in the axilla and help to lift the patient's left shoulder up and over the IR
___ 3. IR is placed in back of axilla (just interior to latissimus dorsi)
___ 4. Patient's left hand should be resting on bar, with their elbow bent behind the IR
___ 5. Place your left hand on patient's left shoulder (if possible) to keep their shoulder relaxed and down
___ 6. Your right hand, with palm facing up, slides down lateral side of the breast to pull on lateral breast tissue and smooth out any skin folds
___ 7. Once your right hand is at the bottom of the breast, turn your hand over so that your hand is now palm down on the breast with the base of your thumb just anterior to the IMF
___ 8. Push the breast up and out with the base of your thumb, keeping continuous contact with the breast
___ 9. At the same, ask the patient to lift and flatten their other breast, as needed
___ 10. Continue to hold the breast in the up and out position until compression is complete

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Source: Mammography Educators

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Sound Ergonomics

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Common Work-Related Injuries

- Wrist problems
- Shoulder problems
- Back
- Knees
- Hips

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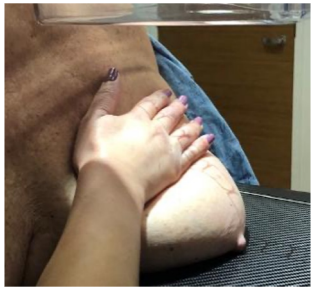
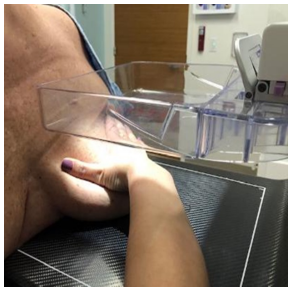
YES!!! NO!!!





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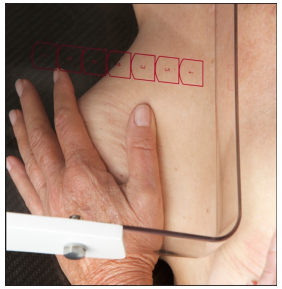
YES!!! NO!!!



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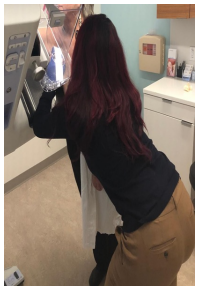
YES!!! NO!!!



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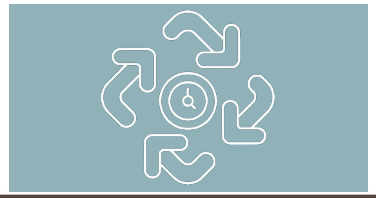
Consistency
and
Reproducibility



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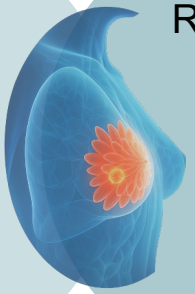
Consistency

- Doing the same thing the same way repeatedly
- Ensures dependable performance in daily practice
- Stability or uniformity of results



Reproducibility

- Others can obtain the same result by following the same process
- Ensures outcomes can be trusted, taught, and scaled
- Ability to obtain the same results again

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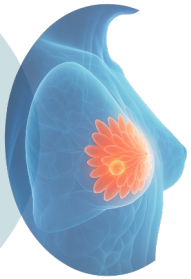
Variability

- Drives discovery in evaluating biologic changes
- Valuable when it is measured and understood
- Reveals truth and confidence in conclusions.
- ***Problematic with <u>poor protocol control</u>, <u>inconsistent methods</u>, and uncalibrated instruments***
  - ➢ ***Contributes to potential measurement errors.***



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Stöcker et al., 2025, Balagurunathan et al., 2014, and Ye et al., 2022

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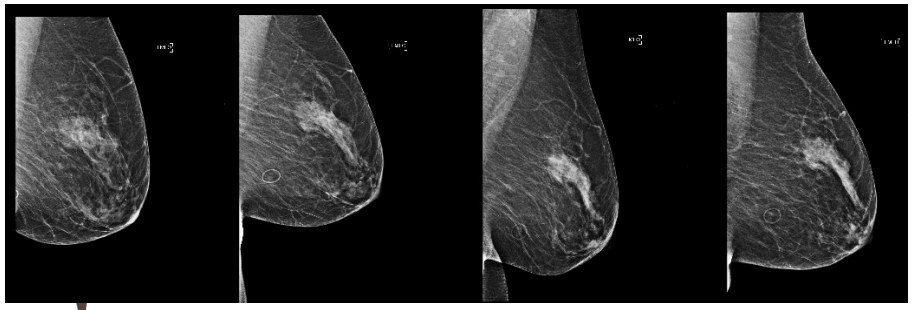
4 Different Years, Different Technologists



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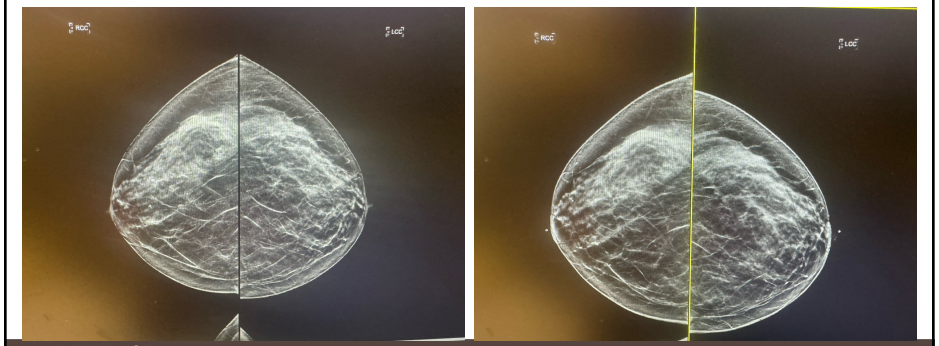
Consistency and Reproducibility
Different Techs — Different Years — Miller Method



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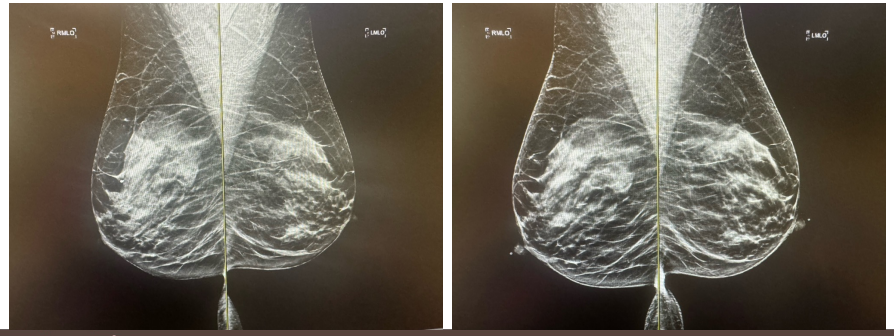
Consistency and Reproducibility
Different Techs — Different Years — Miller Method



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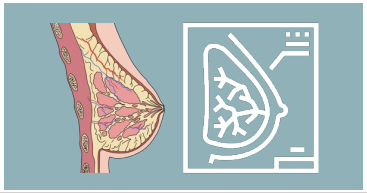
Breast MAP:
Correlational
Anatomy



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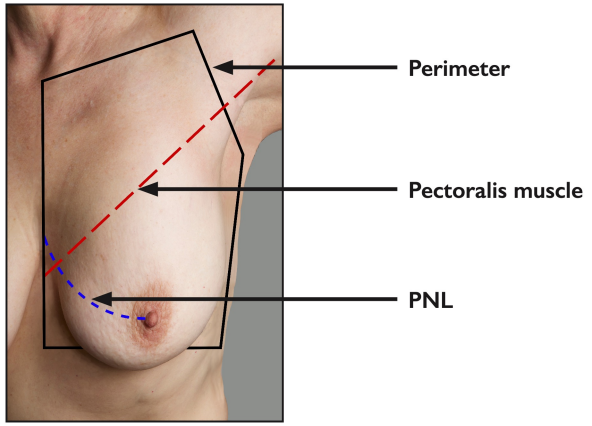

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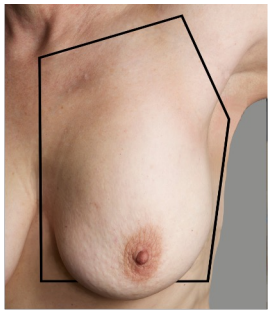
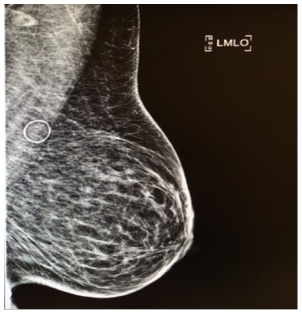
Perimeter Used for Positioning and Clinical Image Analysis





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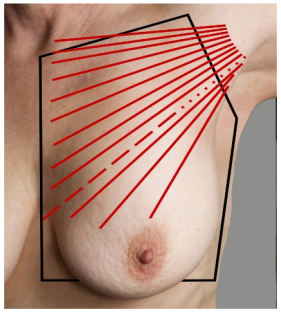
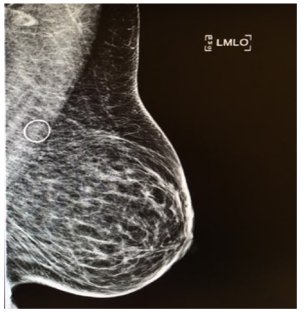
Pectoralis Used for Positioning and Clinical Image Analysis





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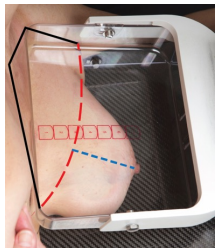
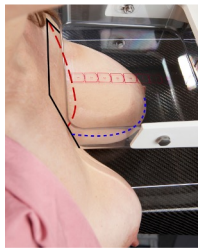
PNL Used for Positioning

Elevate the breast so that the PNL is as close as possible to perpendicular to the chest wall.





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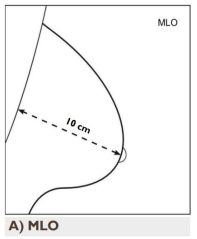
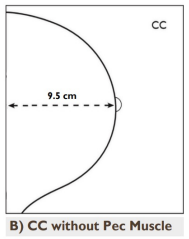
PNL Used for Clinical Image Analysis

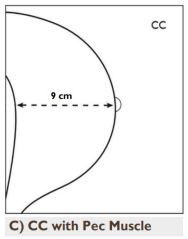
PNL measurement of CC should be within 1cm of the PNL measurement on the MLO.



A) MLO



B) CC without Pec Muscle



C) CC with Pec Muscle

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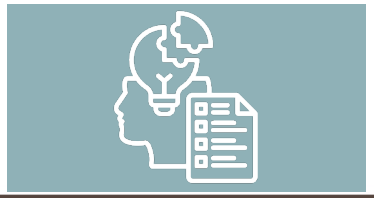
Problem-Solving
MLO View



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TWO Margins for Error

There are only two margins for error:

1. The way the machine is set up (i.e., height, angle, compression paddle size, etc.)
2. The way the patient is "set up": both feet, hips and shoulders facing forward

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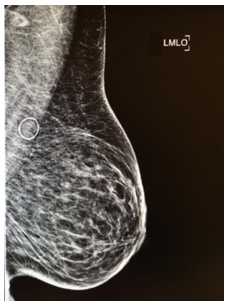
The MLO

Visualization of the pectoral muscle:

- *Width:* wide margin at the top
- *Length:* down to the level of the PNL
- *Shape:* convex/straight



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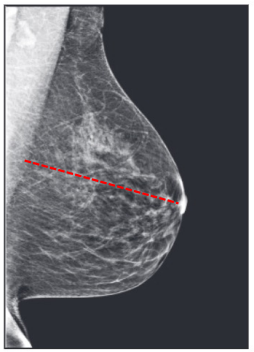
The MLO

LENGTH of the Muscle

Should be visualized down to the level of the PNL.



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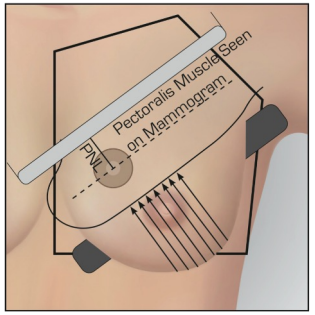
The MLO

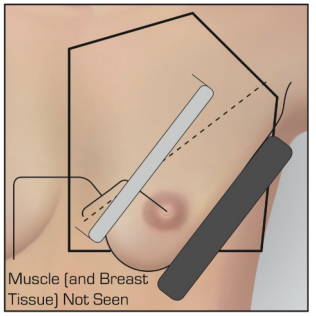
EQUIPMENT: Angle for the MLO

- Angle to the free margin of the pectoralis muscle
- Keep angulation consistent
- Steeper angle for patient with longer thoraxes and small breasts
- Lesser angles for shorter thoraxes and larger breasts

Proper Degree of Angulation



Angle Too Steep



Recommended Angulation for MLO

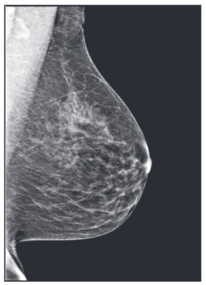
- Depends on body habitus
- Maintain consistency from year to year*
- Use 5-degree increments:
  - 40 degrees for shorter, heavier patients with large breasts
  - 45 degrees for average patients
  - 50 degrees for tall, thinner patients with smaller breasts
  - 35 degrees for patients who have undergone reduction

The MLO

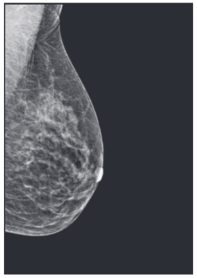
PATIENT: Length of the muscle is related to the position of the patient.

The patient must be turned into the machine with both feet, hips and shoulders as far forward as possible, as not to impede the progress of the compression paddle.

Proper Degree of Angulation



Angle Too Steep



OR…

The patient is not facing the machine properly

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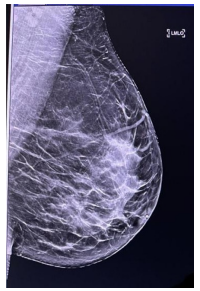
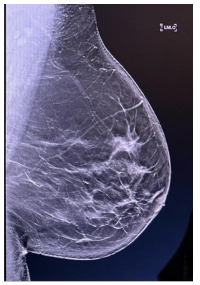
The MLO — **IMF**

NO IMF



IMF



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The MLO

The position of the patient related to the bottom; front corner of the IR is critical.

- Patient must be facing forward with both feet also forward.
- Lower, front corner of the IR should be directly below the patient's nipple or halfway between their ASIS and umbilicus.
- This requires the patient taking a sidestep towards you.

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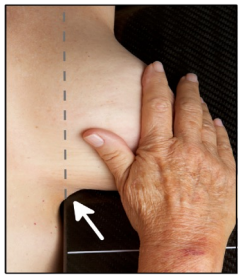
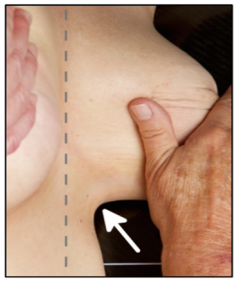
Improper

Edge of IR in front of IMF



Proper

Edge of IR behind IMF



Top edge of IR indicated by vertical dotted line.

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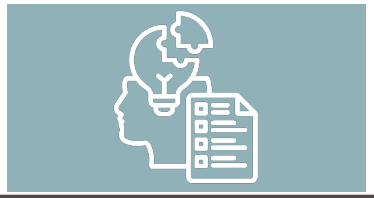
Problem-Solving
CC View



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The CC

Is it the equipment or the patient?

Equipment:
- IR too high or too low
- Compression paddle size

Patient:
- Facing towards the machine with both feet, hips and shoulders forward

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The CC

- Common problems:
  - Short CC (PNL measurement on CC is less than 1 cm of PNL measurement on the MLO)
  - No pec muscle (remember the 50% rule!)
  - No visualization of deep medial breast tissue (cleavage)
- All are most often related to positioning technique vs equipment and patient position. (Although they are still important!)

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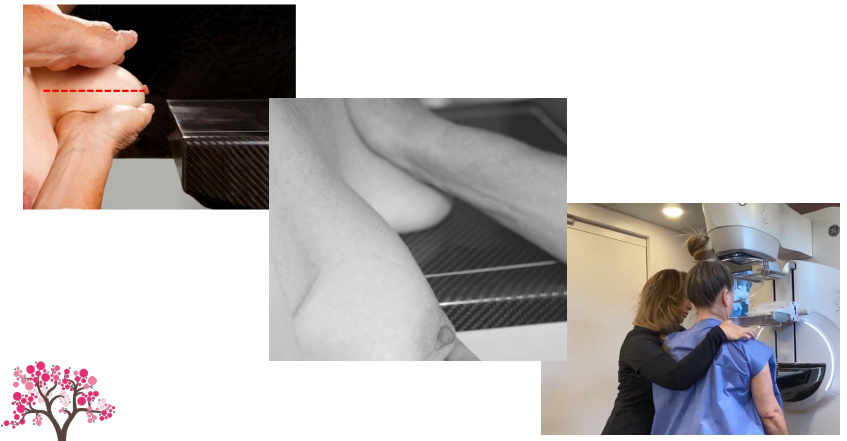

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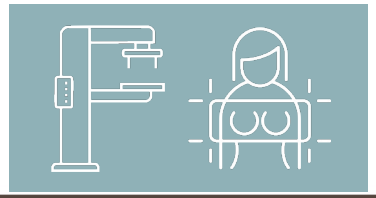
Supplemental Views



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Why Do Supplemental Views?

To show a specific component of the anatomy not seen on a standard view:

- Region of the breast is cutoff one of the standard 4 views
- Special patient or clinical circumstances
- Counteract superimposition of structures

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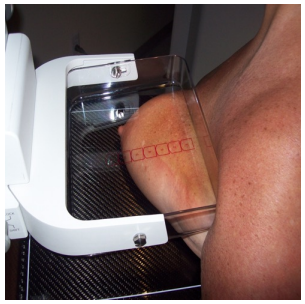
XCCL

- **Machine:**
  - **0-degree** angle
- **Patient:**
  - Patient positioned in the CC position
  - Turn the patient approximately 45 degrees to the IR
  - Do not lean the patient
- **Breast:**
  - Nipple is pointing towards opposite front corner of IR



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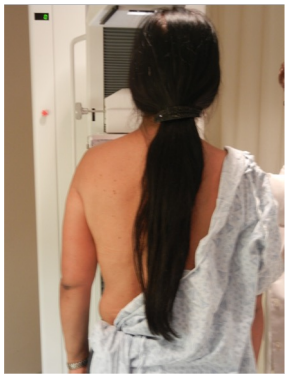
Incorrect

Correct



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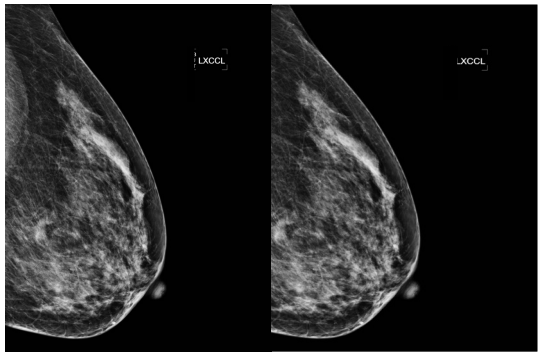
Pectoralis Muscle or NO Muscle?



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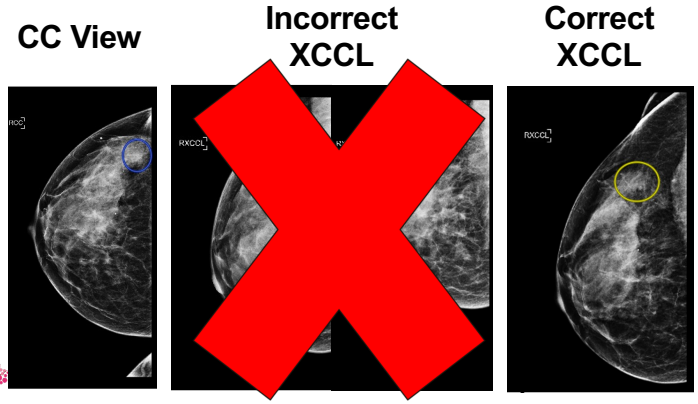

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XCCL — Exaggerated Craniocaudal Lateral

- Should NOT be performed routinely as part of the standard four view mammogram.
- Baseline exams: visualization behind the lateral glandular tissue must be visible on **both** the CC and the MLO views.
- Subsequent exams: visualization behind the lateral glandular tissue must be visible on **one** of the two standard views, either the CC view or the MLO view.

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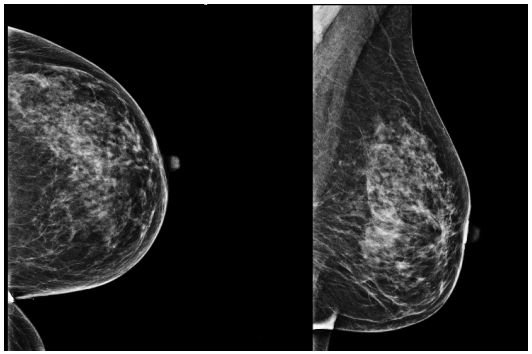
Should an XCCL View be performed?

- Baseline Screening Examination? No prior comparison available
  - **YES?**
  - **NO?**
- Subsequent Screening Exam-Comparison is available?
  - **YES?**
  - **NO?**



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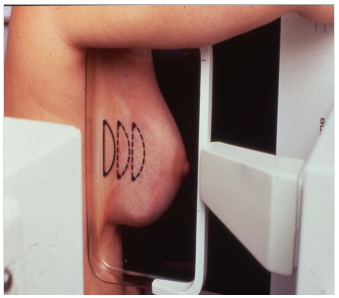
XCCL

How often should XCCL views be performed on screening exams?

- Cardenosa, 1997
  - Less than 10%
- Updated data needed
  - Less than 5%

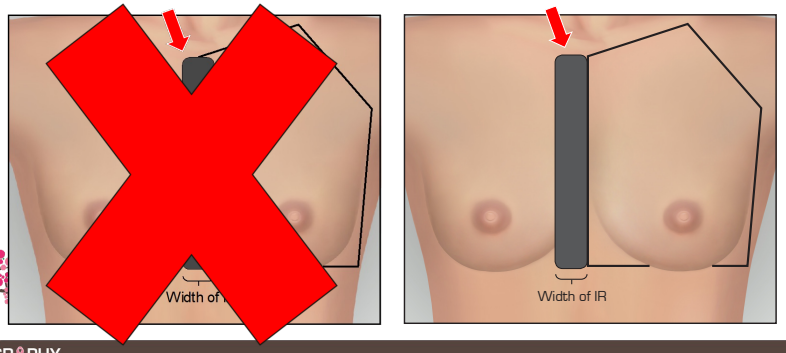
90 Degree/Straight Lateral View

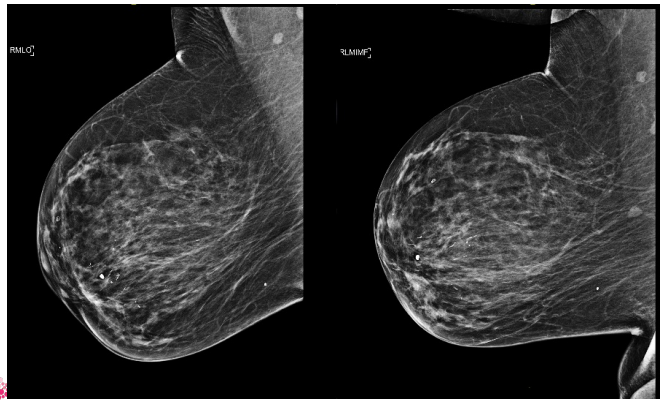
- **Machine:**
  - **90-degree** angle
- **Patient:**
  - Facing the machine with feet, hips and shoulders forward
  - Arm up resting on machine
- **Breast:**
  - Pull breast tissue onto the IR

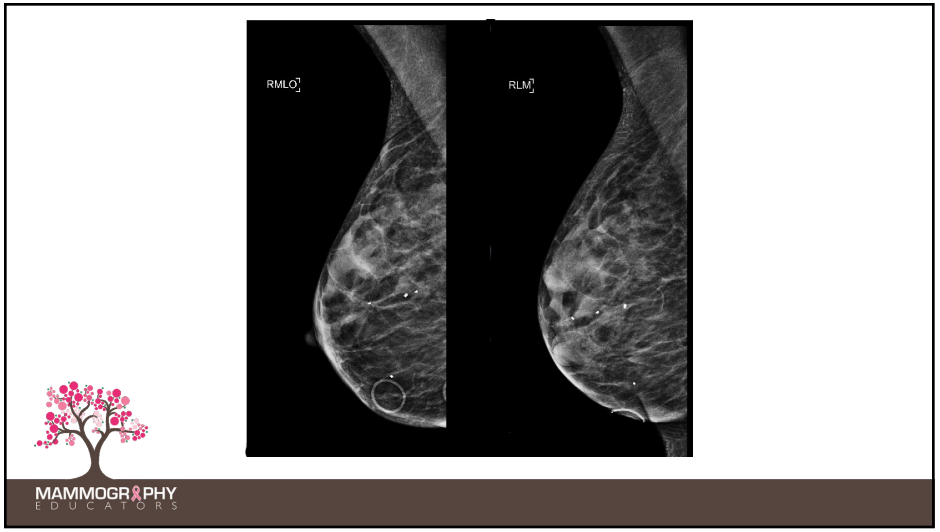


LM — Lateromedial

Properly positioned LM with breasts separated so *top edge of the IR* is centered on midsternal line and the width of the IR pressing against the contralateral breast.



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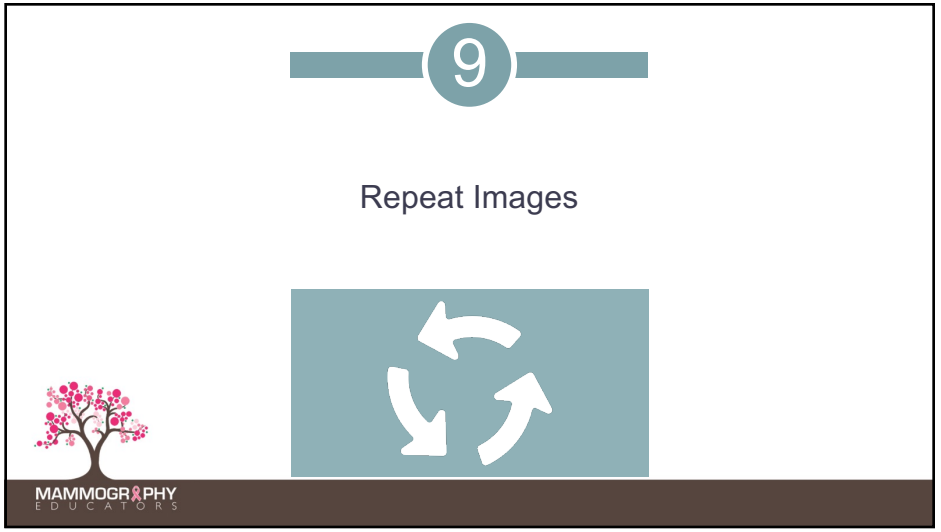
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Repeat Images
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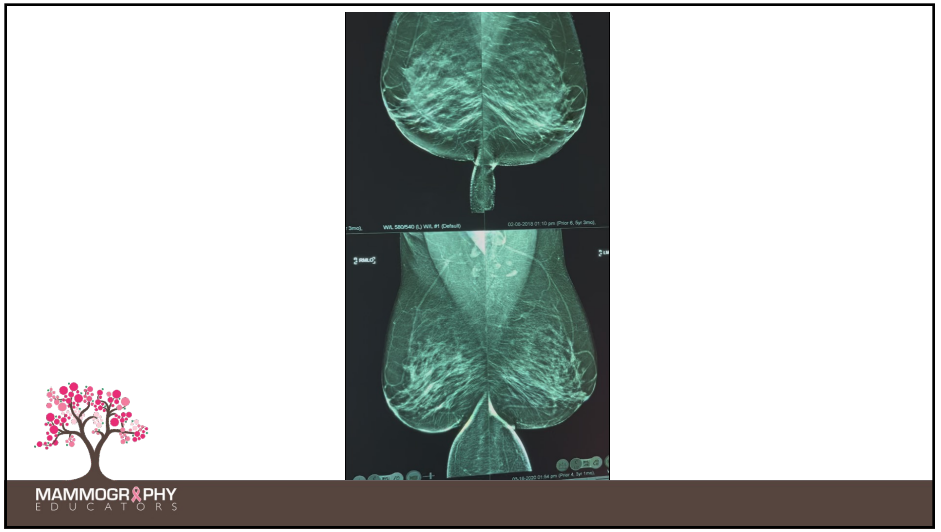
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To Repeat or Not To Repeat??

- Is this impeding diagnosis?
- Am I missing tissue?
- Are there patient limitations inhibiting me from acquiring necessary tissue?
- Is this going to increase cancer detection?

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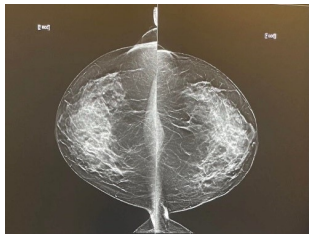
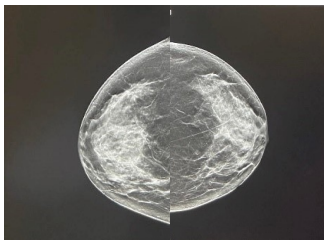
Meet, Beat, Repeat



Year 1



Year 2

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It's ***all*** about the
PATIENT

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Challenging Situations

"Is this all you do ALL day long?"

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Challenging Situations

Suggested Response: *"Yes it is. I am proud to have this opportunity to provide this service to women."*

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Challenging Situations

NOTE: This is *NOT* about *YOU*, so don't take it personally. Usually, individuals will "turn around" if you communicate and acknowledge their feelings.

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