Find It and Fix It: Mammography Positioning Solutions

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Thank you!

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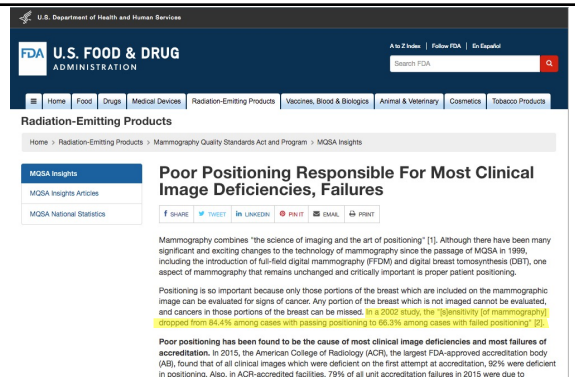

Failed positioning decreased the sensitivity of mammography by 18.1%.

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Source: FDA

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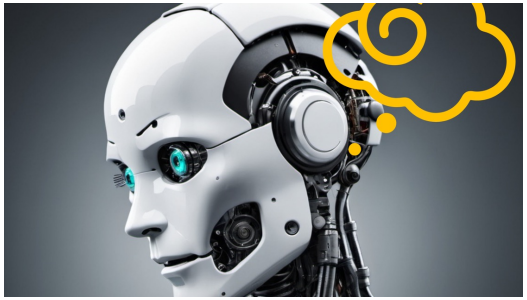

Source: AI Thinking

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Source: Augusto Tomas

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SBI2025 BREAST IMAGING SYMPOSIUM

societyofbreastimaging BreastImaging sbi-breastimaging breastimaging #SBI2025

- 2 lectures and data were presented by international, highly esteemed breast imagining radiologists
- Data clearly demonstrated that the use of AI **with technologist education (suggested corrective actions)** had a positive effect on image quality (positioning)

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What's the Problem and How Do I Fix It?

- MLO
- CC

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There are only **2** factors that cause positioning problems that result in insufficient images.*

1. **EQUIPMENT**: The way the machine is set-up – height of the IR, angle and compression paddle size
2. **PATIENT**: The way the patient is "set-up" – both feet, hips and shoulders facing forward (for all views except the XCCL), shoulder relaxed, elbow bent behind the IR

**Excluding patient limitations*

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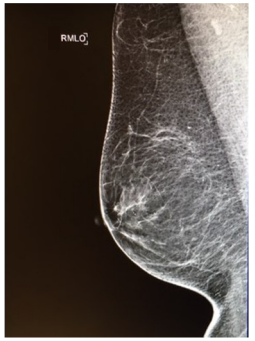
The MLO

- Inclusion of all breast tissue within perimeter
- Pectoral muscle fully visualized
- Tissue well separated
- Tissue visualized back to retromammary fat space
- IMF



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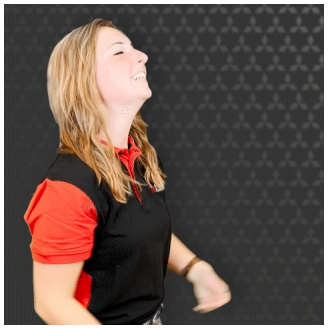
It's All About the Pec….



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The MLO

Visualization of the pectoral muscle:

- The pectoralis muscle is not really part of the breast
- However, it serves as an important anatomical landmark used for positioning and clinical image evaluation

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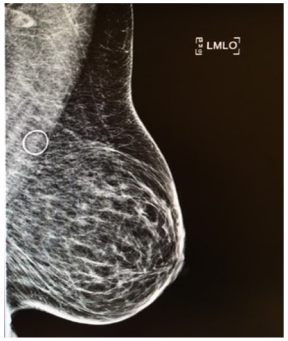
The MLO

- **Width/horizontal distance:** wide margin at the top (axilla)
- **Length/vertical distance:** down to the level of the PNL
- **Shape:** convex/straight



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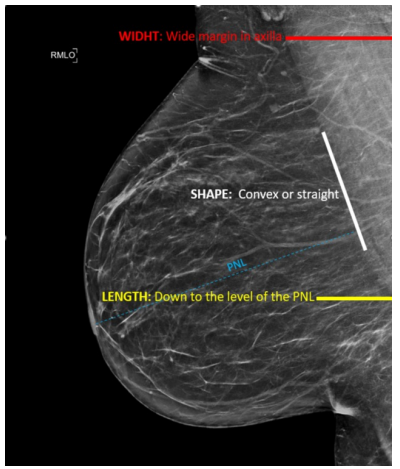

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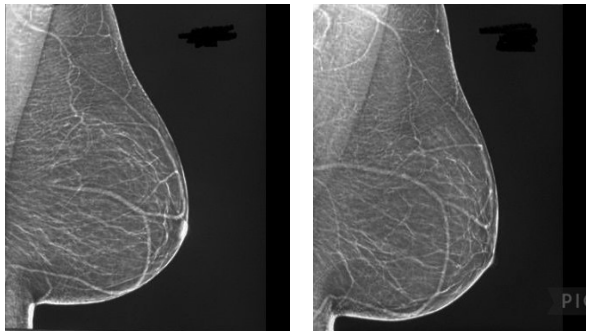
FIND IT:
Narrow vs. Wide Muscle



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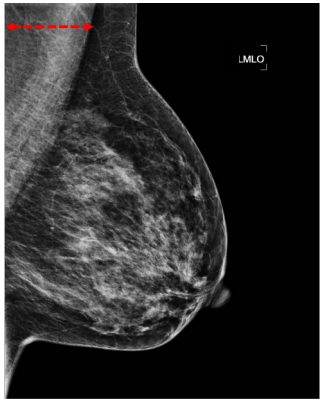
WIDTH/HORIZONTAL DISTANCE OF MUSCLE

There should be a wide margin of the pectoralis muscle at the top of the image (in the axilla).



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FIX IT!

EQUIPMENT: Width of the muscle is related to placement of the IR in the axilla.

The back corner of the IR should be placed just anterior to the latissimus dorsi.

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FIX IT!

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

The patient must be turned into the machine with both feet, hips and shoulder as far forward as possible, with the shoulder down, relaxed and pulled forward and can be held in position by the technologist (if possible)

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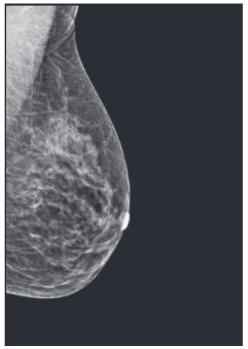
FIND IT:

Short Muscle



Adequate Muscle

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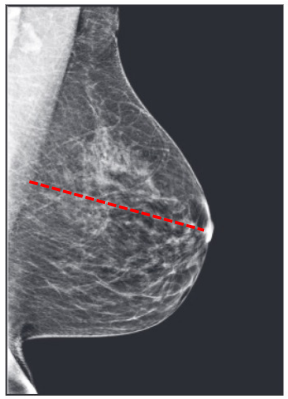
LENGTH/VERTICAL DISTANCE OF MUSCLE

Should be visualized down to the level of the PNL.



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FIX IT!

EQUIPMENT: Angle for the MLO

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

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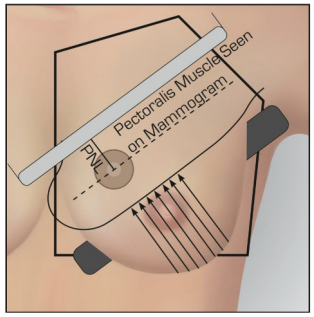
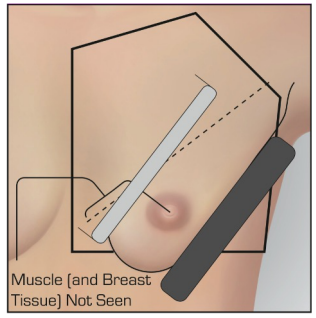
Proper Degree of Angulation



Angle Too Steep



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Recommended Angulation for the MLO

- Depends on body habitus
- Maintains consistency from year to year

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Keep Angles Consistent

- 40 degrees for shorter, heavier patients with large breasts
- 45 degrees for average patients
- 50 degrees for tall, thinner patients with small breasts

*35 degrees for patients who have undergone reduction

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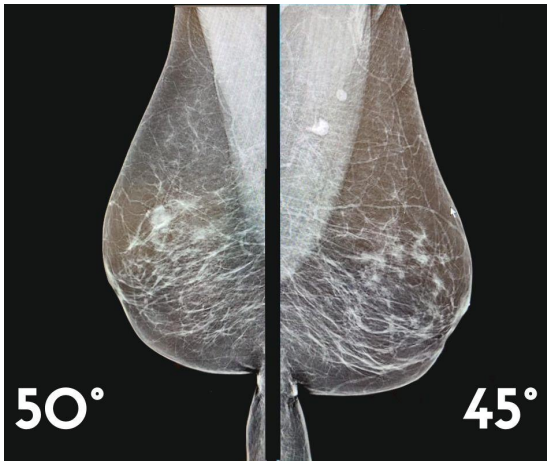

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Keep Angles Consistent

- Use variations of 5-degree increments
- No more 47, 42, 48, 53 etc.

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Keep Angles Consistent

- I am not saying to NEVER use 35 or 55, but try to keep it consistent so comparison is easier from year to year
- An MLO angled at 56-degrees one year will look markedly different than an MLO angled at 42-degrees the next year

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FIX IT!

PATIENT: Length of 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 progress of the compression paddle.

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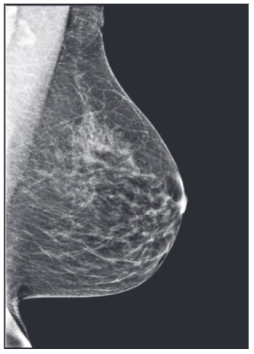
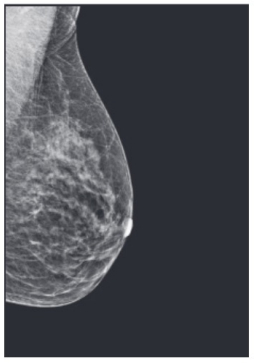
Proper Degree of Angulation



Angle Too Steep



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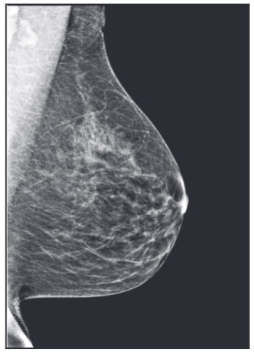
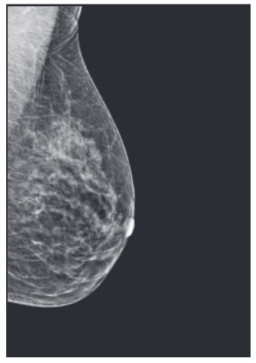
OR… the patient is not facing the machine properly.





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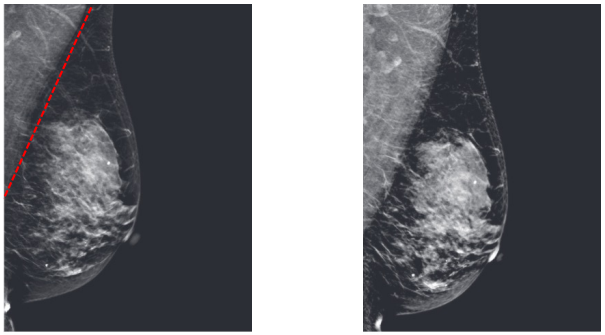
FIND IT!

Concave vs. Convex



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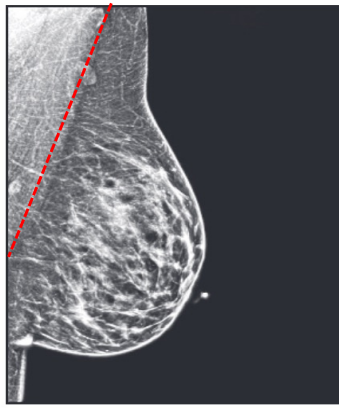
SHAPE AND OPACITY OF the MUSCLE

The muscle should be convex or straight.



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FIX IT!

EQUIPMENT: The shape and opacity of the muscle is related to the height of the IR.

The top of the IR should be positioned at the height of the sternoclavicular joint, or halfway between the top of the shoulder and axillary crease.

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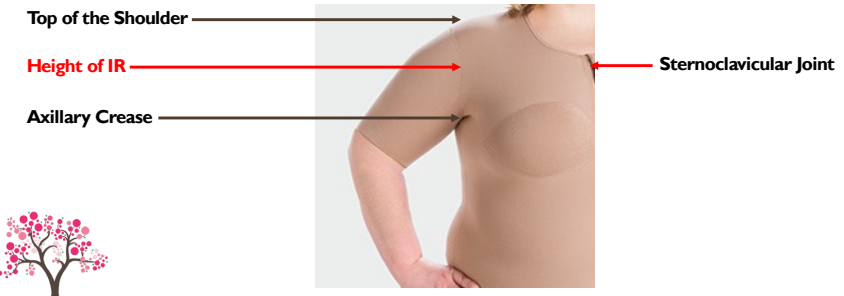
FIX IT! Height of the IR



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Source: Juzo

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FIX IT!

PATIENT: The shape and opacity of the muscle is related to relaxation of the pectoralis muscle.

The patient's shoulder and hand must be relaxed with their elbow bent and behind the IR.

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FIND IT: Problems with the MLO

- No/poor visualization of the IMF
- Folds in the IMF
- Breast drooping
- Breast not centered

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FIND IT: Problems with the MLO

- **No/poor visualization of the IMF**
- Folds in the IMF
- Breast drooping
- Breast not centered

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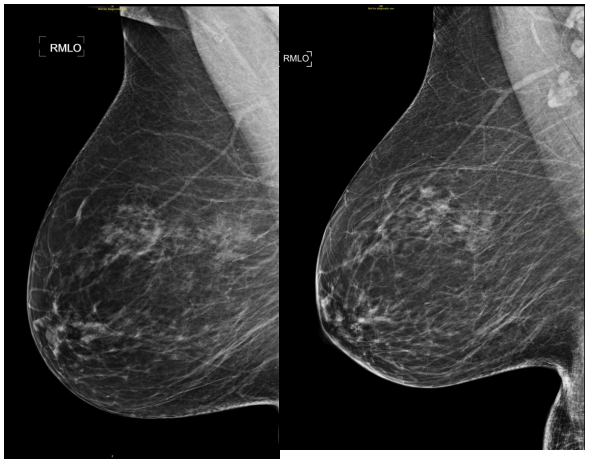

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FIX IT!

The position of the patient related to the bottom, front corner of the IR is critical:

- Patient must be facing forward with both feet forward
- Lower front corner of the IR should be directly below the patient's nipple (VNL) or halfway between the ASIS and umbilicus
- This requires the patient taking a "side step" towards you

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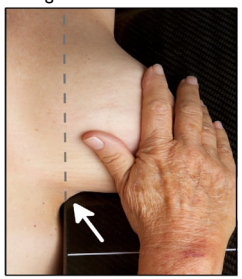
Improper

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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FIND IT: Problems with the MLO

- No/poor visualization of the IMF
- **Folds in the IMF**
- Breast drooping
- Breast not centered

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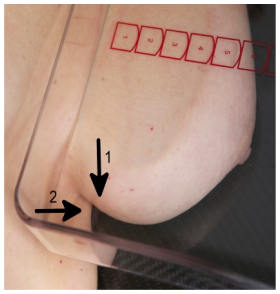
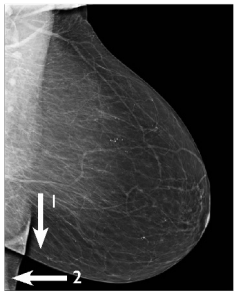
FIND IT: Folds in the IMF





1. Horizontal fold is in the medial breast
2. Vertical fold is in the lateral breast

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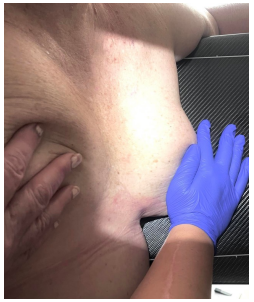
FIX IT!

Have the patient lift and flatten their other breast.



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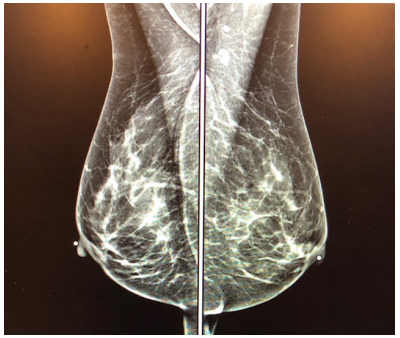
FIND IT: Vertical Folds in the Lateral Breast



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FIX IT!

The technologist's hand must slide down the lateral side of the breast.

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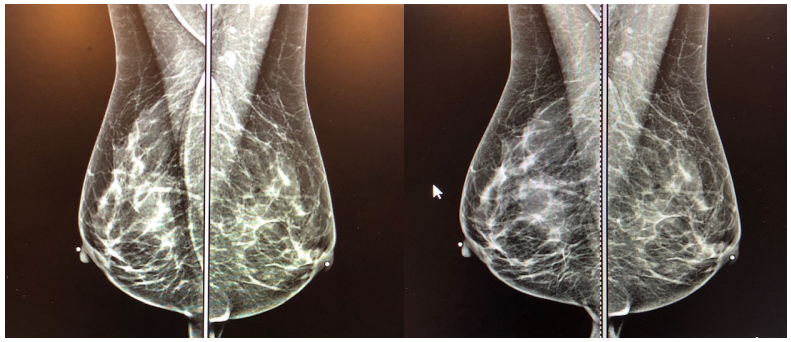

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FIND IT: Problems with the MLO

- No/poor visualization of the IMF
- Folds in the IMF
- **Breast drooping**
- Breast not centered

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FIND IT: The "Sagging Breast"

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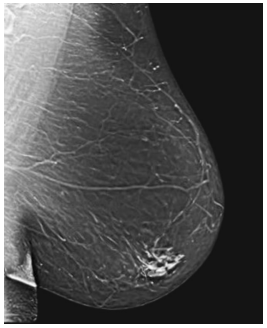
The "Sagging Breast"



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The "Sagging Breast"

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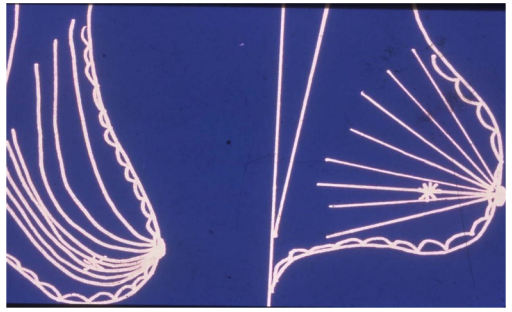
The "Sagging Breast"



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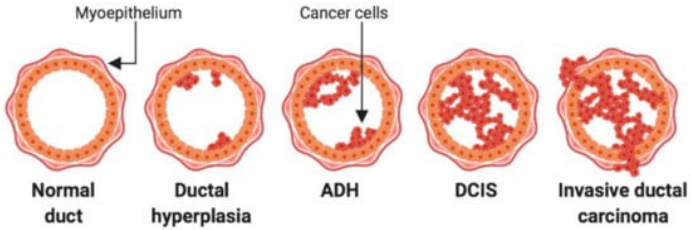
Stages of Breast Cancer Development



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FIX IT!

The position of the breast:

- Breast held in the "up and out" position to bring back to its "normal" position (nipple perpendicular to the chest wall)
- Maintained by adequate compression
- Have the patient lift and flatten the contralateral breast

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FIX IT!

Maintain breast in the "up and out" position*:

- Keep the nipple as close as possible to perpendicular to the chest wall
- Don't let go of the breast until compression is complete

*This will help eliminate the "sagging breast."

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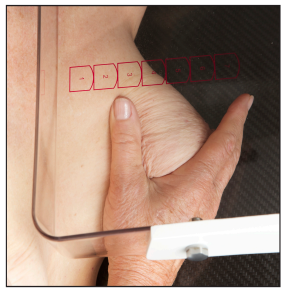
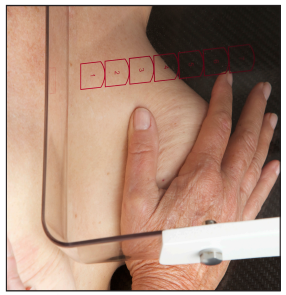
FIX IT!



Hold the breast in up and out position.



Compress.

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FIX IT!
"Knuckle Table"

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FIND IT: Problems with the MLO

- No/poor visualization of the IMF
- Folds in the IMF
- Breast drooping
- **Breast not centered**

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FIND IT: Breast Not Centered on MLO (Too Much Abdomen)

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FIX IT!

- Large compression paddle is needed for the CC, due to the width of the breast
- If the patient has a short thorax, the compression paddle should be changed to the small size for the MLO

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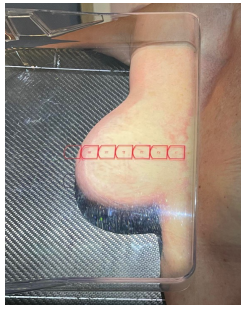
FIX IT!



24x30

18x24

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FIX IT! Solution for Breast Not Centered

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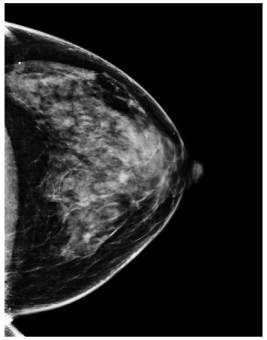
The CC

- Include maximum amount of breast tissue in the axial/transverse plane
- Visualization of medial breast tissue (cleavage) if possible
- Visualization of pectoralis muscle on approximately 40-50% of all CCs
- PNL within 1cm of PNL on the MLO



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FIND IT: The "Short" CC

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It's NOT All About the Pec…

- Pec muscle can be included if leaning the patient forward or having them bend at the waist but…
- It's more about the PNL

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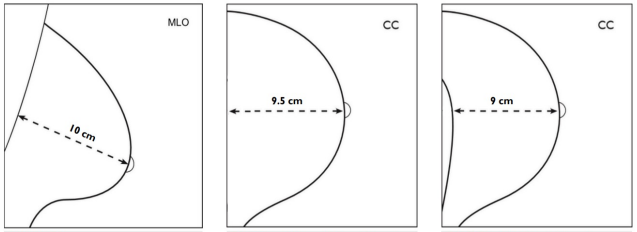
How to Measure the PNL

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



A) MLO | B) CC without Pec Muscle | C) CC with Pec Muscle

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Source: Mammography Educators

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Is it the Equipment or the Patient?

The Equipment:

- IR too high or too low
- Compression paddle size

The Patient:

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

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Due to lack of anatomical landmarks, positioning techniques are extremely important!!

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Standardized Positioning Method

- Elevate the breast to the correct height
- Pull the breast onto the IR with both hands
- Anchor the breast
- Lift the contralateral breast onto the IR
- Push the patient in with your elbow/arm
- "Crawl" up on the chest wall to include more pec muscle

Source: Mammography Educators

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FIX IT!

1. Elevate the breast until the PNL is perpendicular to the chest wall
2. Elevate the height od the top of the IR to the level of the elevated IMF
3. Pull the breast onto the IR with both hands
4. Anchor the breast with the base of your thumb
5. Gently push the patient forward (at the mid-thoratic region) with your elbow

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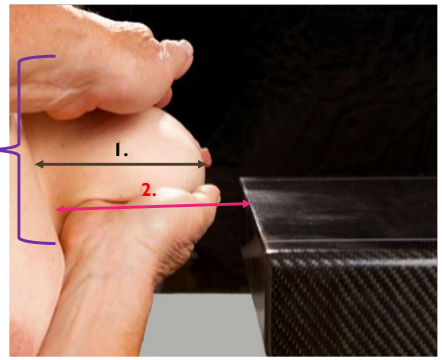
FIX IT!



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FIX IT!

4. Anchor the breast

5. Push the patient forward

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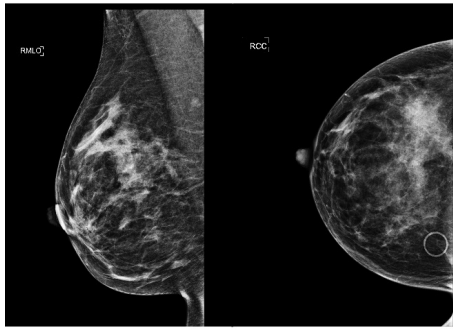
Find It: Missing Posterior Lateral Breast Tissue



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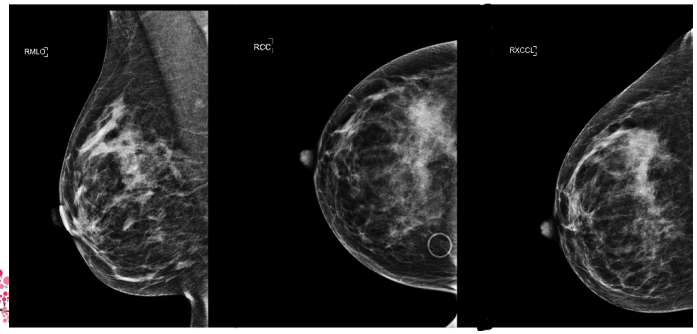
Fix It! Use of the XCCL



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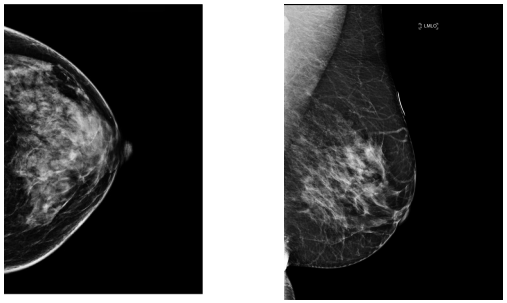
Subsequent Screening Mammogram
No XCCL Needed!



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Use of the XCCL – Standard of Care

- XCCLs should be done on *baseline* mammograms when posterior breast tissue is excluded on the CC
- On subsequent screening mammograms, if glandular breast tissue is imaged back to the retromammary fat space an XCCL *does* ***not*** need to be done
- *There is no data that shows that the use of XCCLs for screening finds more breast cancers*

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Repeat or Recall?

- AI makes a case-wise repeat/recall suggestion, just like asking a radiologist/colleague or a second opinion
- Provides suggestions for improvement (drop down menus/videos)
- Decreases recalls
- Improves image quality!!

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Ask Yourself:

"Will this impede diagnosis?"

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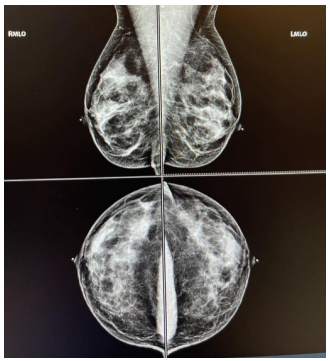
ACR Accreditation: Perfect!!



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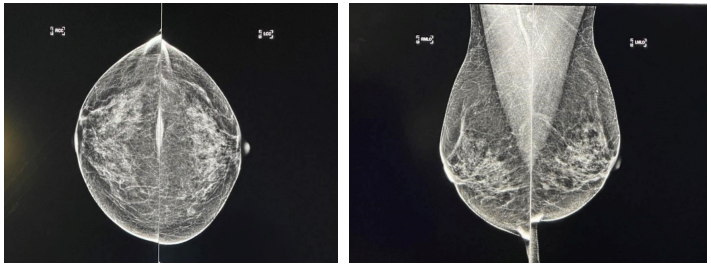
Meets Image Quality Standards



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ACR Accreditation Images vs. Diagnostic Quality Images

- ACR accreditation images are examples of your BEST work! (8 images out of 40,000 = 0.0002!!!)
- "Every day-real life" images are rarely perfect and should be evaluated for their diagnostic quality before repeating
- Screenings are meant to be 4 views
- Consider additional (often unnecessary) radiation exposure!

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THE BOTTOM LINE:

AI That Includes Solutions for Problem Solving Improves Image Quality!

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"It's not a matter of if……it's a matter of when"

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A New Adventure!!

- AI, just like a train station or airport, is meant to help us on our journey
- It is a means to an end
- Helps us go and see beyond our own borders
- Give us the ability to use of tools/technology *and* imagination/inspiration
- Improves image quality and SAVES MORE LIVES

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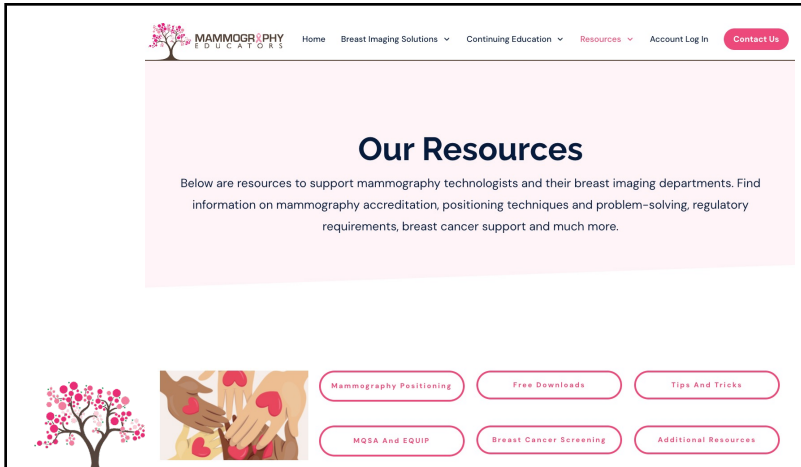

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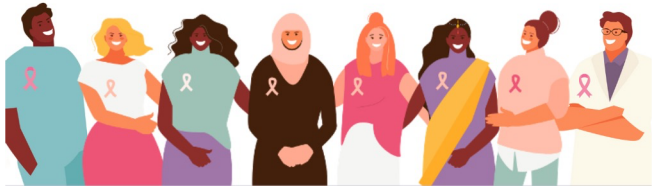

Interact with Breast Imaging Professionals from Around the World

Join our Facebook Group:

Quality Breast Imagers

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Find It and Fix It: Mammography Positioning Solutions
(Part 2)

Gina Arnold, MPH, R.T.(R)(M)
Senior Technologist, Women's Imaging, St Luke's University Health Network

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St. Luke's University Health Network

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About Us

15 SITES

71 TECHNOLOGISTS

78,000 EXAMS PERFORMED ANNUALLY

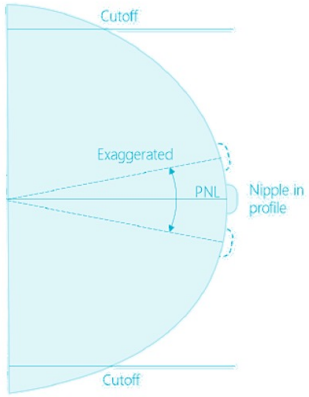
3

Quality

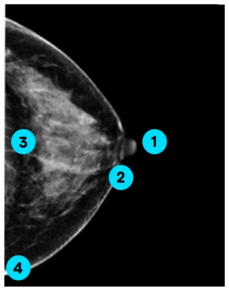
- Our network focuses on quality
- If we don't image all the tissue, the radiologist can't read it
- Leadership strives for staff education and development
- Using tools that provide feedback and learning opportunities

4

AI Metrics



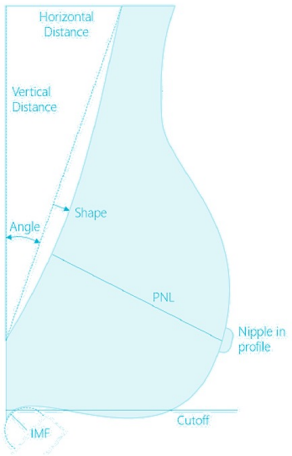
Volpara TruPGMI Metrics for CC View



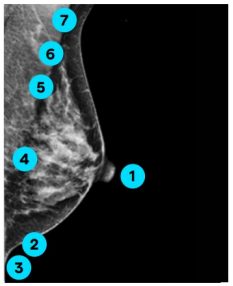
1 Nipple in profile
2 Nipple in midline of imaged breast
3 Posterior nipple line (PNL) within 1 cm of PNL on MLO view
4 Breast tissue has no cutoff

5

AI Metrics



Volpara TruPGMI Metrics for MLO View



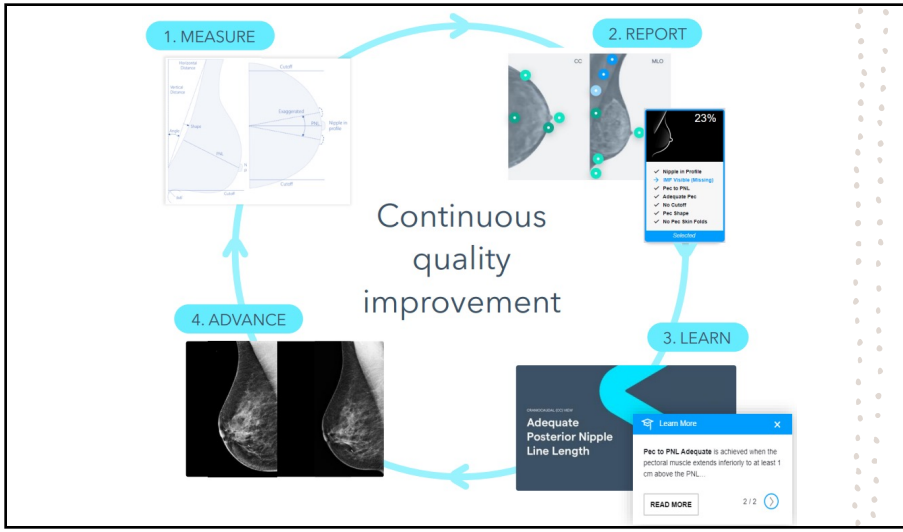
1 Nipple in profile
2 Inframammary fold (IMF) visible
3 Inferior breast tissue has no cutoff
4 Pectoral muscle length
5 Pectoral muscle shape
6 Pectoral muscle adequacy
7 No pectoral skin folds

6

Continuous Quality Improvement

- Objective Performance Results
- Education – video tutorials, resources
- Skills advancement
- Individual, site, system wide statistics
- Better patient outcomes
- Consistency of care throughout the network

7



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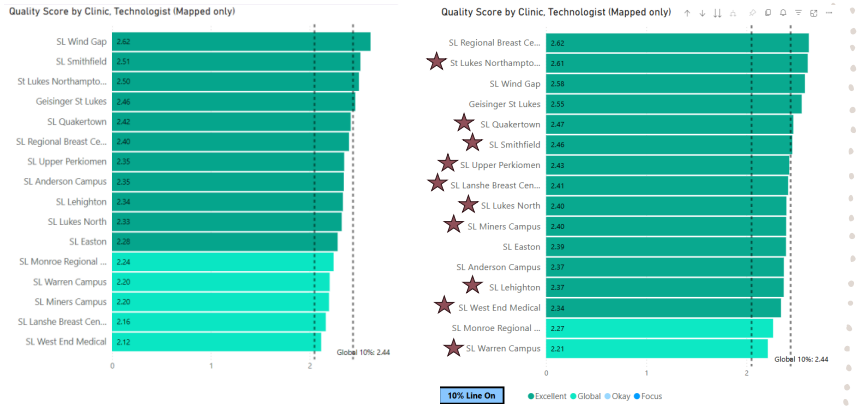
Pre-Hands on Training
Data sent on Sept 20th, 2024

Post Hands on Training
Dec 16th, 2024- April 2nd, 2025



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OJT program

- 13 techs have enrolled – 9 have passed their boards
- Use AI to provide real time feedback on image critique and discussion
- Evaluate comparison studies
- Training the next generation and passing on the commitment to high quality images

10

Bravo

- Encouragement for the team
- Recognition of a job well done
- Staff earn points and can cash in for swag or gift certificates

11

YOU Make a Difference

- Talk to your lead technologist/ supervisor/ manager about an incentive program
- What are ways that you can help your time improve images?
- Work together and brainstorm ideas of how to enhance your department's quality

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Thank You!

Services we offer, include:

- Onsite Positioning Training
- Assistance with Accreditation & Inspection
- Live Webinars and Conferences
- On-Demand Continuing Education

For questions or more information:

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mammographyeducators.com
info@mammographyeducators.com

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