


What's Wrong with this Picture? Positioning Problem-Solving

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Back to the Basics


Going back to the basics strengthens your foundation.



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ANATOMY - PHYSIOLOGY - PHYSICS



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You lucked out... NO physics!





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Except... Sir Isaac Newton's Laws of Motion

- For every action, there is a reaction
- What goes up, must come down




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Anatomy and Physiology

As they relate to mammography positioning, using general radiology principles...




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Goals for Mammography Positioning


- Bring the breast back to its true anatomical position
- Use palpable and visible anatomical landmarks for positioning and clinical image evaluation
- Use consistent and reproducible methods



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The goal for **ALL** positioning should be to bring that part back to its natural anatomical position and perform orthogonal views. This maximizes visualization of that body part and avoids superimposition of structures.



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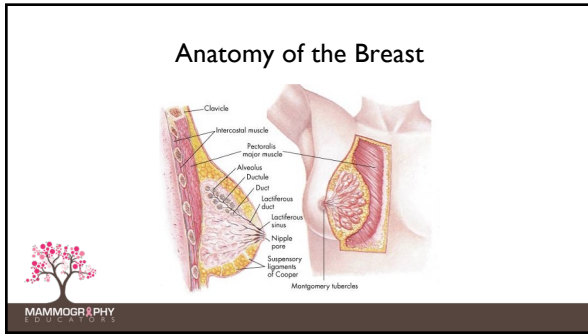
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The goal for **mammography** positioning should be to bring the breast back to its natural anatomical position (with the nipple perpendicular to the chest wall) on both screening views to maximize visualization of breast tissue and to avoid superimposition of structures.

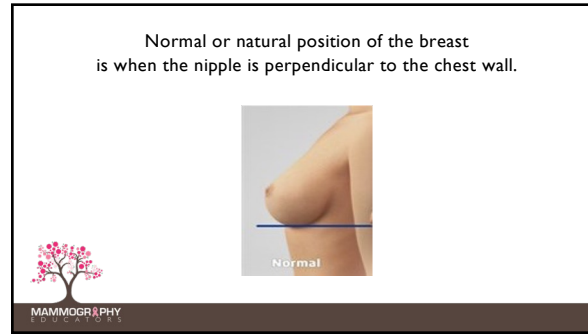


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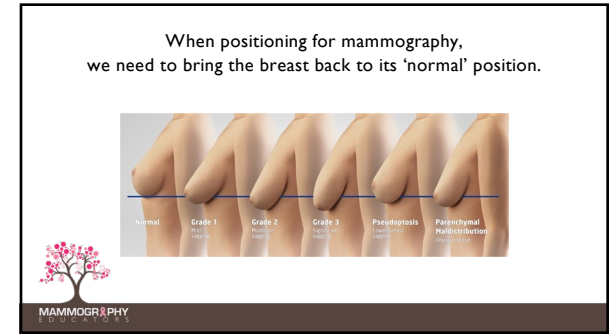
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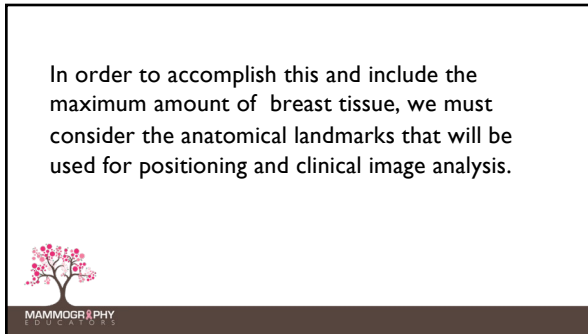
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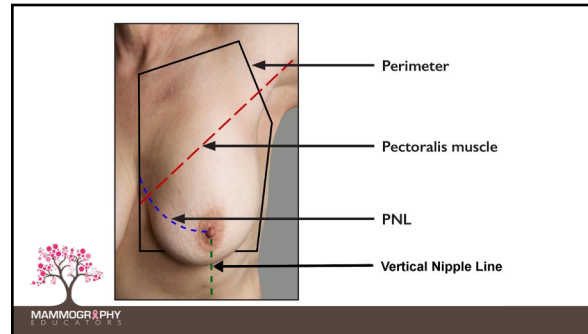
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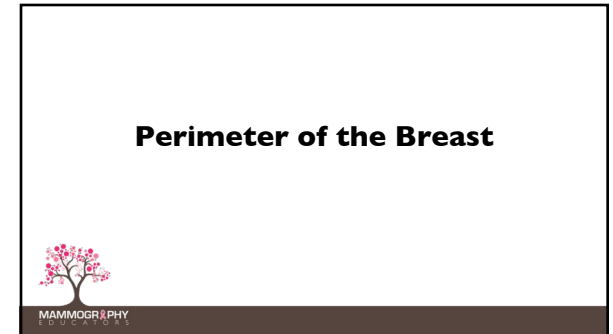
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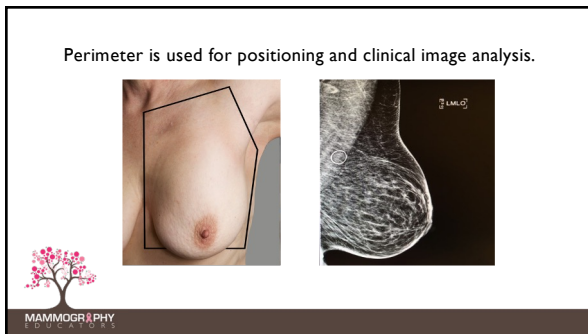
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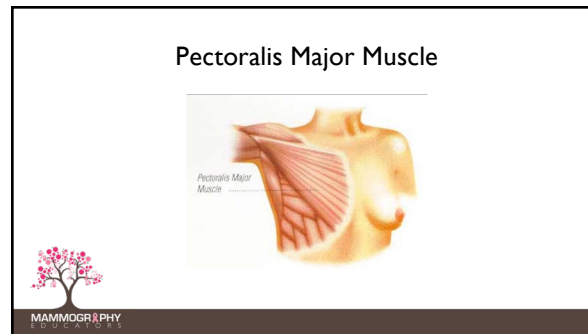
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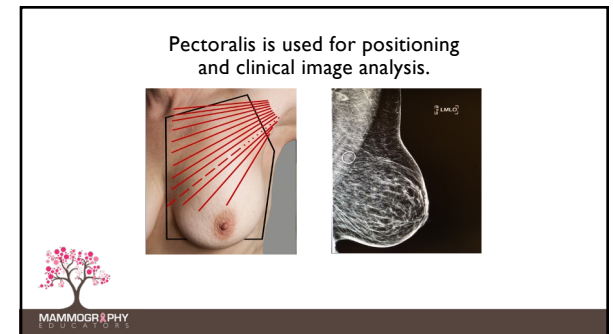
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PNL used for positioning:
Elevate the breast so that the PNL is as close as possible to perpendicular to the chest wall.

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PNL used for clinical image analysis:
PNL measurement of CC should be within one cm of the PNL measurement on the MLO.

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Vertical Nipple Line
Used for positioning the MLO

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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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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 for positioning and film evaluation.

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The MLO:

- Visualized down to the PNL
- Wide margin at the axilla
- Convex/straight
- Radiolucent

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The absence or presence of these characteristics will tell you exactly what you did right or wrong when positioning and therefore, whether you included or excluded breast tissue!!

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LENGTH OF MUSCLE

Should be visualized down to the level of the PNL

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EQUIPMENT: Length of the muscle is related to the degree of angulation

The average degree of angulation will be 40-50 degrees, but most importantly, the angle should be chosen on the basis of anatomy. The wrong degree of angulation could exclude breast tissue.



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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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Angle for the MLO

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



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Recommended Angulation for MLO

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



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I am going to say something that is shocking!!



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Keep Angles Consistent

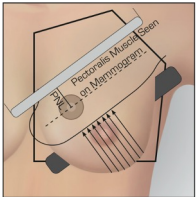
- 40 degrees for shorter, heavier patients with large breasts
- 45 degrees for average patients
- 50 degrees for tall, thinner patients with smaller breasts



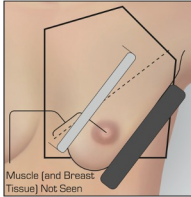
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Proper degree of angulation



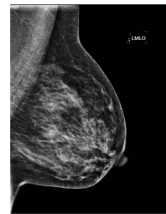
Angle too steep



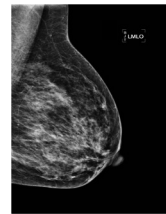
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Proper degree of angulation



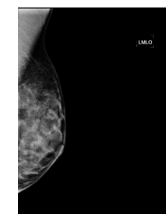
Angle too steep



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Is it the angle or the patient?

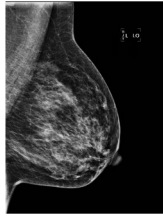


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WIDTH OF MUSCLE

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



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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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PATIENT: Width of the muscle is related to the 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.



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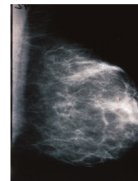
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Is it the placement of the IR in the axilla or the patient?



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SHAPE AND OPACITY OF THE MUSCLE

The muscle should be convex or straight.



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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 height of the sternoclavicular joint, or halfway between the top of the shoulder and the axillary crease.



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

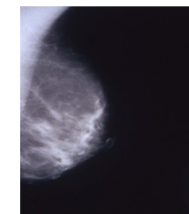
- Patient's shoulder, arm and hand muscle
- Be relaxed



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Is it the height of the IR or the patient?



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Problems with the MLO

- No visualization of the IMF
- Folds in the IMF
- Breast drooping



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Visualization of the IMF

Equipment challenges:

Change of the angle will not compensate for the increased length and the width of IR for FFDM and DBT (compared to the bucky)

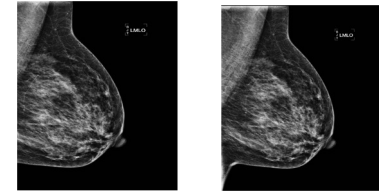
Change should be made in the patient position.



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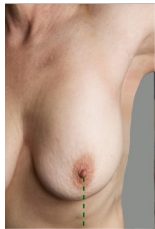
No IMF

IMF

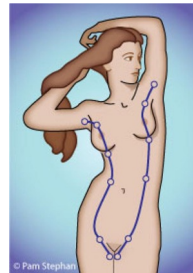


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Vertical Nipple Line



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

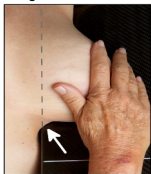
- Patient must be facing forward with both feet
- Lower front corner of the IR should be directly below the patient's nipple (VNL) or half between her ASIS and umbilicus
- This requires the patient taking a "side step" towards you



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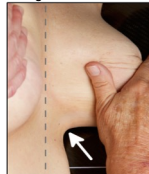
Improper

Edge of IR in front of IMF



Proper

Edge of IR behind IMF

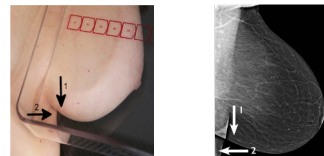


Top edge of IR indicated by vertical dotted line



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Folds in the IMF

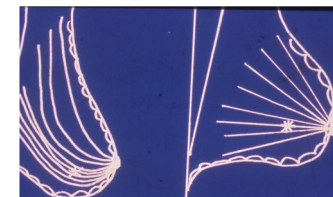


1. Horizontal fold is in the medial breast
2. Vertical fold is in the lateral breast



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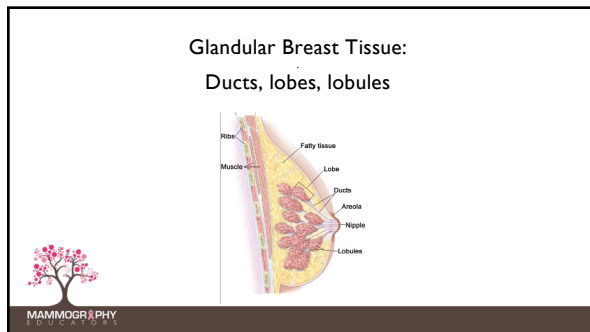
Breast Sagging



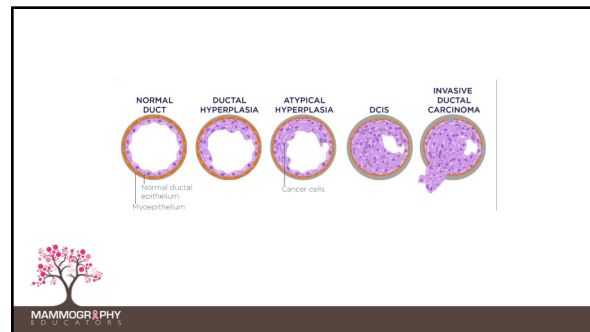
Courtesy Stephen Feig, MD



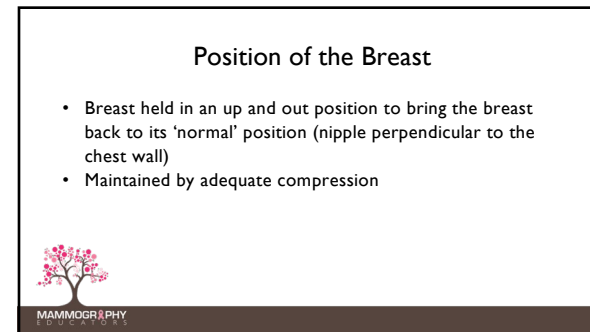
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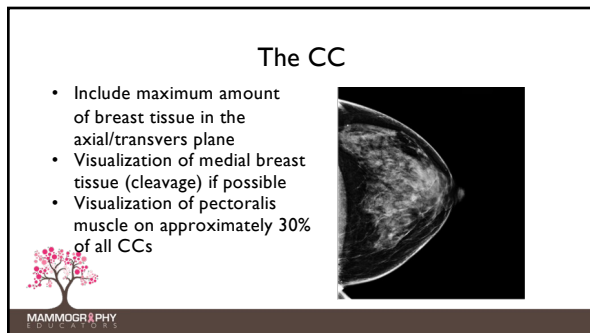
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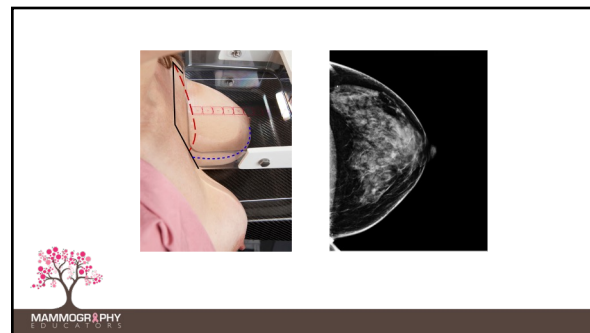
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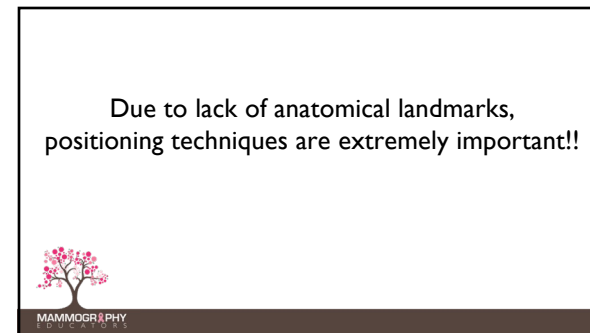
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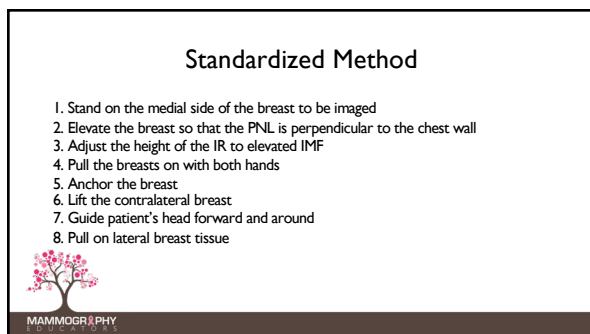
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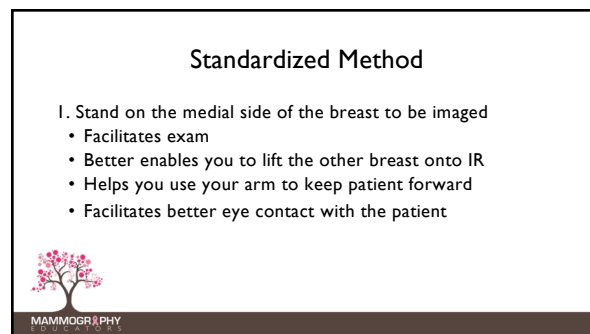
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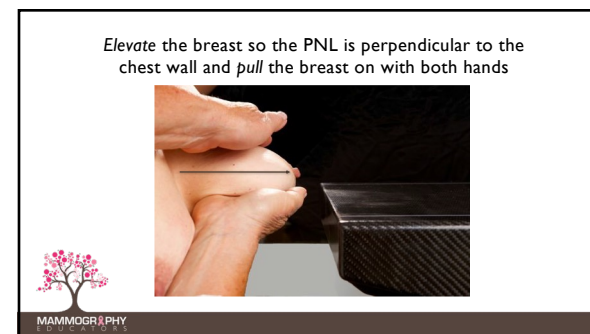
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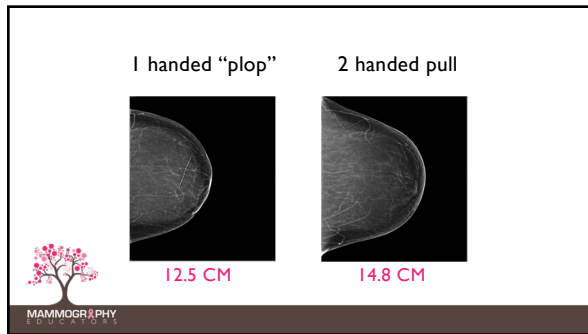
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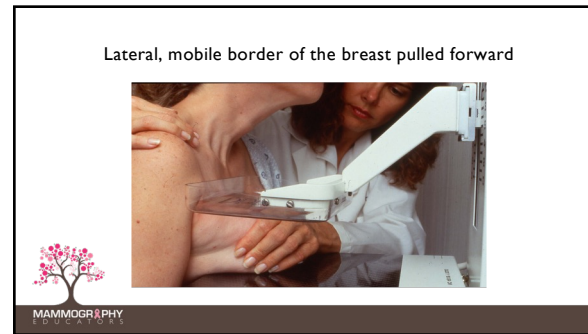
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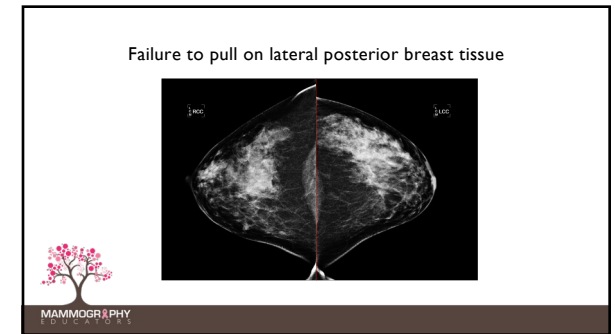
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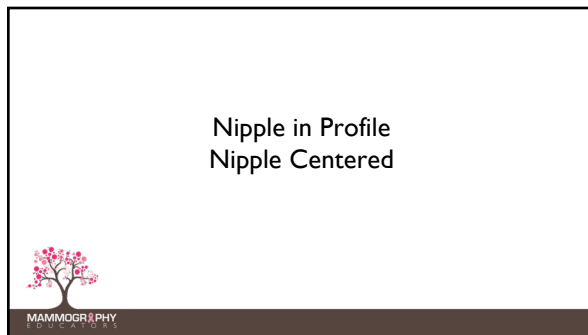
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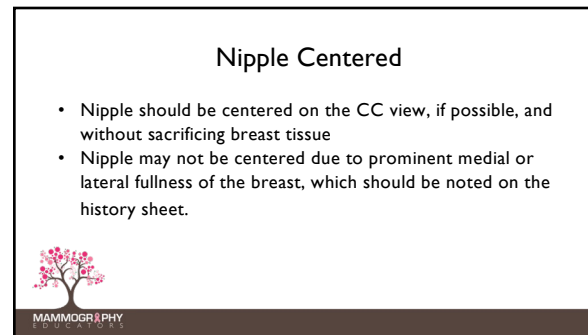
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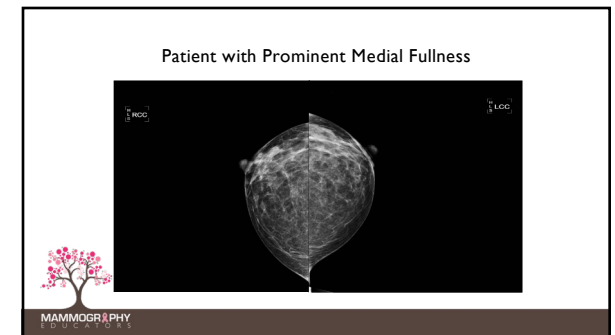
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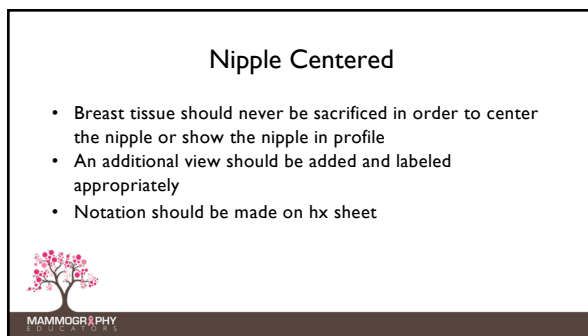
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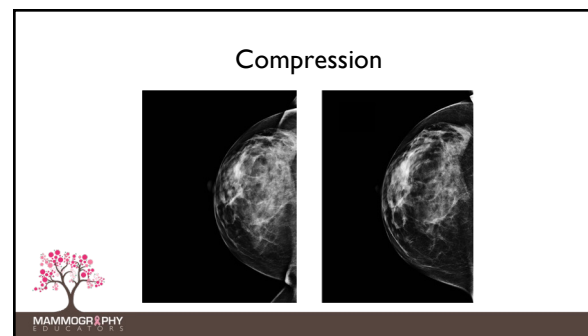
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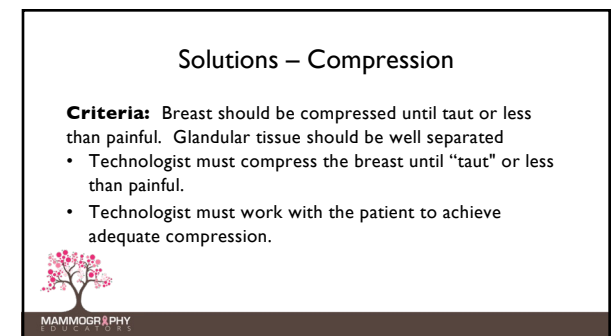
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Sequence of Views



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All general radiology exams
are done in the same sequence.



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But in mammography.....
we are "all over the map".

- LCC, LMLO, RMLO, RCC
- RCC, LCC, RMLO, LMLO
- RMLO, RCC, LMLO, LCC
- LCC, RCC, LMLO, RMLO
- RCC, RMLO, LMLO, LCC
- LCC, LMLO, RCC, RMLO
- LMLO, LCC, RCC, RMLO



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The last bit of shocking news!



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My Suggestion:

- Do CC's first
- Then do the MLO on the side you just finished the CC
- Then do the other MLO

Example: RCC, LCC, LMLO, RMLO



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So.....

Just like in general radiology, let's all position using the same
method and the same sequence.

WHAT A NOVEL CONCEPT!!



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WHY???

- Consistent
- Reproducible
- Efficient
- Proficient
- Ergonomically sound
- Decreases errors
- Decreases radiation exposure
- Finds more early breast cancers
- Saves lives



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Mammography Saves Lives!

But it is up to you.....

Even the best radiologist, in the best breast center cannot
diagnose a cancer that is not included on the image.




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Interact with Breast Imaging Professionals from Around the World

Join our Facebook Group:
Quality Breast Imagers



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Thank You!

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