

ADVANCED IMAGING OPTIONS

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COMPLEMENTARY PROJECTIONS

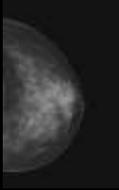


- CC and MLO are complementary
- Eliminating tissue on one projection does not necessarily eliminate the area from the study

GOOD COMPRESSION

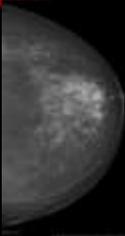
- Breast should be compressed until taut
- Avoid compression against a fixed margin or tissue
- Most movable margins are the lateral and inferior
- Fixed margins are the medial and superior

THE CRANIOCAUDAL (CC)



- Beam travels from superior to inferior
- Will visualize: Anterior, central, medial, and posteromedial portions of the breast
- Poor at visualizing
 - Lateral breast

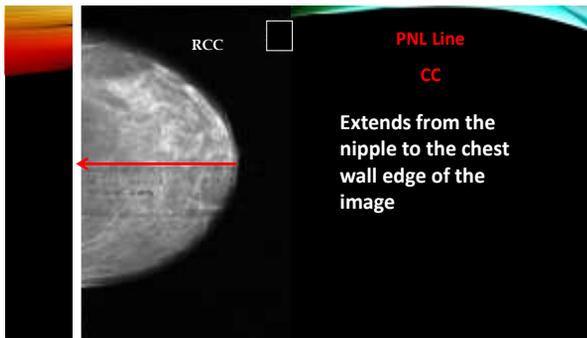
IMAGE EVALUATION -CC

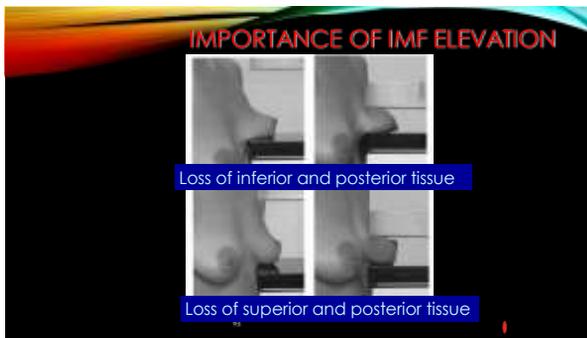


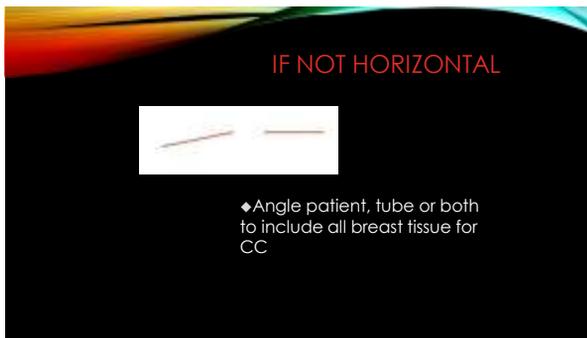
- Nipple in profile/centered
- Medial and lateral tissue in the collimated field
 - Nipple centered
- Pectoral muscle not always seen
- CC should include within 1 cm the PNL measurement of the MLO
- Dense area adequately penetrate

KEY POINT FOR THE CC

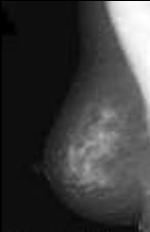
- IP at elevated inframammary crease
- Ipsilateral arm down. Contralateral arm raised - holding the machine for support
- Must include, within 1 cm, the same amount of tissue measured on the MLO
- Best demonstrates the anterior, central, medial and posteromedial portions of breast – poorly visualize lateral breast tissue







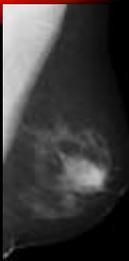
THE MLO



- Beam is directed superomedial to inferolateral
- Will visualize:
 - extreme posterior and
 - upper-outer quadrant
- Poor at visualizing:
 - Anterior, central, and medial breast tissue



IMAGE EVALUATION MLO



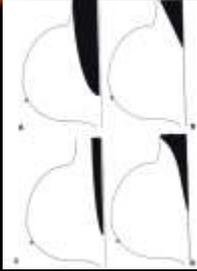
- Pectoral muscle
 - Wide/Convex anterior border
 - To nipple line or below
- Include posterior tissue
- Retroglandular fat space
- Open inframammary fold
- Nipple in profile when possible
- Dense areas well penetrated

PNL: MLO Projection



Line from the nipple to the pectoralis muscle or the posterior edge of the image, whichever comes first

Good!
CONVEX



Must be repeated

VERTICAL
Suboptimal

CONCAVE
Suboptimal

TUBE ANGULATION DEPENDS ON BODY HABITUS

- Tall and thin = steeper angulation, 50°-60°
- Average = 40°-50°
- Short & stocky = shallow angulation, 30°-40°

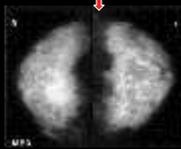


KEY POINTS FOR THE MLO

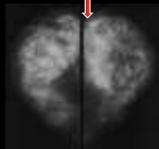
- Tube angulation will vary between 30 – 70 degrees depending of patient size i.e. Image plate parallel to muscle.
- Arm closest to the breast being imaged, draped over the top of image plate.
- The image plate in the axilla.
- Compression must support the anterior breast tissue to preventing sagging & distortion of ductal architecture.
- The pectoral muscles should be demonstrated to the level of nipple.

ADDED IMAGING NEEDED

- No XCCL required
- Glandular tissue ends before chest wall edge of image

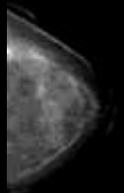


- XCCL required
- A portion of the lateral aspect of the glandular tissue is missing

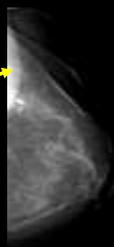


XCCL IMAGING

A



B



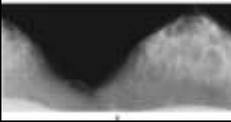
XCCM

- To show the medial aspect of breast not seen on the CC projection

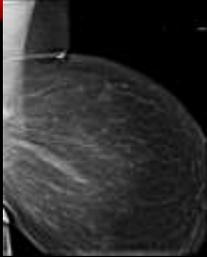


CLEAVAGE OR "VALLEY VIEW" (CV)

- Images the medial breast tissue



MANAGING SKIN FOLD



- Use index finger to smooth the breast as you compress
- Skin folds may be unavoidable – do not eliminate breast tissue to eliminate skin folds
- Additional imaging or supplementary projections may be necessary

OPEN THE INFRAMAMMARY FOLD



- Use fingers to open the IF before completing compression

UNEVEN BREAST THICKNESS

CC Imaging

- Two CC projections:
 - Anterior breast
 - Posterior breast
- Other option
 - Flex paddle



PATIENTS WITH THICK AXILLA

Upper & lower breast imaging necessary on the MLO

- Option 1
 - Routine MLO – for upper breast
 - ML – for lower breast
- Option 2
 - AT for upper breast
 - ML for Lower breast
- Option 3
 - Use a 'Flex Paddle'



PATIENTS WITH FROZEN SHOULDER



- Reverse MLO i.e. LMO or LM – with the patient's arm moved backwards
- Use compression paddle to keep arm out of the way

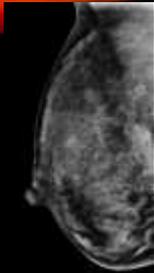
LATEROMEDIAL OBLIQUE (LMO)



- Imaging medial lesions
- Imaging nonconforming patients (pacemakers, surgery, etc)



LMO IMAGING

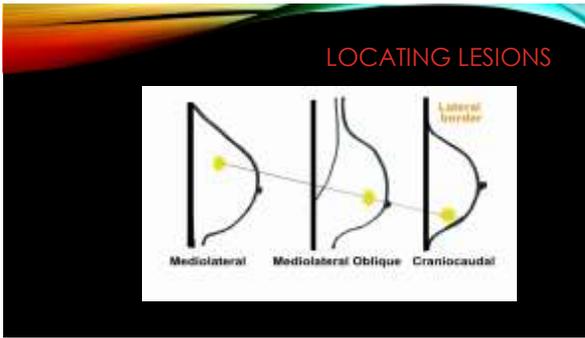


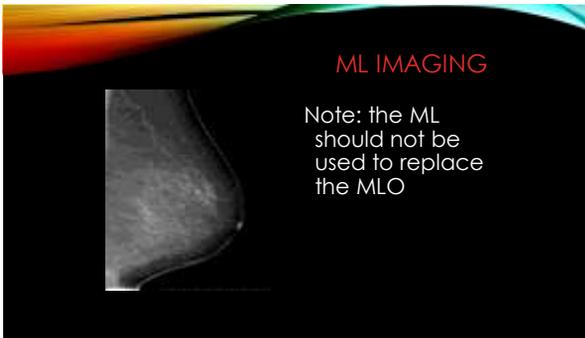
- The LMO give a true reverse of the MLO
- Imaging should look the same

MEDIOLATERAL 90-DEGREES (ML)

- Localize a lesion, e.g., needle loc
- Prove calcifications are benign
 - Medial lesions—up on lateral from their position on the MLO
 - Lateral lesions—down
 - Central lesion—no change









LM IMAGING



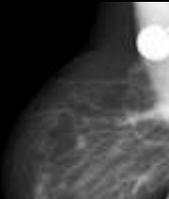
- Can replace the LMO to image a missed area

PACEMAKER IMAGING



- ML or LM to avoid the pacemaker
- Limited muscle

PORT-A-CATH



- ML or LM instead of MLO

SUPERIOR-INFERIOR OBLIQUE (SIO)

- Demonstrates the upper-inner and the lower-outer quadrant
- Useful when imaging implants and to get an open IF



SIO IMAGING



- The beam is directed from the superior lateral aspect to the inferior medial aspect

AXILLARY TAIL (AT)



- Ideal projection to image
- Extra breast tissue in axilla
- Axilla lymph nodes

AT IMAGING



- Degree of angulation is based on radiologist preference. Some prefer a 20-degree tube rotation
- The AT should not include the inferior portion of the breast

MASTECTOMY RADIOGRAPHS



ELDERLY/UNSTABLE PATIENT

- Chair exam
- Check with physician
- Document limitations



WRINKLING



- Very thin breast
- Elderly
- Do not eliminate posterior breast to remove wrinkles

NIPPLE NOT IN PROFILE



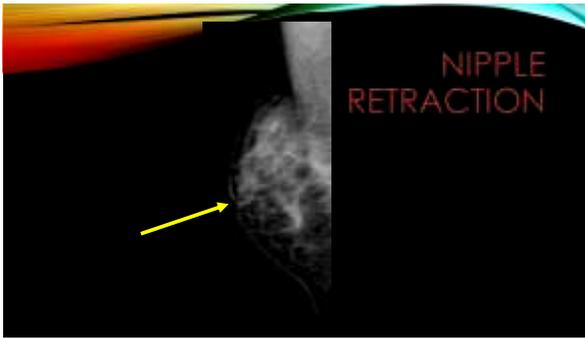
Reasons

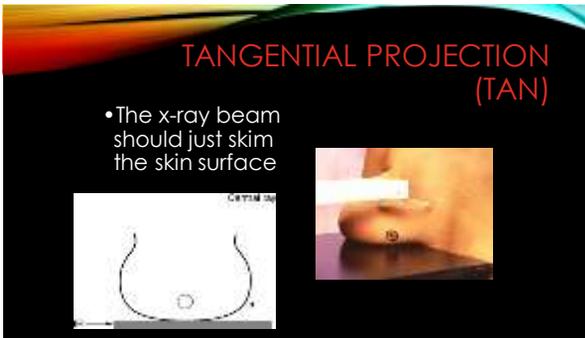
- In normal anatomy
 - Nipple does not fall naturally in profile on the CC or MLO
- Surgery

NIPPLE NOT IN PROFILE



- Image the entire breast first – using nipple marker.
- Separate imaging with nipple in profile - only if necessary.







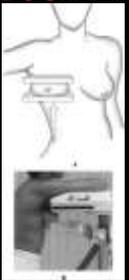
KYPHOTIC PATIENTS

- CC imaging
 - FB or two CC projections – medial & lateral imaging
- MLO imaging
 - Reverse MLO i.e. LMO



CAUDOCRANIAL OR FROM BELOW (FB)

- Used to visualize lesions in the superior or upper quadrants of the breast



FB IMAGING

- Imaging small breasts
- Kyphotic patients
- Patients with pacemakers



SMALL OR MALE BREAST



- Manual technique
- Breast pads
- Cautions if used for routine imaging
- Manufacture specific for digital
- Shave chest hairs if necessary

MALE BREAST



- Turn patient to affected side
 - Do not tilt
- Imaging easier in MLO
 - Image MLO first
- Use spatula if necessary
- Slouch on MLO; lean away on CC

MALE IMAGING

- Pectoral muscle can present a problem on the MLO
- Use a spatula to avoid compressing fingers



MALE IMAGING – POSITIONING -FB



The slide features two images. On the left is a mammogram showing a vertical line through the center of the breast. On the right is a photograph of a person's chest with a marker placed on the skin.

PECTUS EXCAVATUM
(DEPRESSED STERNUM)



- Two CC projection – one for medial breast, one for lateral breast
- CV for medial breast
- LMO instead of MLO

The slide includes a photograph of a male torso showing a depressed sternum. To the right of the image is a bulleted list of imaging recommendations.

PECTUS CARINATUM – (PIGEON CHEST)
BARREL CHEST – (PROMINENT RIB & STERNUM)



- Routine CC for medial breast tissue
- XCCL for lateral breast tissue
- Routine MLO plus AT to image any missed breast tissue

The slide includes a photograph of a male torso showing a prominent rib and sternum. To the right of the image is a bulleted list of imaging recommendations.

DELICATE IMF

- ? Use of lubricant at IMF
- Use gloves if skin is compromised
- May compromise positioning



LUMPECTOMY IMAGING



- Scar markers
- Magnification
- Skin folds
- Follow guideline of facility

IRRADIATED BREAST



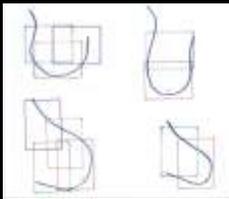
- Skin is very fragile
- Infection control critical
- 1st mammogram 6-12 months after completion of treatment
- Earlier mammograms will be of limited value

PATIENTS WITH PROTRUDING ABDOMEN



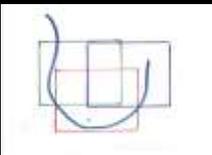
- For the CC
 - Keep patient away from the unit i.e. Patient should lean forward
- For the MLO
 - Reduce tube angulation – patient lies on the receptor

MOSAIC IMAGING



- Sectional imaging
- Include breast overlap in each section
- Correctly label all sections

WIDE BREAST



- Use a larger imaging plate for the CC projection
- XCCL if necessary
- MLO projection usually images as normal

WHEELCHAIR PATIENT



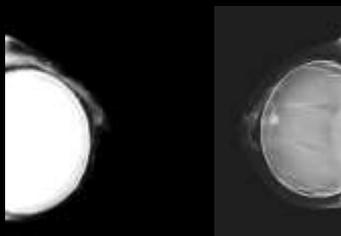
- Lock chair
- Talk at level of patient
- Easier if chair arms removable
- Patient restraints if needed
- Modify exam if necessary
 - LM
 - FB

WHEELCHAIR OPTIONS



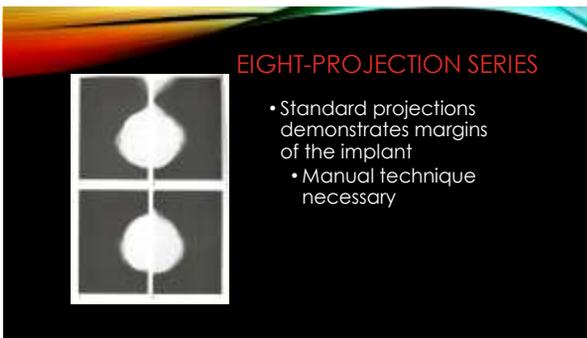
- Bolster back of patient with pillow
- Have patient sit upright
- Transfer patient or build-up

SILICONE AND SALINE IMPLANT

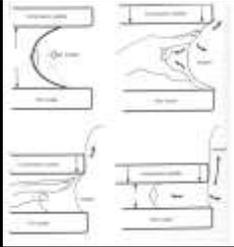






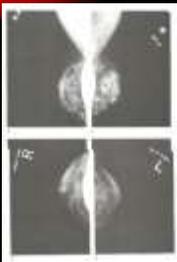


ID TECHNIQUE



- Locate the extent of the implant
- Have the patient step away from the unit
- Place the IR just posterior to edge of implant
- Use thumb and finger to hold anterior breast
- Compress. The edge of IR helps keep the implant back

EIGHT-PROJECTION SERIES



- Modified (ID) projections demonstrate breast tissue
- Manual or AEC techniques depending on amount of breast tissue over the 1st detector

CASE 1



In the normal anatomy the patient's nipple does not fall in profile. What are your options?

- Image the entire breast first – using nipple marker. Separate imaging with nipple in profile - only if necessary
- It is the normal anatomy. No added imaging necessary

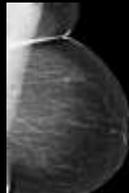
CASE 2



• You are imaging an elderly patient with very thin breast. How do you eliminate the wrinkling?

- A. Repeat. Push breast tissue posteriorly to remove wrinkling. Send repeat image
- B. Leave wrinkling, do not repeat
- C. Repeat. Push breast tissue posteriorly to remove wrinkling. Send both images
- D. Use the XCCL projection

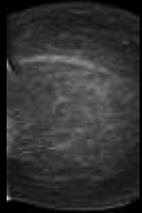
CASE 3



How do you eliminate this skin fold in the axilla?

- a. Smooth back the breast tissue
- b. Raise patient's arm higher
- c. Lower patient's arm
- d. Additional imaging or supplementary projections may be necessary

CASE 4



• On this RCC the fold should be removed. What is its likely location?

- A. On the mediolateral aspect of the breast
- B. On the superior aspect of the breast
- C. On the inferior aspect of the breast
- D. On the lateral breast

CASE 5



Why are mag view of the specimen recommended? Select the best answer...

- A. To confirm the lesion was removed
- B. To evaluate calcifications
- C. To please the radiologist
- D. To please the patient

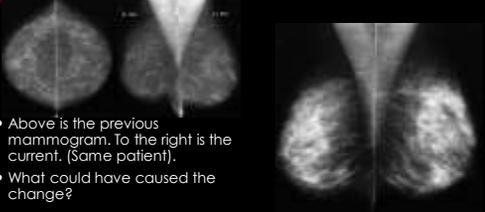
CASE 6



- Male patient came to the department because he felt bilateral breast lumps...
- Give a possible cause.

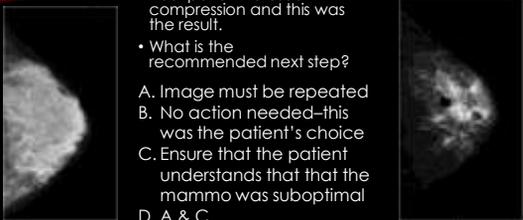
- A. Cancer
- B. Papilloma
- C. FAD
- D. Gynecomastia – right greater than left

CASE 7



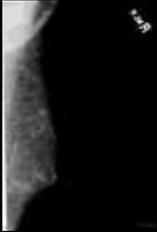
- Above is the previous mammogram. To the right is the current. (Same patient).
- What could have caused the change?

CASE 8



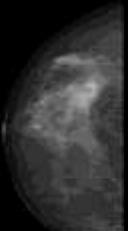
- Your patient refused compression and this was the result.
- What is the recommended next step?
 - A. Image must be repeated
 - B. No action needed—this was the patient's choice
 - C. Ensure that the patient understands that that the mammo was suboptimal
 - D. A & C

CASE 9



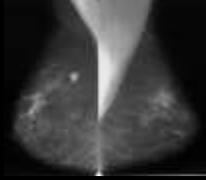
- Identify the calcifications in the axilla region
 - A. Possible DCIS
 - B. Oil cysts
 - C. Deodorant calcifications
 - D. Micro hematomas

CASE 10



- What is the 'Triangular Marker' used to indicate?
 - A. Nonpalpable lump
 - A. Skin lesion
 - B. Palpable lump
 - C. Surgical scars

CASE 11



- You noticed a lesion in the posterior aspect of the right breast.
- What do you think the radiologist will suggest as the next image?

A. Repeat MLO
B. Spot compression /mag
C. XCCL
D. Magnification only

CASE 12



- What problem is demonstrated here?

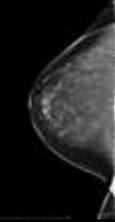
CASE 13



- What problems are demonstrated here?

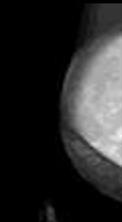
CASE 14

- Identify the problem



CASE 15

- Identify a possible cause of the problem

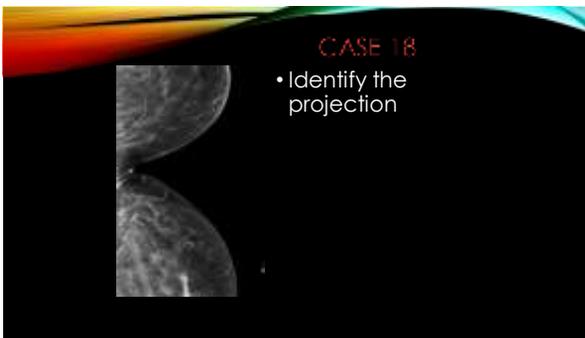


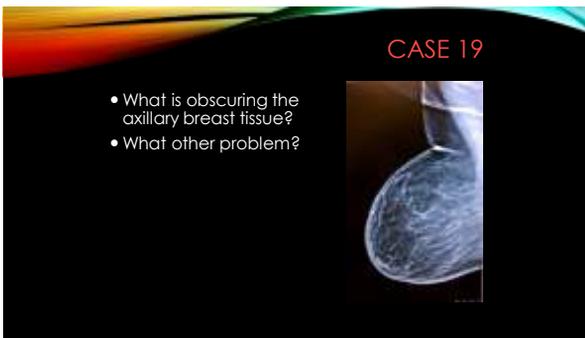
CASE 16

- What is the main reason for the closed IF here?









CASE 20



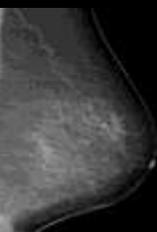
- What problem is demonstrated here?

CASE 21



- Identify the projection

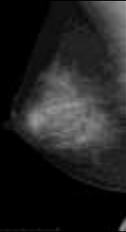
CASE 22



- Identify the projection

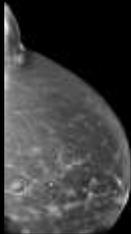
CASE 23

- Identify the projection & problem



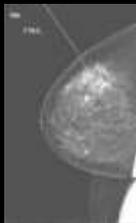
CASE 24

- Identify the projection



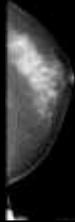
CASE 25

- This artifact appeared during a needle localization. Identify the artifact...



CASE 26

- Which area of breast tissue is missing
 - A. medial
 - B. lateral
 - C. anterior
 - D. posterior

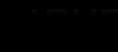


CASE 27

- Identify the pathology and problem



THE TAIL OF SPENCE IS EASILY VISUALIZED USING THE AT PROJECTION



WHAT AREA OF THE BREAST IS BEST IMAGED USING THE CLEAVAGE?

WHICH PROJECTION IS OFTEN USED TO PROVE "TEACUP" BENIGN CALCIFICATION

WHEN IMAGING THE KYPHOTIC PATIENT, INSTEAD OF THE CC WE COULD USE THE...

WHEN USING MAGNIFICATION, THE SKIN DOSE IS MUCH HIGHER THAN ROUTINE IMAGING.

SPOT COMPRESSION CAN BE PERFORMED IN ANY PROJECTION.

THE TRUE REVERSE OF THE MLO IS THE

THE XCCL PROJECTION IS USED TO IMAGE THE EXTREME LATERAL ASPECT OF THE BREAST WITH THE PATIENT POSITIONED CC

WHICH POSITIONS CAN BE USED TO REMOVE SUPERIMPOSED TISSUE

IN ADDITIONAL TO THE CC & MLO WHICH PROJECTIONS IS OFTEN UTILIZED WHEN IMAGING THE LUMPECTOMY PATIENT.

THE LM CAN BE USED TO IMPROVE
DETAILS OF MEDIAL LESIONS.

WHEN IMAGING THE MALE BREAST, ON
WHICH PROJECTION WOULD CHEST HAIR
PRESENT A PROBLEM?

THE TAN PROJECTION CAN BE USED
TO LOCATE SKIN CALCIFICATIONS.

**THE SUPERIOR-INFERIOR OBLIQUE (SIO)
DIRECTS THE BEAM FROM THE...**

- A. Inferior lateral to the inferior medial aspect of the breast
- B. Superior lateral to the superior medial aspect of the breast
- C. Superior lateral to the inferior medial aspect of the breast
- D. Lateral to the inferior medial aspect of the breast
- E. None of the above

**MATCH THE FOLLOWING
ASSOCIATIONS:**

- | | |
|--------------------|---------------------|
| Magnification | Spatula |
| Lumpectomy imaging | Depressed sternum |
| Pectus excavatum | Microcalcifications |
| Large breast | Skin folds |
| Small breast | Sectional Imaging |

WRAPPING UP

- Extra projection should:
- Demonstrate missed breast tissue to justify the added radiation dose to patient
- Also:
- Evaluate your patient before taking the first image
 - Be familiar with all the supplementary projections
 - Always choose the most suitable projection to complete the study

•Questions???



THANK YOU!
