Breast Ultrasound for Mammography Technologists

Belinda Zaparinuk R.T(M), BS, CBEC, FNCBC
Senior Consultant, Mammography Educators

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Breast Ultrasound for Mammography Technologists

- Where Do I Start
- Basic Core Knowledge
- Correlation/Triangulation
- Positioning
- Scanning Technique
- Equipment/Knobology
- Documentation
- Standardized Protocols
- Ergonomics

2

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Where Do I Start?

- Do they like performing breast US?
- Mammography Technologist - ARRT CERT BS
- Cross-trained Mammography Technologist

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Where Do I Start?

These guidelines are in accordance with those published by the Canadian and American Cancer Societies, the National Comprehensive Cancer Network and the American College of Radiology.

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Where Do I Start?

- Graduates of an accredited School of Sonography
- Or have obtained certification from the American Registry of Diagnostic Medical Sonographers (ARDMS)
- Canadian Association of Registered Diagnostic Ultrasound Professionals (CARDUP)

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Where Do I Start?

- Mammography technologists performing breast sonography must have specific qualifications in breast ultrasound
- Recommend be members of their national or provincial professional organization

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Where Do I Start?

- Consistent with the requirements of ARDMS or CARDUP, continuing medical education and minimum volumes should be mandatory
- Sonographers should perform breast ultrasounds regularly in order to maintain high level of quality

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Where Do I Start?

Why do Mammography Technologists perform Breast Ultrasound?

- They already know how to triangulate and correlate
- Improves Continuity of Care

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Basic Core Knowledge

- Mammography is the foundation
- The standard of care is that mammography along with ultrasound provides comprehensive imaging
- If an area presses out, it is still recommended to document with ultrasound

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Basic Core Knowledge

- Ultrasound alone does not provide the complete interrogation of the breast
- It can be a starting point for imaging women under 30 and pregnant women, but mammography may be needed

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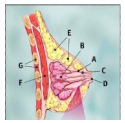
Basic Core Knowledge

Basic core knowledge of breast anatomy and the breast perimeter is necessary.



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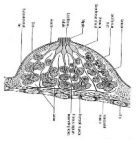
Basic Core Knowledge

- Skin
- Nipple
- Subcutaneous fat
- Cooper ligaments
- Superficial mammary fascia
- Breast parenchyma(ducts/lobules)
- Retromammary fat
- Pectoralis muscle(major/minor)
- Ribs
- Pleura



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Basic Core Knowledge

Breast density composition is defined by four categories. These categories consist of the following:

- A – Almost entirely fatty
- B – Scattered areas of fibroglandular density
- C – Heterogeneously dense
- D – Extremely dense

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Basic Core Knowledge

- The breast composition categories are assigned value by a visual estimation of fibroglandular-density tissue within the breast.
- The assessment of the volume of attenuating tissue in the breast is to help indicate the relative possibility that a lesion could be obscured by normal breast tissue and that the sensitivity of the the examination may be compromised by dense breast tissue.

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Basic Core Knowledge

- This allows the patient and her doctor to better assess her risk of developing breast cancer.
- Other factors include age, family history, previous breast
- biopsies, and gene mutations.
- 50% of all women undergoing screening mammography have dense breasts.

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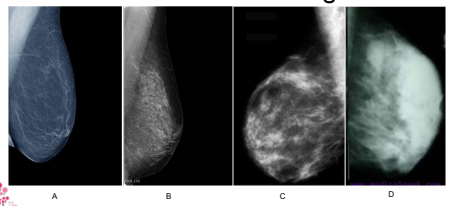
Basic Core Knowledge



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Basic Core Knowledge

- Approximately 75% of breast cancers occur in women who have no family history of the disease and are not high-risk
- One in six breast cancers occur in women ages 40-49

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Basic Core Knowledge

- Minority women are 72% more likely to be diagnosed with breast cancer before age 50.
- 58% more likely to be diagnosed with advanced stage disease prior to age 50.
- 127% more likely to die of breast cancer before age 50 compared to white women.

Source: Applied Radiology

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Basic Core Knowledge

- It is important to be familiar with breast pathology because it indicates the relative risk of developing an invasive breast cancer.
- Pathology helps to determine the plan of care.
- Pathology assists in the tumor characteristics to determine neoadjuvant treatment.

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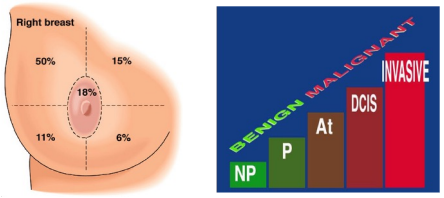
Basic Core Knowledge



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Basic Core Knowledge

Breast cancer can be multi focal and multi centric.

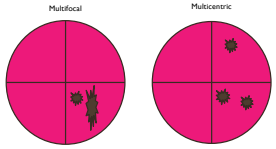

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Image Review/Correlation/Triangulation

- Review prior images, reports, patient history
- Look at your patient's breasts

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Image Review/Correlation/Triangulation

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Image Review/Correlation/Triangulation

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Image Review/Correlation/Triangulation



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Image Review/Correlation/Triangulation

How we view the anatomy is always changing, but the anatomy itself always presents the same.

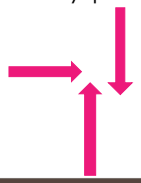
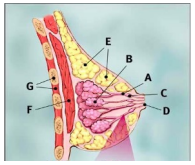

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Image Review/Correlation/Triangulation

Mammography

- Craniocaudal view (CC view): 0 degrees
- Mediolateral Oblique (MLO) view: 45 degrees

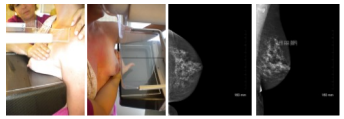

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Image Correlation and Triangulation

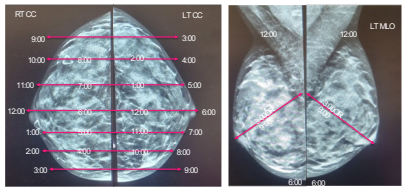

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Image Correlation and Triangulation

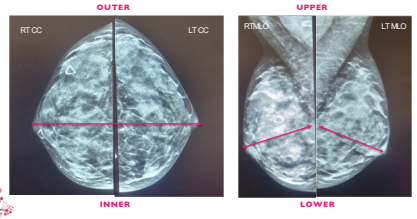

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Image Correlation and Triangulation

- O'clock is determined by the location of Area of Concern (AOC) on the CC view.
- The quadrant is determined by the MLO, either the AOC is above the nipple (upper) or below the nipple (lower).

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Image Correlation and Triangulation

- If the AOC is seen in one view only, a 90-degree lateral (LM/ML) can help determine if the AOC is located in the medial breast.
- "Muffins Rise… Lead Sinks"

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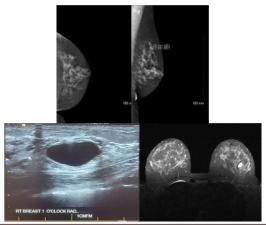
Image Review/Correlation/Triangulation



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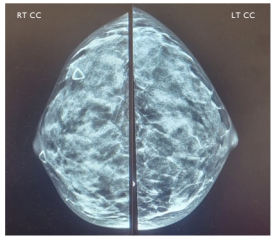

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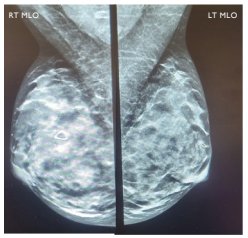

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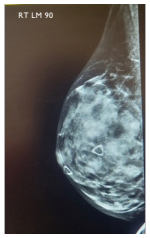

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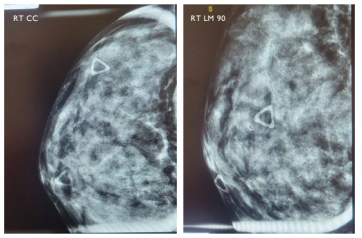

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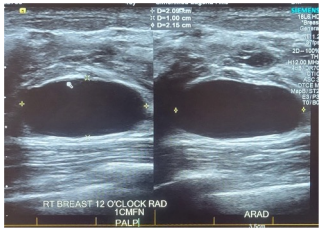

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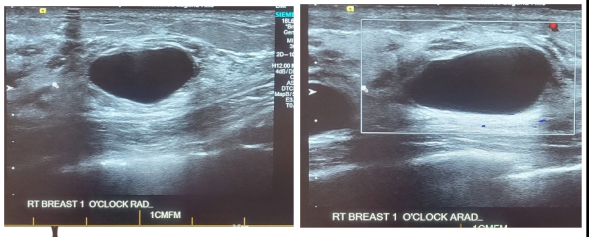

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Case #2

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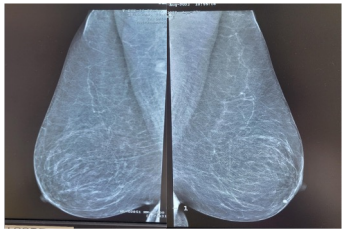
Case #2



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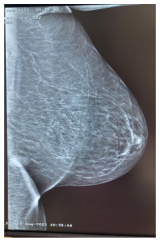

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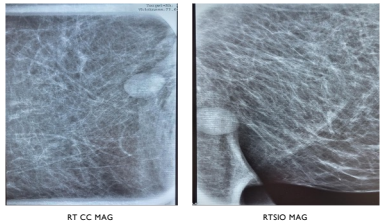

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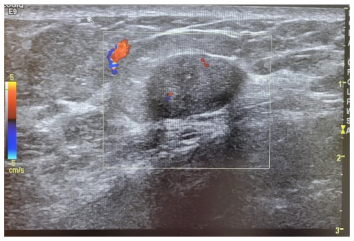

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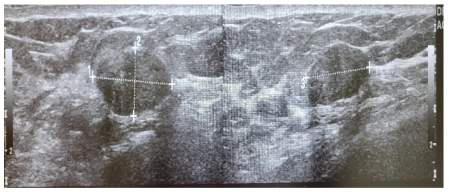

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Image Review/Correlation/Triangulation

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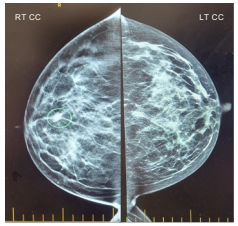
Case #3



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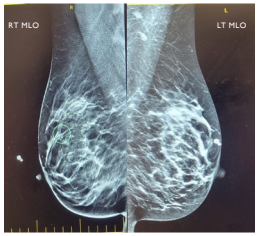

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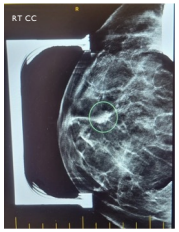

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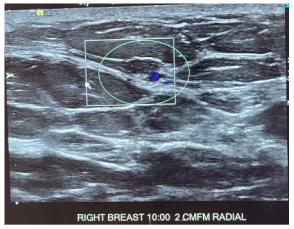

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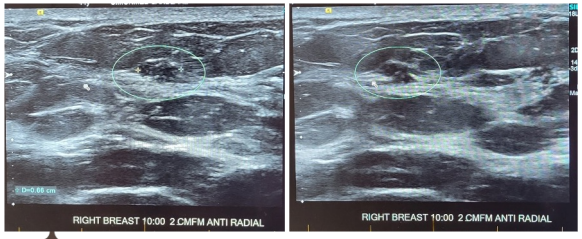

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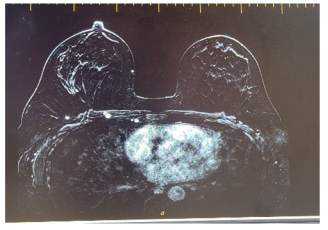

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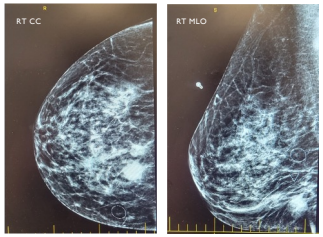
Case #4



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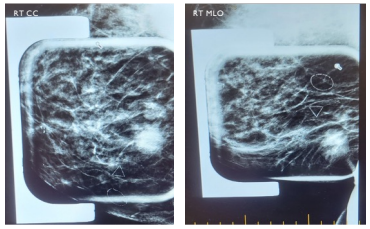

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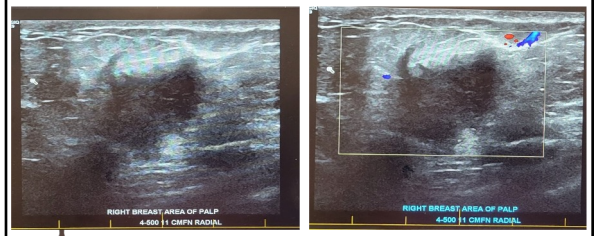

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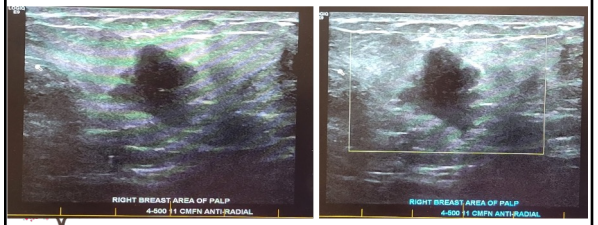

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Case #4

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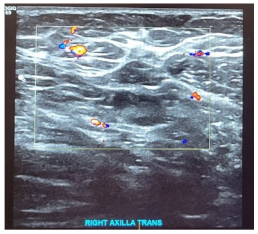
Case #4



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Case #4

Patient scheduled for biopsy

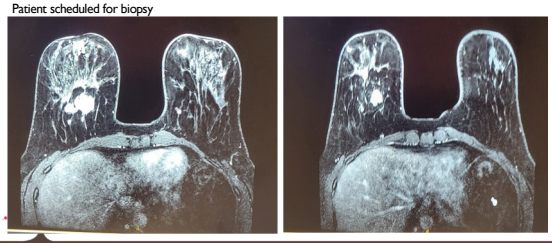

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Image Review/Correlation/Triangulation

When correlating findings found on prior breast imaging modalities, the operator performing handheld scanning should correlate the size, location of lesions and match the type and arrangement of tissues surrounding the lesion in order to reduce the likelihood of misregistration.

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Positioning

Patient should be rolled into a Cahan position, which reduces thickness of the breast by evenly distributing the breast tissue and elongates the pectoralis muscle, allowing for better mobilization of the breast. This position helps in the imaging of the upper outer quadrants of the breast.

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Positioning

The arm should be raised above the head, even when patient is rolled back to supine the position, to complete imaging of inner quadrants of the breast.

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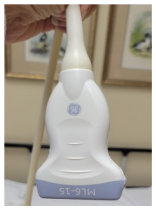
Scanning Technique

Recommended that breast US to be performed with **7MHz-15MHz(or higher resolution)** high resolution, real time, linear array transducer.



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Scanning Technique

- To **survey** the breast completely, Sagittal and Transverse scans are recommended.
- Supplemental Radial and Anti-Radial scans ensure entire breast structures are interrogated.

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Scanning Technique

Scanning in three directions while applying a firm, even compression, provides a good interrogation of the breast. Then document in orthogonal views.

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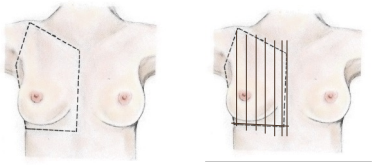
Scanning Technique



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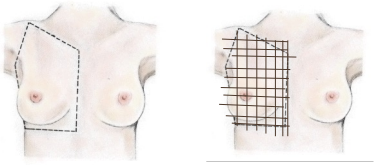
Scanning Technique



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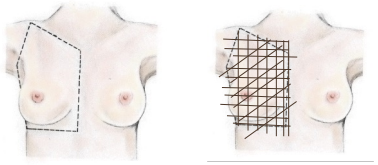
Scanning Technique



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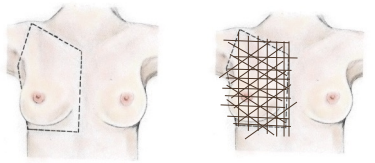
Scanning Technique



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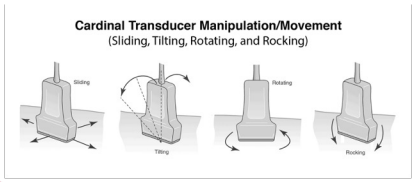
Scanning Technique



The 4 Cardinal Ultrasound Movements (Adapted from Ramsingh 2018)

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Equipment/Knobology

Settings should be adjusted at the center of the breast; this allows the breast to appear uniformly bright in near and far fields.

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Equipment/Knobology

- Gel is your friend
- Apply even, firm compression

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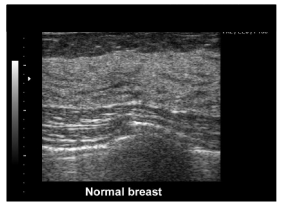
Equipment/Knobology Field of View (Depth)

FOCAL ZONE



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Equipment/Knobology Field of View (Depth)

- Controlled by image depth, it must be optimized to see the detail of the breast.

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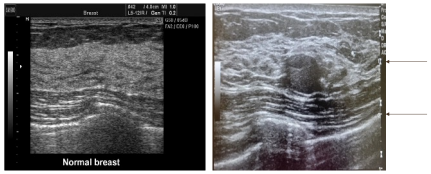
Equipment/Knobology Field of View (Depth)

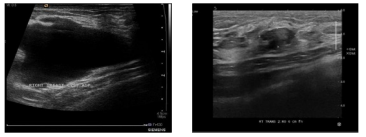
Depth is indicated on the monitor by a line of cm markers



80

Equipment/Knobology Field of View (FOV/Depth)

Search with a larger FOV and narrow it down when characterizing a lesion.



81

Equipment/Knobology
Calipers

- Measure what is real
- If in doubt, mark the skin

82

Equipment/Knobology
Calipers

- Lesions should be measured in at least two dimensions and documented in two planes.
- Images documented, require with and without calipers.
- If suspicious of malignancy, the axilla is to be interrogated and documented accordingly.

83

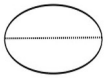
Equipment/Knobology
Calipers

- To make the caliper measurement, record the dimensions to include the longest dimension.
- Acquire one view in the scan plane demonstrating the longest dimension, which may not correspond to the two orthogonal views.

84

Equipment/Knobology
Calipers

Note that the scan plane of the lesion's longest diameter may be in any plane.



85

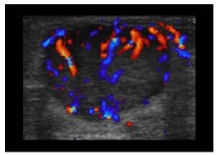
Equipment/Knobology
Doppler

- Brightness indicates the velocity of blood cells
- Brighter shades of color = higher velocities of blood cells
- Mean velocity is calculated by color doppler

86

Equipment/Knobology
Doppler

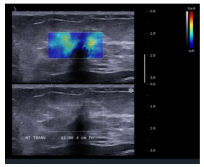
BART – Blue Away Red Towards



87

Equipment/Knobology
Elastography

Used to perform breast mass evaluation and characterization.



88

Equipment/Knobology
Elastography

- It can increase the specificity in differentiating benign versus malignant breast masses
- Benign lesions compress with transducer pressure and malignant lesions displace the breast tissue without changing in height
- The color scales should be annotated to denote hardness or softness when using elastography

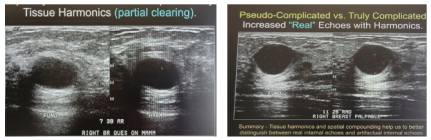
89

Equipment/Knobology
Harmonic Imaging

- Improves quality of the displayed image which is of suboptimal quality
- The harmonic frequency travels through the body with less beam distortion

90

Equipment/Knobology
Harmonic Imaging



Source: Dr. Tom Stavros

Breast Ultrasound for Mammography Technologists

- Where Do I Start
- Basic Core Knowledge
- Correlation/Triangulation
- Positioning
- Scanning Technique
- Equipment/Knobology
- **Documentation**
- Standardized Protocols
- Ergonomics

Documentation

Communication along with Image and Report Review is essential for continuity of care.

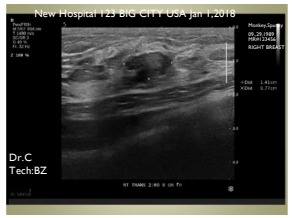
Documentation

- The facility name and location
- Examination date
- Patient's first and last name
- Identification number and/or date of birth
- Anatomic location including side (left/right)
- Orientation of transducer
  - Radial/antiradial
  - Transverse/longitudinal/oblique

Documentation

- Quadrant, clock notation, or labelled diagram of the breast
- Distance from nipple
- Depth (using alphabet) may also be used
  - If alphabet notation is to be used to describe lesion depth, it is recommended that the referring clinicians are educated as to meaning of the nomenclature
- Sonographer and/or radiologist initials or other identifier

Documentation



Documentation

- Distance measurement is from the nipple, not the areolar
- Should be measured by using a ruler

Source: ACR

Documentation

- Reports need specific information regarding location in the breast, distance from the nipple and what type of abnormality needs to be imaged
- Additional imaging should be specific

Documentation

From the Radiologist:

- For example: Rt breast calcification 9 O'clock, 6 cmfn. Recommend 90 standard lateral, with CC and 90 Lat magnification spots. Whole Breast Ultrasound Right Breast.

Documentation

- Reports that say additional imaging with ultrasound is not specific
- Specific reports, along with annotated AOC on images aid in the triangulation between modalities (Mammo, US, MRI)
- Also needed if patients go to another facility for work up
- Vital, especially with teleradiology communication

100

Documentation

- For example: If the radiologist annotates only the images and sends a message to do spots (mags or spot compression) then send to US, it's not specific
- The communications should state what the abnormality is (mass, calcs, asymmetry), location and distance

101

Documentation

Specific documentation from the technologist with accurate and complete history taking is important, as well.

102

Documentation

If working in an environment where the patient is passed onto another department for imaging, strong communication is important along with accurate documentation.

103

Documentation

Work sheets, history sheets and instant messaging is vital for continuity of care for the patient, the staff and the radiologist.

104

Documentation

These messages and documentation should include:

- Gender, age of patient and ethnicity
- The type of abnormality or symptom being worked up, the location and the distance from the nipple

105

Documentation

From the Technologist:

- For example-52 yr. old Hispanic female, c/o palp lump right breast 9 o'clock, 3 cmfn x 1 month
- Use of skin markers and diagrams are important and necessary

106

Documentation

From the Ultrasound technologist:

- For example: 52 yr. old Hispanic female, c/o palp lump right breast 9 o'clock, 3 cmfn x 1 month
- Documented worksheets, history sheets are important and necessary

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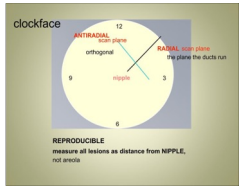
Documentation

The Why = Reproducible



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Breast Ultrasound for Mammography Technologists

- Where Do I Start
- Basic Core Knowledge
- Correlation/Triangulation
- Positioning
- Scanning Technique
- Equipment/Knobology
- Documentation
- **Standardized Protocols**
- Ergonomics

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Standardized Protocols

RADA

RADB

MAMMOGRAPHY EDUCATORS

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Standardized Protocols

- Standardized imaging protocols allow for image reproducibility, accountability and provide measurable information
- Staff understand that imaging requirements improve patient flow, productivity and work environment

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Standardized Protocols

- Radiologists on board with standardized imaging protocols
  - Reduces interruptions and confusion
  - Holds accountability
  - Empowers the staff
  - Improves patient flow and productivity
- HAPPY RADIOLOGIST = HAPPY STAFF

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Standardized Protocols

Quality Watch is the super user, provides the education to new staff, maintains the compliance and provides the measurable information.

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Standardized Protocols

Tech/Rad Review

DATE:	TECH	RAD	PATIENT MRN#
REVIEWER:			

TECH	PASS	FAIL	N/A	RAD	PASS	FAIL	N/A
LATERALITY							
CMFN							
2 PLANES							
LOCATION							
CALIPERS							
DOPPLER							
PROTOCOL							
MISC							
CORRECTIVE ACTION:				CORRECTIVE ACTION:			

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Breast Ultrasound for Mammography Technologists

- Where Do I Start
- Basic Core Knowledge
- Correlation/Triangulation
- Positioning
- Scanning Technique
- Equipment/Knobology
- Documentation
- Standardized Protocols
- **Ergonomics**

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Ergonomics

- Roughly 80% of sonographers have musculoskeletal related injuries
- 1 in 5 have a career ending injury
- On average, a sonographer works 5 years before experiencing pain

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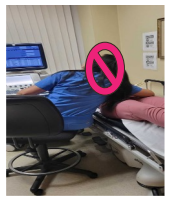
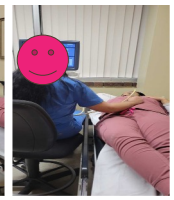
Ergonomics





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Ergonomics


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Ergonomics

There is a certain perimeter that the worker can perform in, without overextending for a long period of time

- This is known as the Primary Work Zone, Secondary Work Zone, and the Tertiary Work Zone.
- Understanding this workspace will help with your ergonomics

119

Ergonomics


120

Ergonomics

- Chair or stool adjusted to you
- Monitor at eye level
- Machine within proper reach

121

Ergonomics

- Feet flat or supported (fatigue mats)
- Move the patient close to you
- Adjust height of bed if possible
- Flip the patient

122

Test Your Knowledge

- 55 yr old female Caucasian
- Hx MVA 5 yrs ago
- No fm hx ca breast or other cancers.
- Recent weight loss 55 lbs
- C/o palp lump rt breast x 5 yrs
- No bx, surg, HRT, meds
- Nulliparous,14 menstrual, 50 menopause

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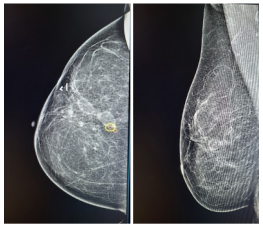
What do you see?



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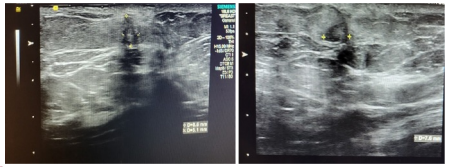
What do you see?

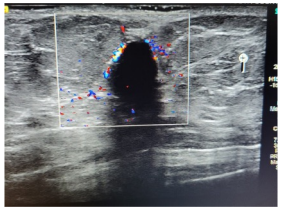
125

What do you see?



126

What do you see?



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YOU

What you see, image and document *makes a difference* of finding something early or late.

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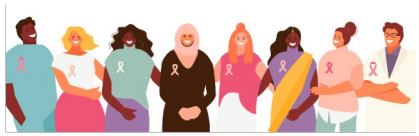

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