

2025 SDMS Annual Conference

Navigating the Breast Imaging Toolbox

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1

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2

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Objectives

Learn the anatomy of the breast and some pathology that will come through an ultrasound department.

Learn tips and tricks on how to optimize your breast imaging to improve diagnostic confidence.

Correlation of breast imaging with other modalities

Discuss some interesting breast cases

3

What's in your toolbox?



4

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A sonographer plays many rolls



- **A psychiatrist:** Listen to your patient's concerns and ease their minds...best you can. A little information goes a long way.
- **An investigator:** What are you looking for? Is it real? Gather your information and present it to the Radiologist.
- **A Secretary:** Is the paperwork complete? Do you have the correct diagnosis code or ICD 10 code?
- **A Sonographer:** Scan the area of concern. Maximize your knobology. Create quality images.

5

A sonographer's role is so much more than just scanning

A Psychiatrist

- Your patient is coming in with concerns. Listen to what issues they're having and do your best to ease their minds.
- Let them know what to expect of your exam or procedure
- Answer their questions (with in reason)
- A little information can go a long way



6

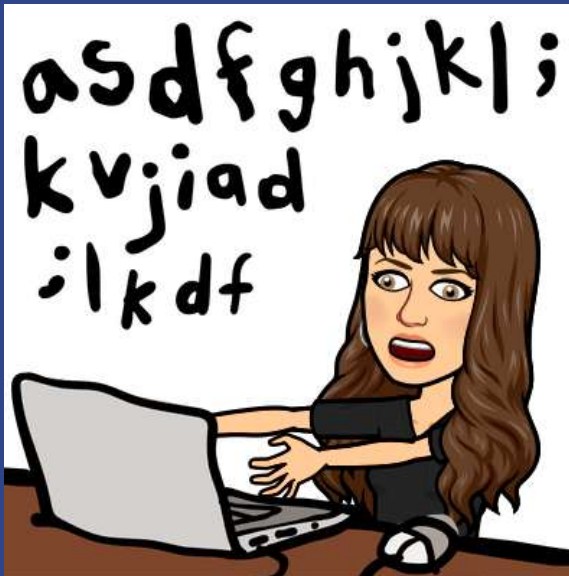
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An Investigator

- Get the patient's history.
- What symptoms do they have?
- Review all prior studies (mammo, US, MRI)
- Does it correlate with the prior study?
- Is this real?
- Are you looking for something small or large?

7



A Secretary

- Make sure you fill out all the appropriate paperwork.
- Did you document the ordering physician?
- Don't forget to check the patient's ID.
- Do you have the right CPT code?
- How about the ICD-10 code?
- Don't forget their signatures!
- Did you scan all the paperwork?

8

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OK! *Now... are you ready to get started!?*

Yup!!!

All that and you haven't
even started scanning yet!

Now you get to be a
sonographer



9

A Sonographer

- Scan the area of concern
- Is there a mass?
- Does it correlate with the mammogram? (MRI)
- Maximize your knobology
- Create quality images
- Present your case to the radiologist and discuss your finding



10

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Statistics and facts about Breast Cancer

1 in 8 women in the US will be diagnosed with invasive Breast CA. It's the most common cancer diagnosed among women in the US except for skin cancer

Most significant risk factors are female and age

95% of Breast CA in the US occur in women 50 & older. They increase after 40 yrs. old and highest over 70 yrs. Old


Fewer than 5% of women diagnosed with Breast CA are under the age of 40

In 2024, an estimated 2,800 men were diagnosed with breast cancer in the US.

11

Statistics and facts about Breast Cancer

- *A woman's risk nearly doubles if she has a 1st degree relative with Breast CA (mother, sister, daughter)
- *1 woman will die of Breast CA every 13 minutes in the US
- *Early detection is key!!!!

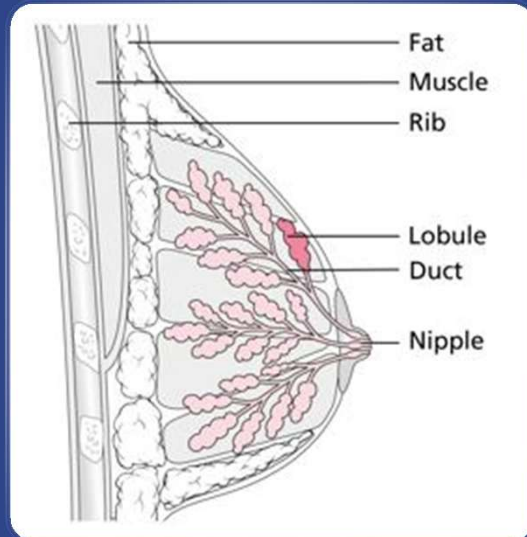


12

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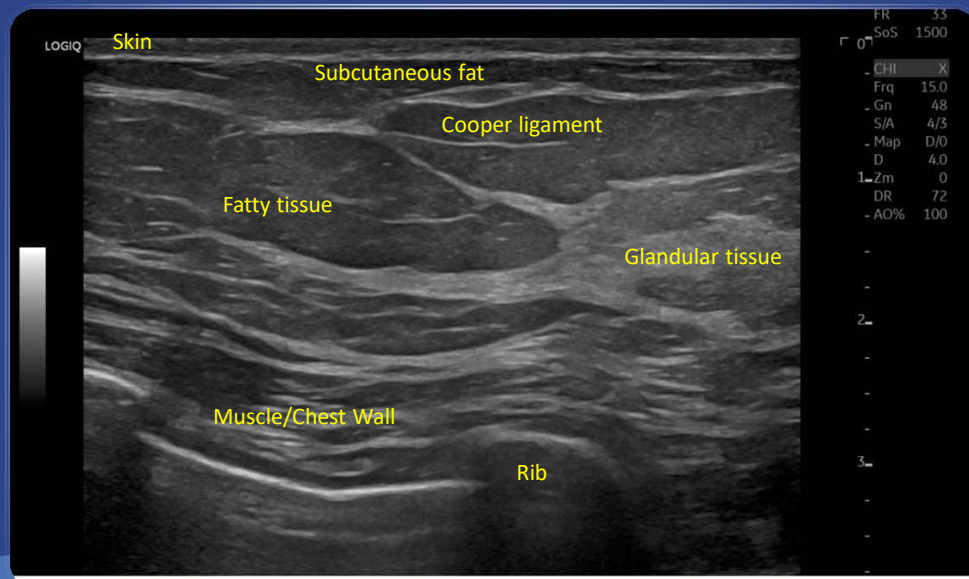
Basic Breast anatomy

- **Lobules:** Produce milk
- **Ducts:** Carry milk to the nipple
- **Connective tissue:** Consists of fibrous and fatty tissue (Holds everything together)
- **Breast Cancer** is when the breast cells grow out of control.
- The type of cancer depends on which cells in the breast turn into cancer.



13

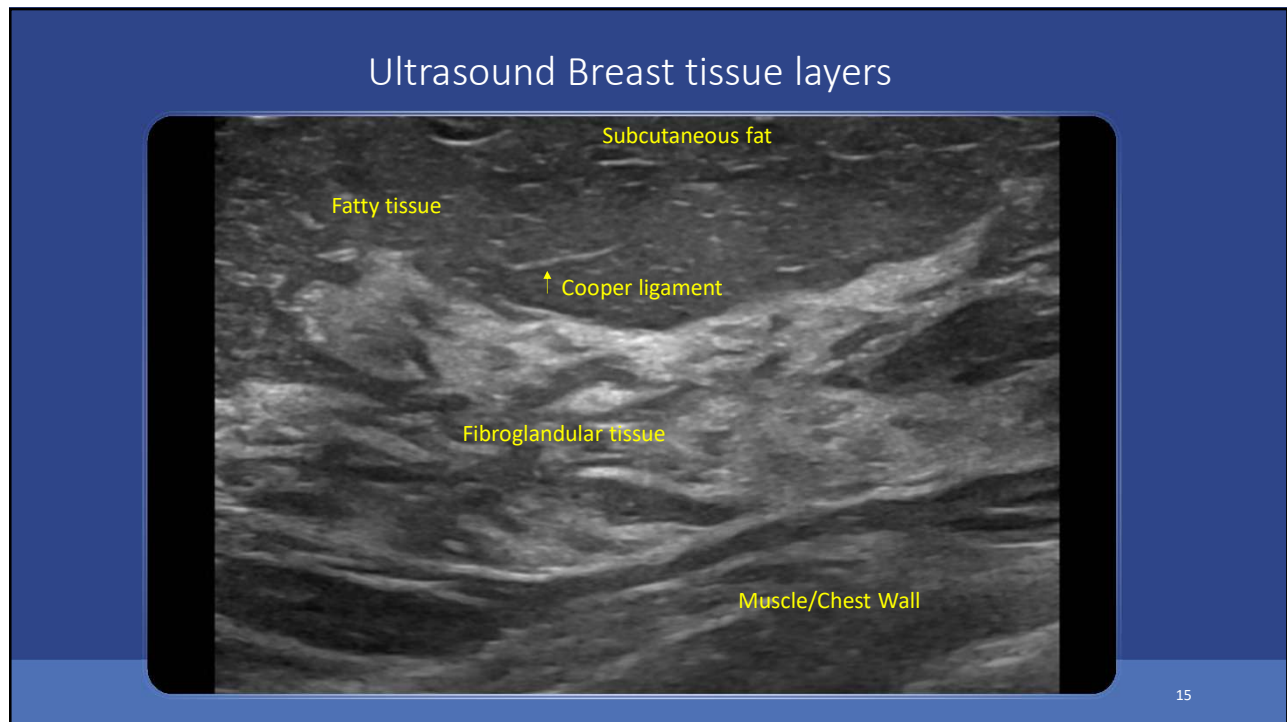
Ultrasound Breast tissue layers



14

14

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15

What is a **TC score** (tyrer-cuzick)

- *Calculated risk score of your chances of developing breast cancer.
- *This score does not mean that you will develop breast cancer (it is simply a prediction based on family health history and potential risk factors.)
 - *Some of those factors are age, breast density, personal and family history of breast or ovarian cancer, Ashkenazi Jewish heritage, 1st menstrual, age of giving birth, age of menopause etc...
- *A score of 15-19% indicates an intermediate risk of developing breast cancer.
- *A score over 20% is typically considered high risk.
- *High risk scores often will allow for additional screening test every year such as MRI of the breast or Screening breast ultrasounds if they have dense tissue.

16

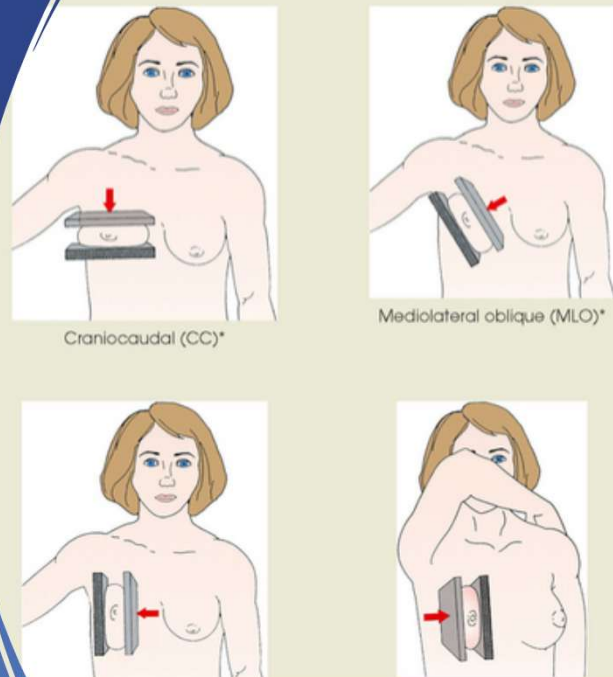
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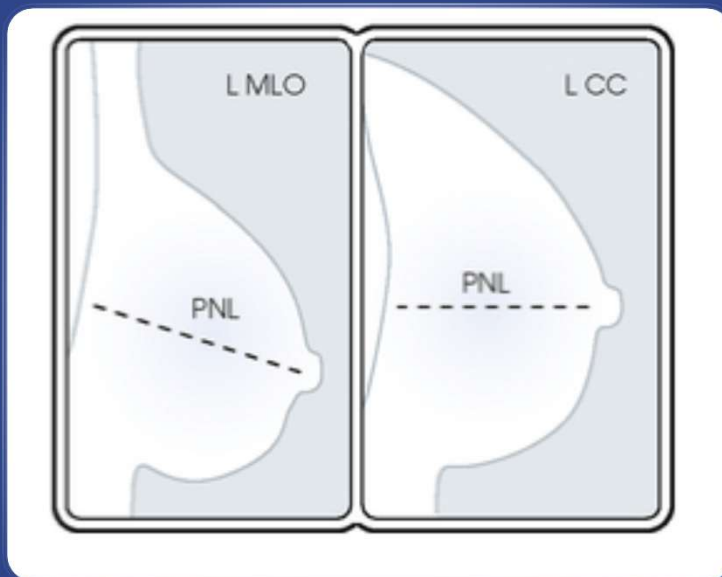
Standard Mammogram images taken

- **Craniocaudal or CC** view, taken from top-down
- **Mediolateral oblique or MLO** taken from the side at an angle or ML view
- **Mediolateral or ML** taken from side to side

Image from Radiologykey.com/mammography-3/



17



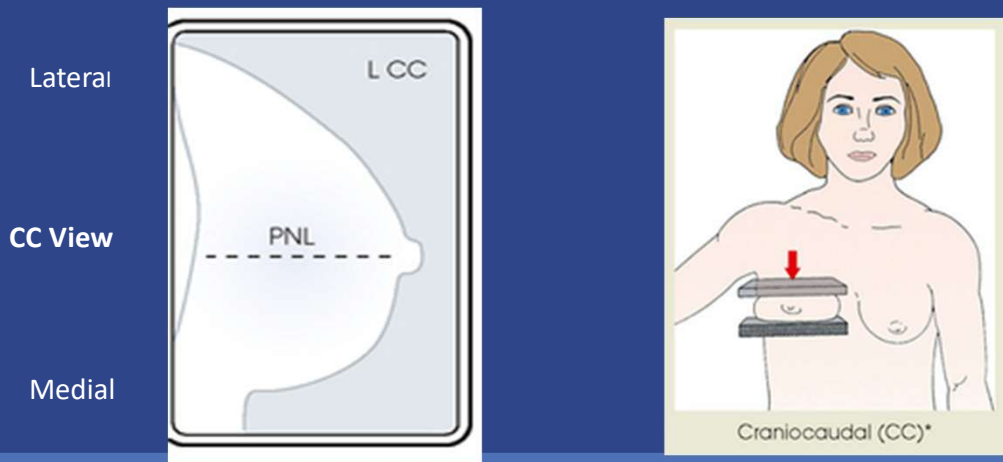
PNL

- PNL refers to a line drawn posteriorly and perpendicular from the nipple towards the pectoral muscle.
- This will give you a better understanding between lateral and medial and superior and inferior.

18

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CC mammogram view



19

CC mammogram view

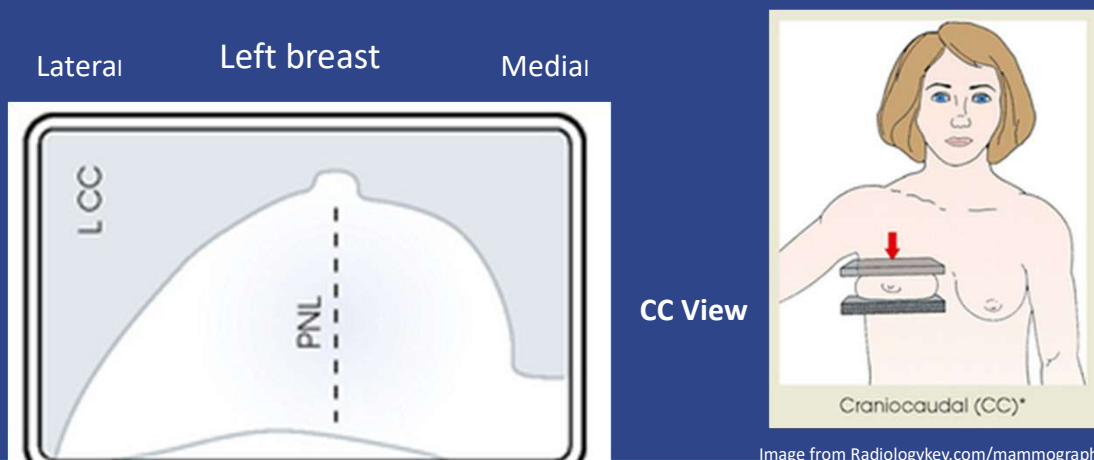


Image from Radiologykey.com/mammography-3/

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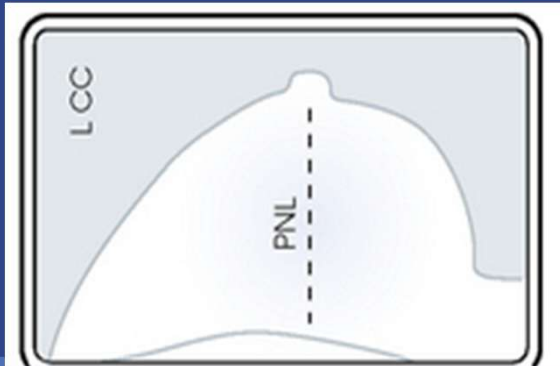
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CC mammogram view

Left breast

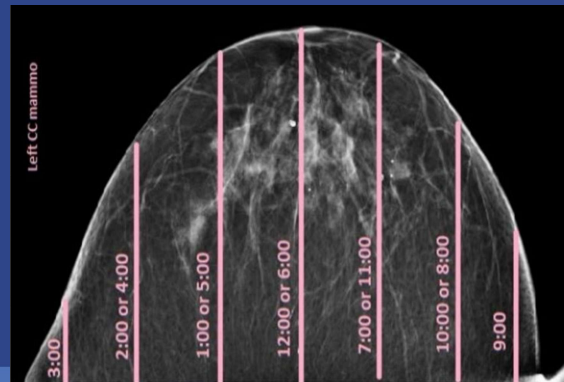
Lateral

Medial



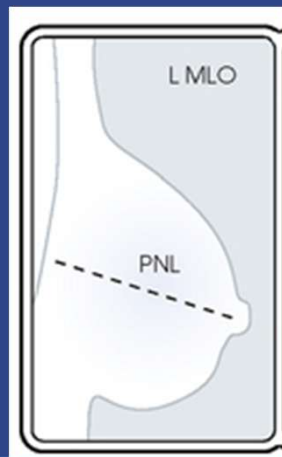
Lateral

Medial



21

MLO mammogram view



Head

Feet

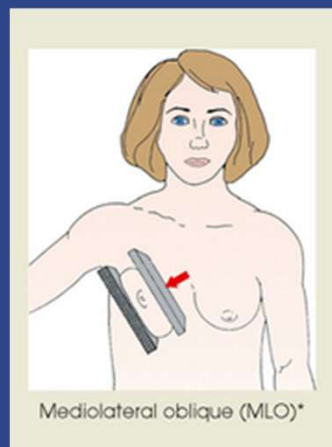
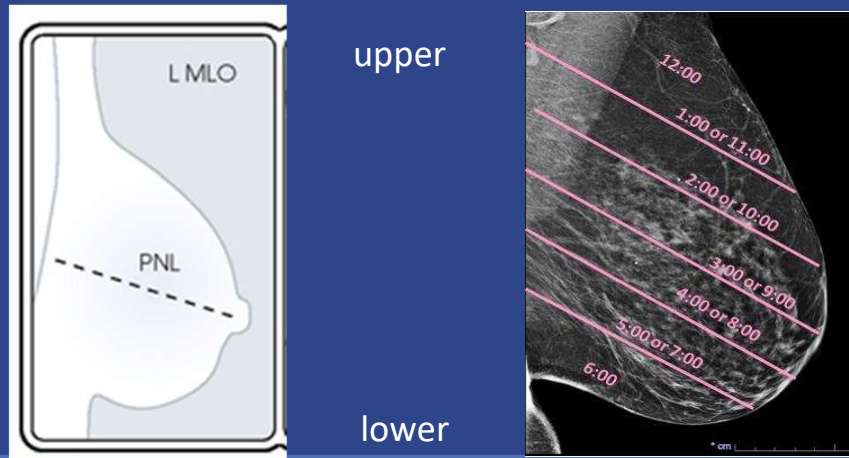


Image from Radiologykey.com/mammography-3/

22

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MLO mammogram view



23

Mammogram images

In addition to the standard routine mammogram images, there are multiple views and spot compression views that are sometimes needed

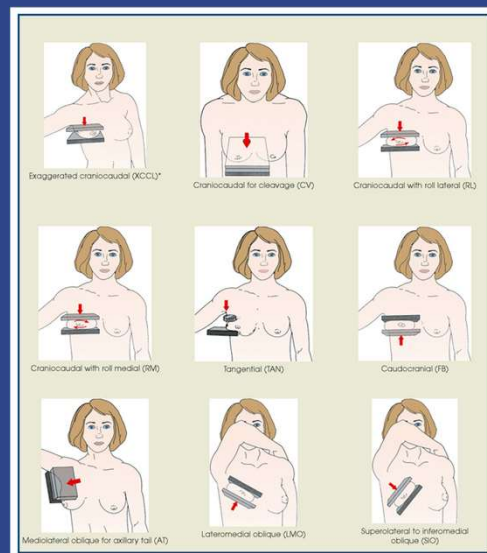


Image from Radiologykey.com/mammography-3/

24

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Understanding your clock

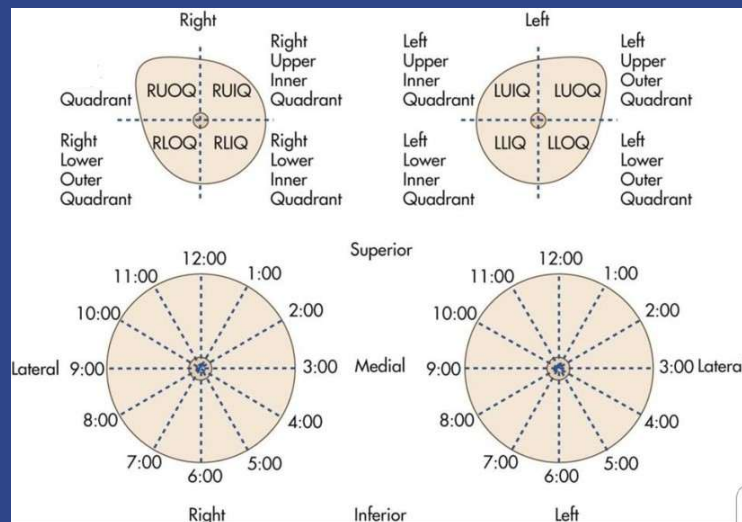


Well.... Not exactly that type of clock

- “Time” in the breast world indicates location.
- Those locations are compared to times of a clock

25

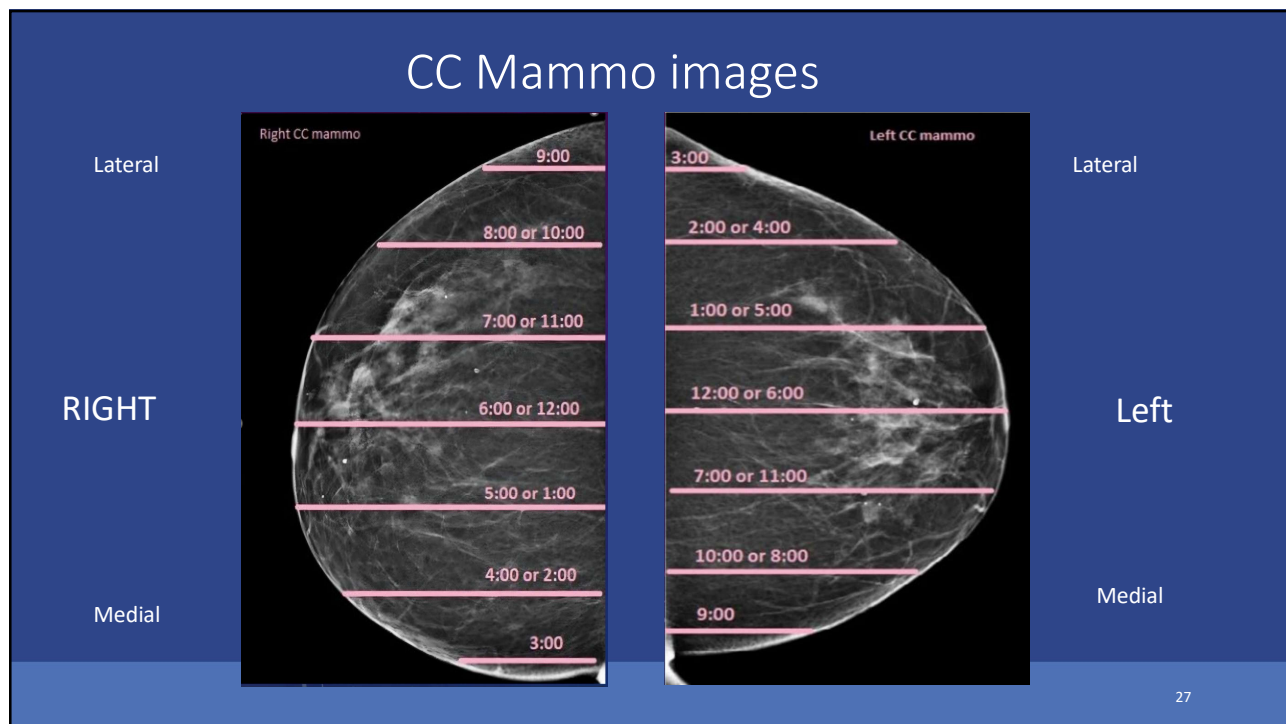
Long & Trans
vs.
Rad & A Rad



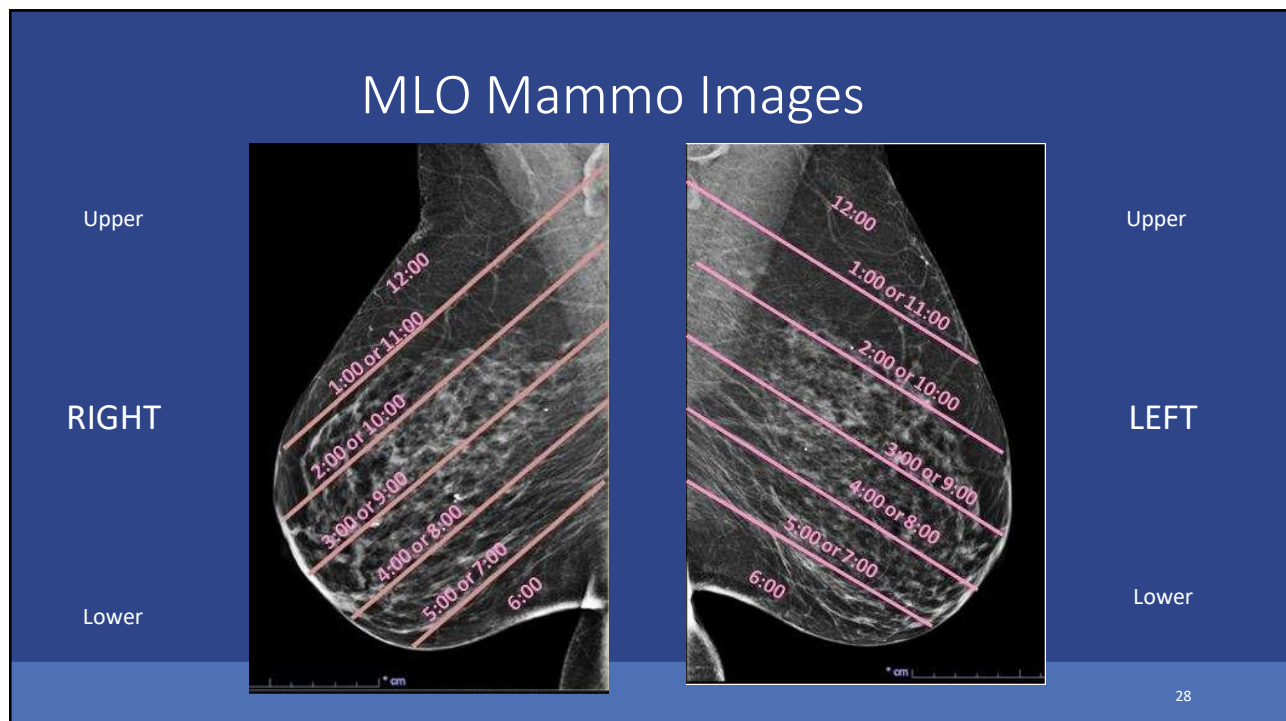
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26

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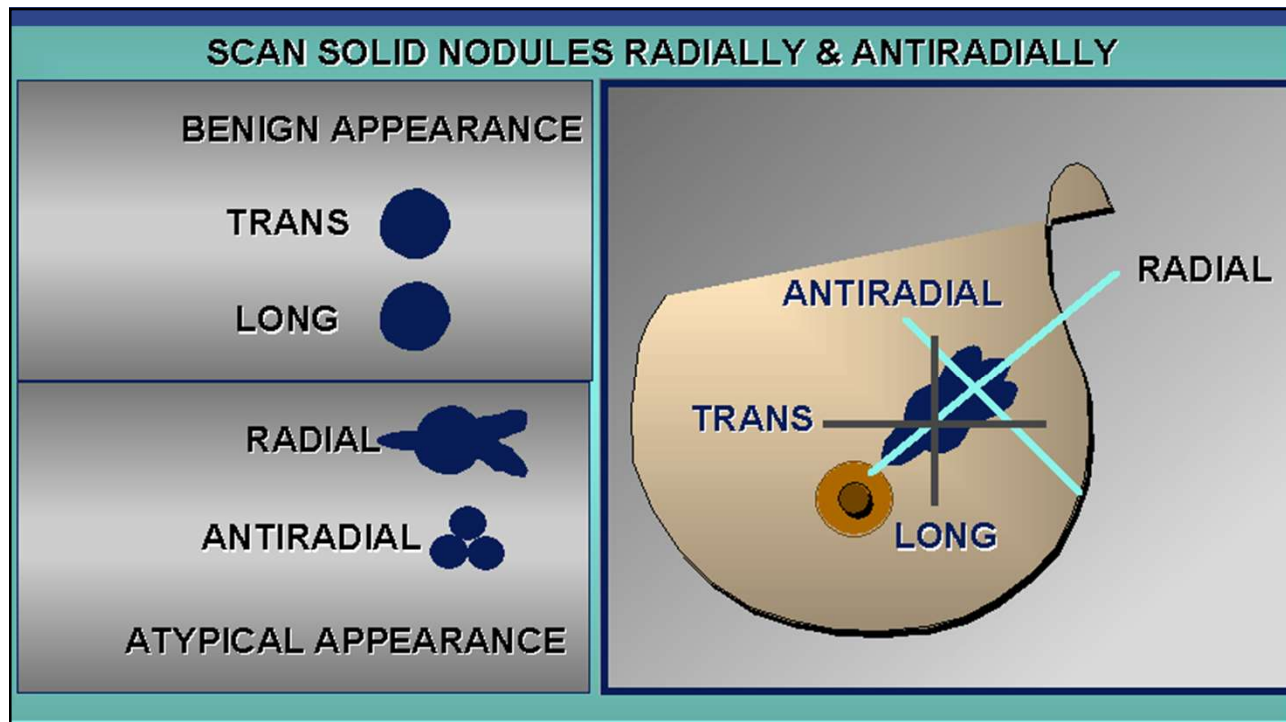


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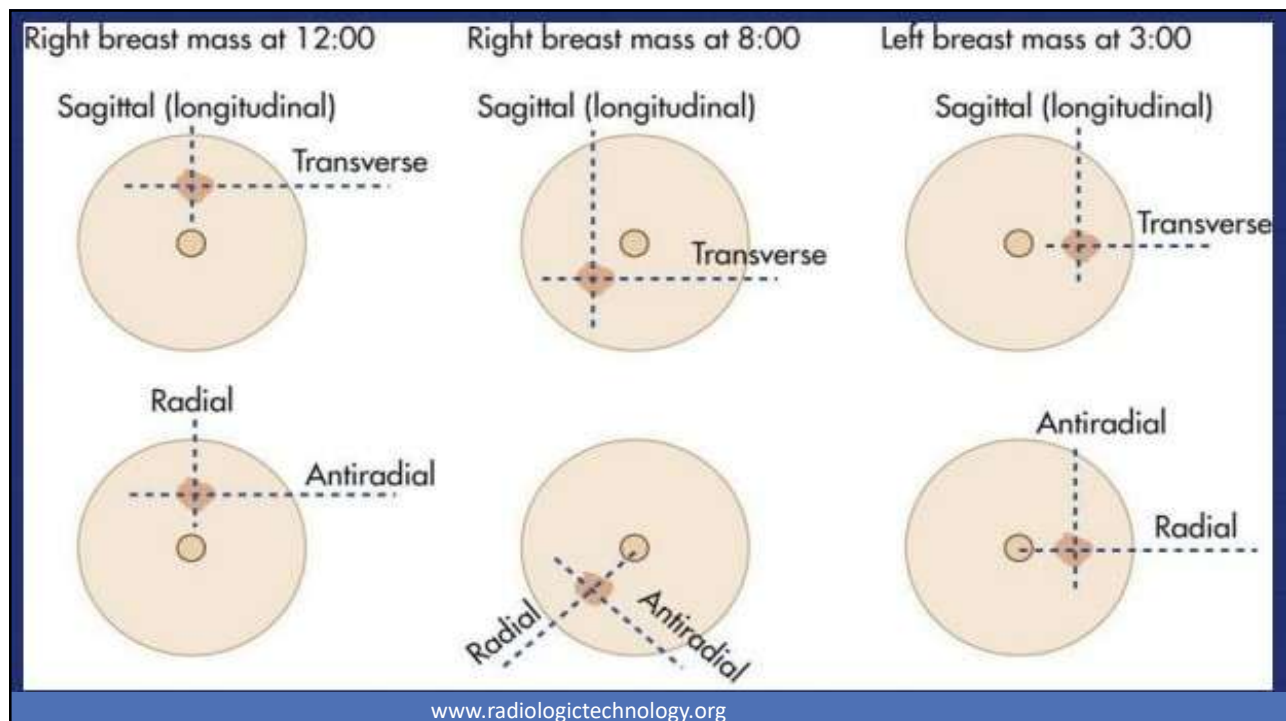


28

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29



30

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31


So, what is the best test for the breast?

<i>Mammography?</i>	They each play a role, but it depends on the reason why the imaging is needed.
<i>Ultrasound?</i>	Mammography is still the #1 standard of care for breast imaging for breast cancer.
<i>MRI?</i>	Ultrasound and MRI play a role in getting additional answers.

31

31

Mammogram



- A **mammogram** is like a room with the lights on.
- It gives you a global image of the entire breast.

32

32

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breast US

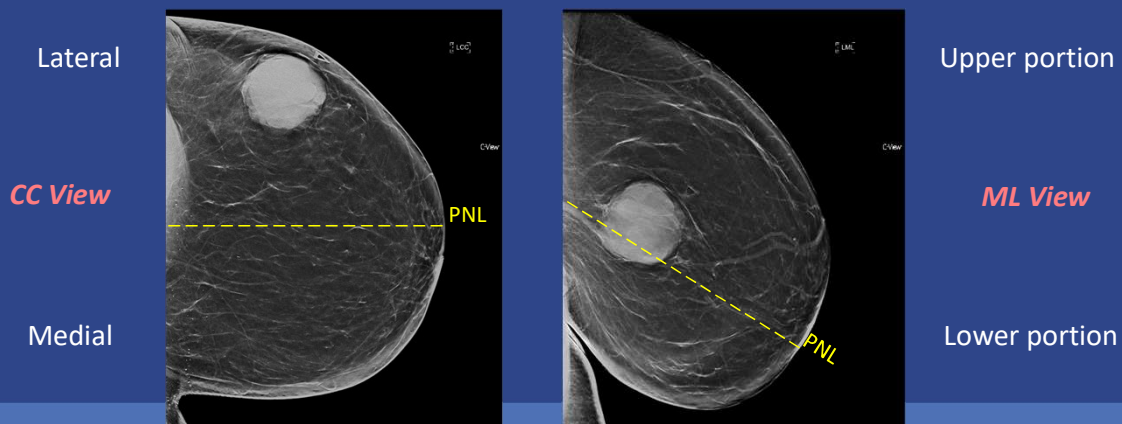
- An **ultrasound** is like walking into a dark room with a flashlight. It only sees what's directly in front of it.
- Not all cancers are visible on ultrasound.
- Micro calcifications seen on mammo are not seen on ultrasound.
- Ultrasound is limited to the sonographer and their skill set



33

33

Left mammogram images

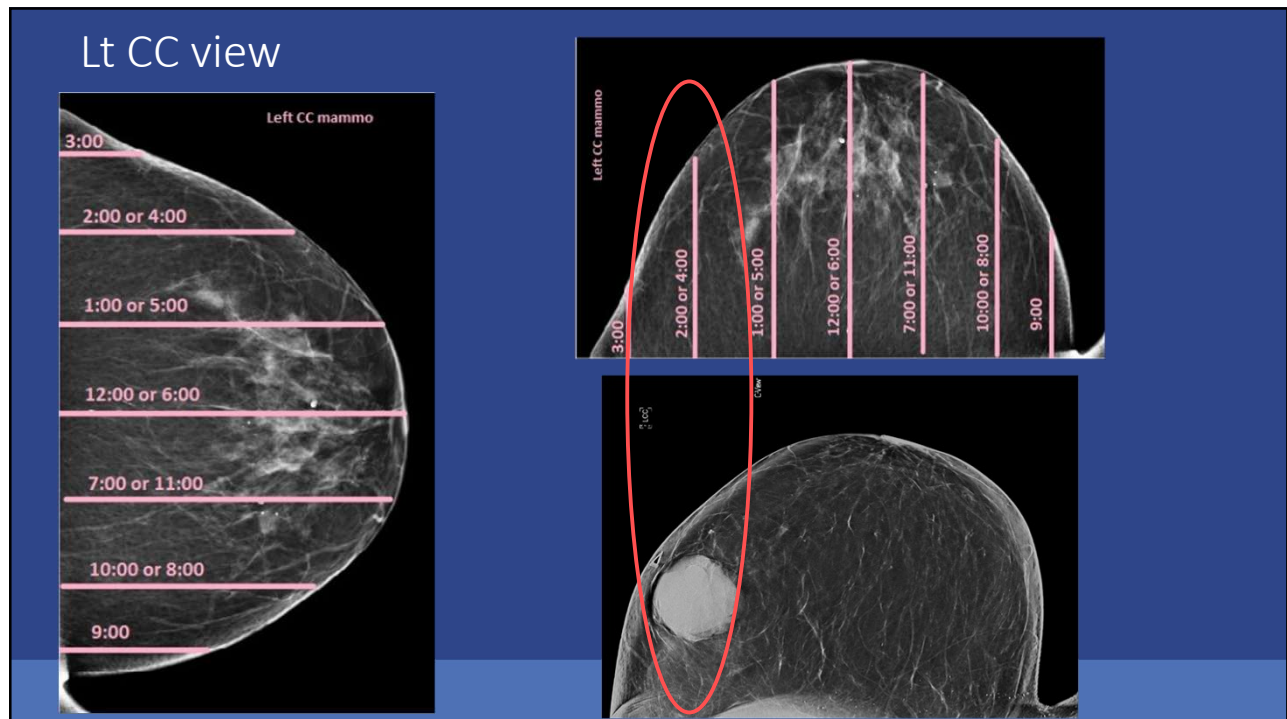


34

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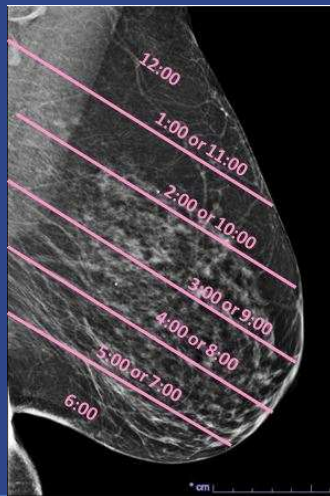
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36

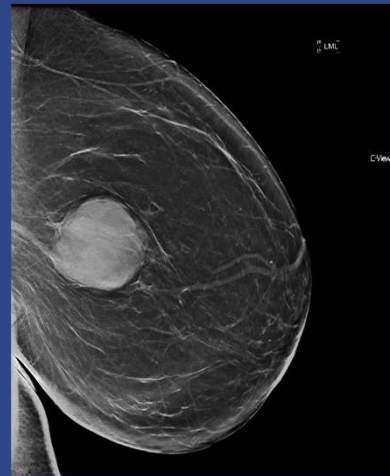
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Left mammogram



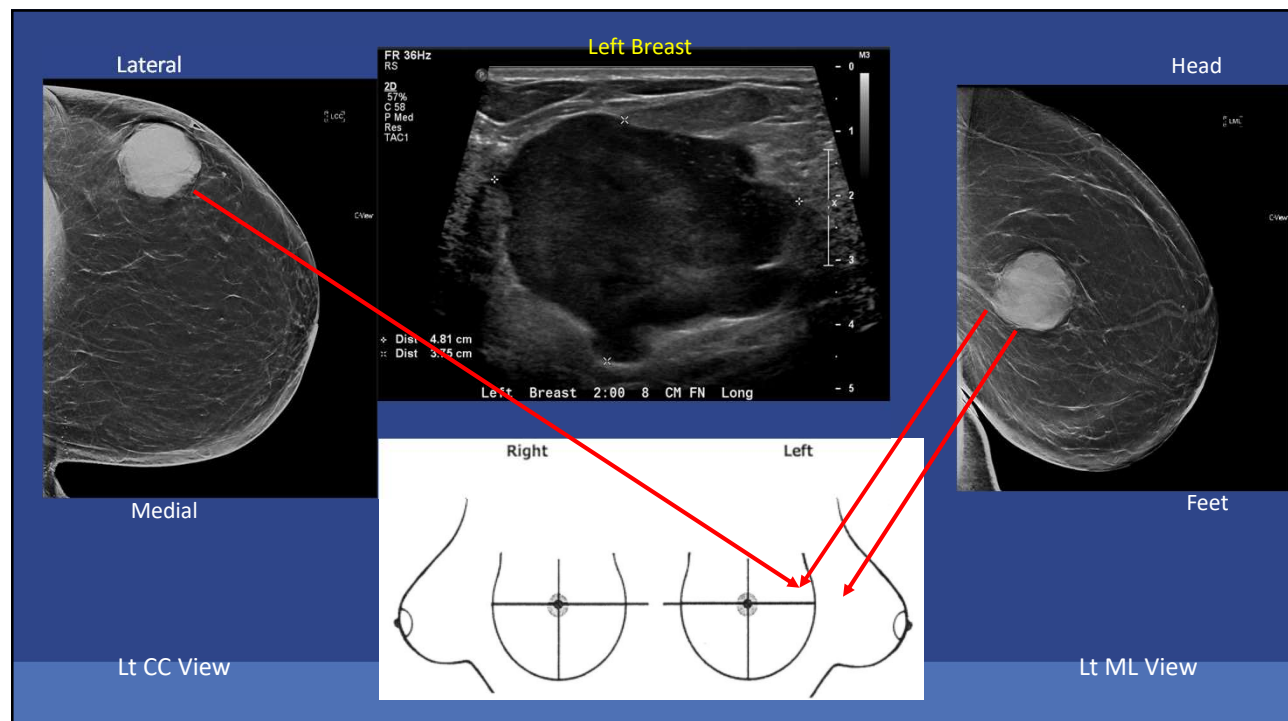
Upper

Lower



37

37



38

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Mass correlating with mammogram

Left Breast mass 2:00 position 8 CMFN

Trans



Long



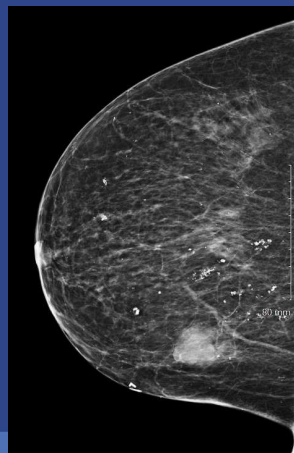
39

Right mammogram images

Lateral

CC View

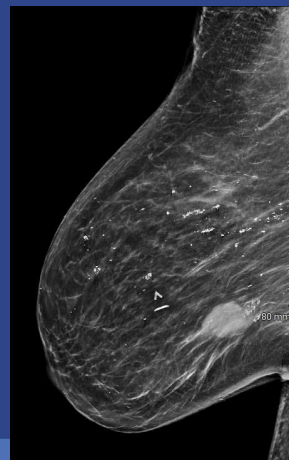
Medial



Upper
portion

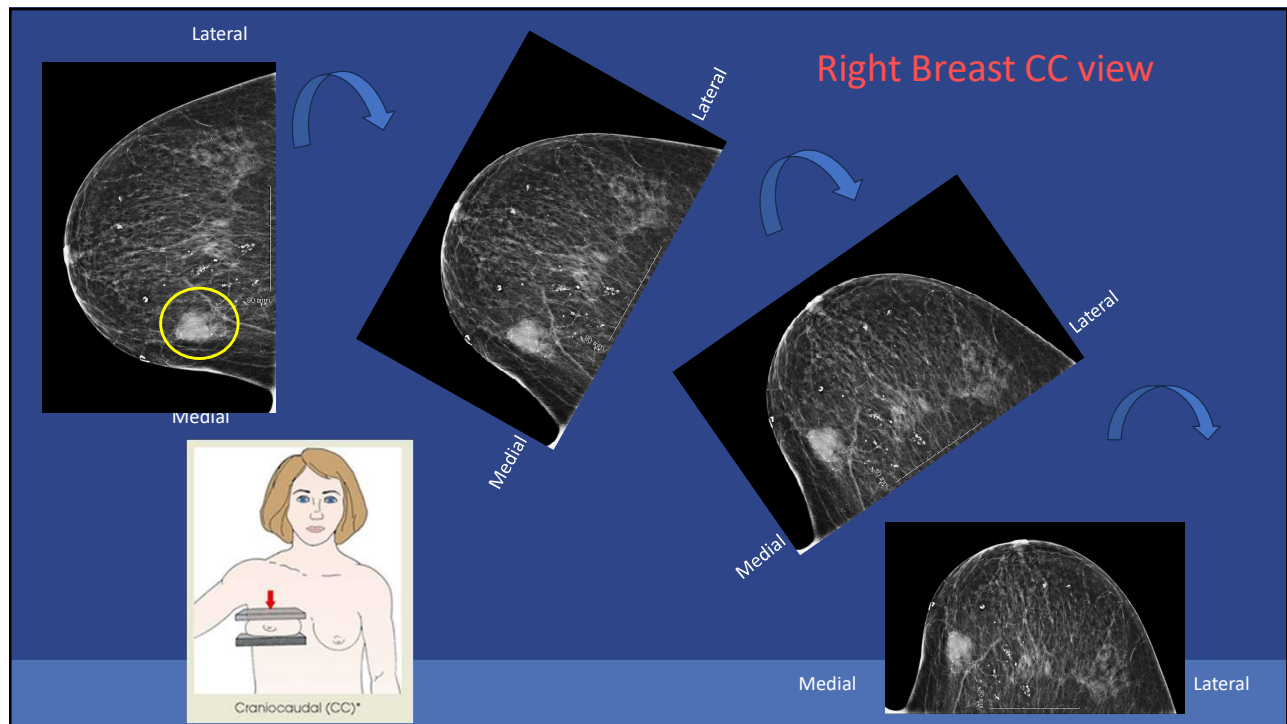
ML View

Lower
portion

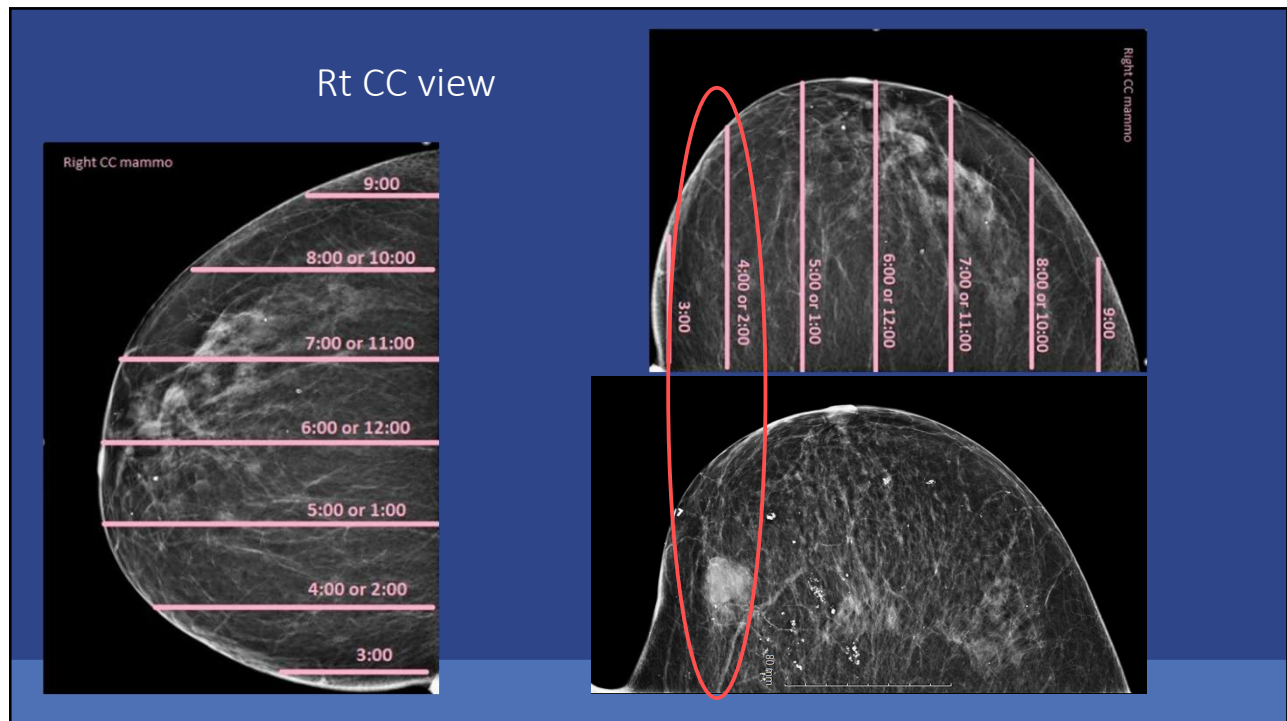


40

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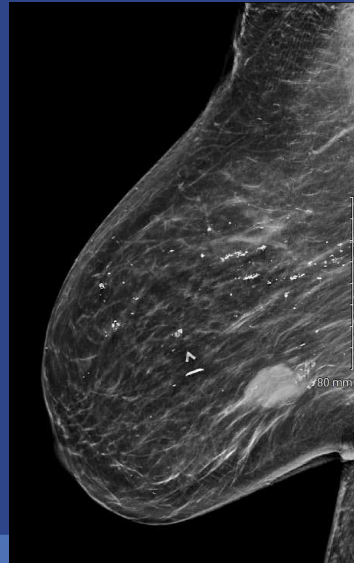
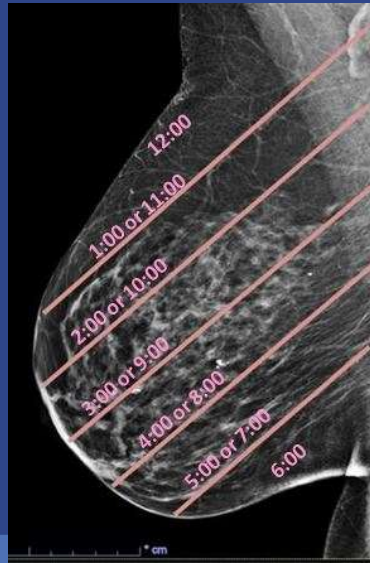
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42

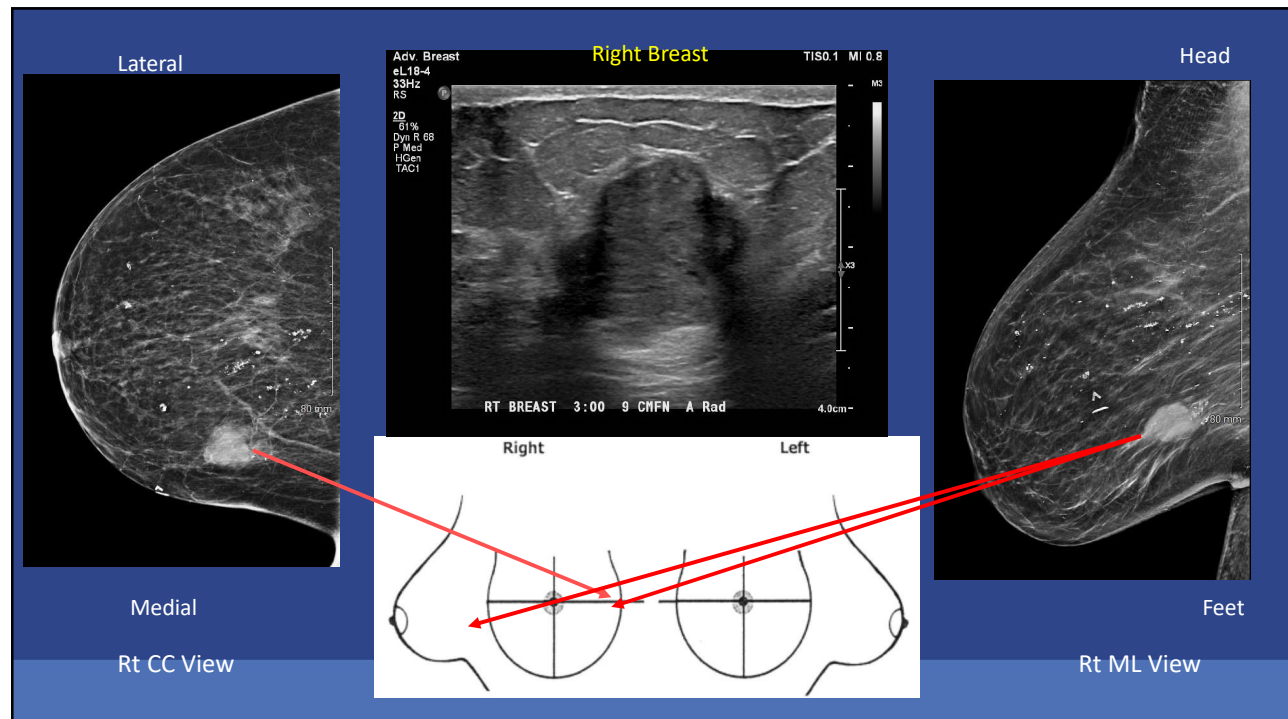
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Left mammogram



43

43

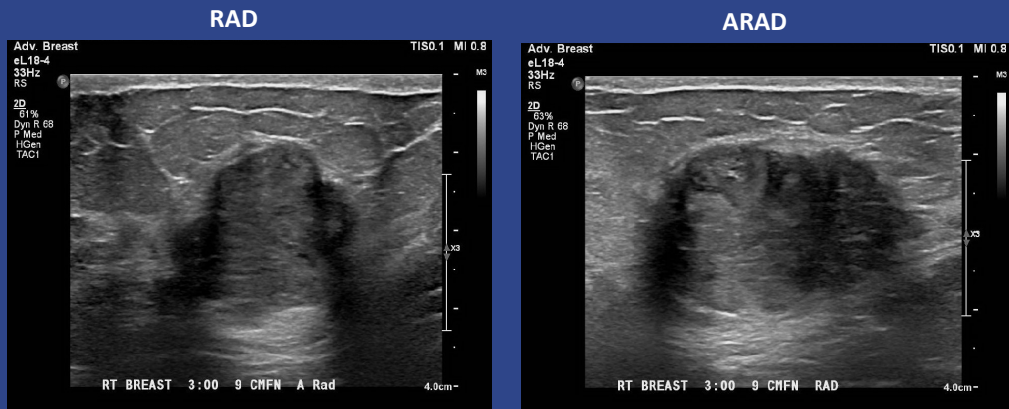


44

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Mass correlating with mammogram

Right Breast mass 3:00 position 9 CMFN



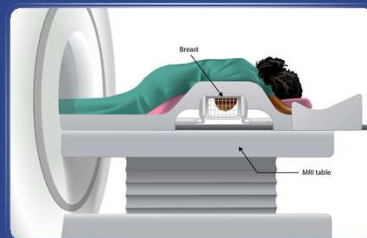
45

Mri breast

- Breast MRI is another imaging modality used with powerful magnets and radio waves.
- Breast MRI's can be helpful with further evaluating breast abnormalities that are difficult to assess with mammograms or ultrasounds, such as dense breast tissue or suspicious finding.

•Risks and Considerations:

- Some patients could be allergic to the contrast given.
- False positives: MRIs sometimes detect abnormalities that are benign, leading to unnecessary additional testing or biopsies.
- Metal Implants: Patients with certain metal implants or pacemakers may not be eligible to have an MRI.
- Position of the patient can be challenging for some patients. The patient is laying face down on the table with their arms above their head.

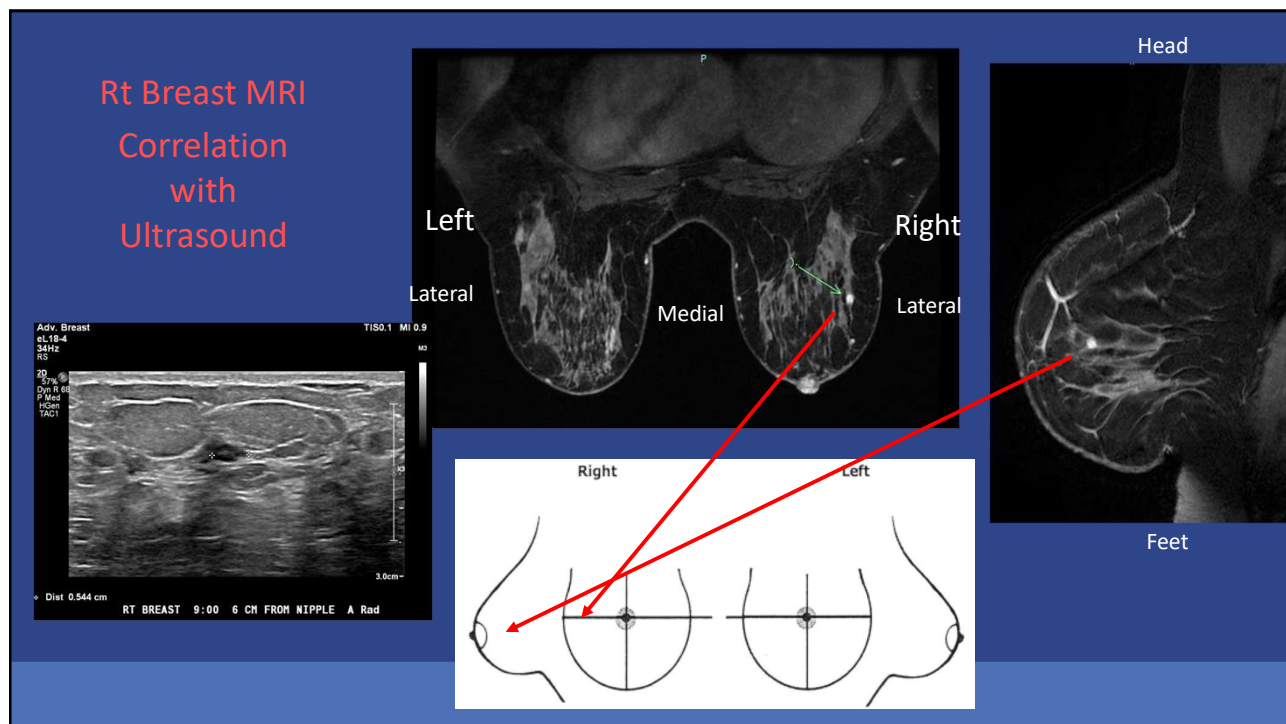


mydoctor.kaiserpermanente.org

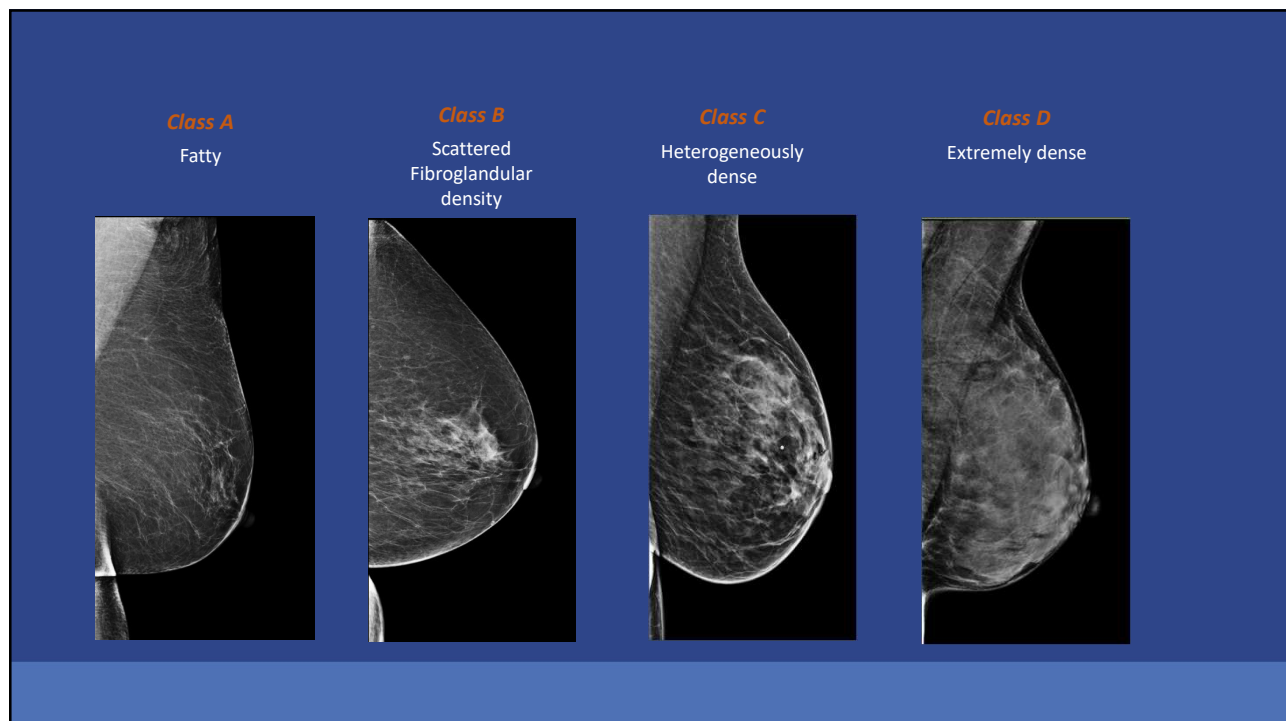
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46

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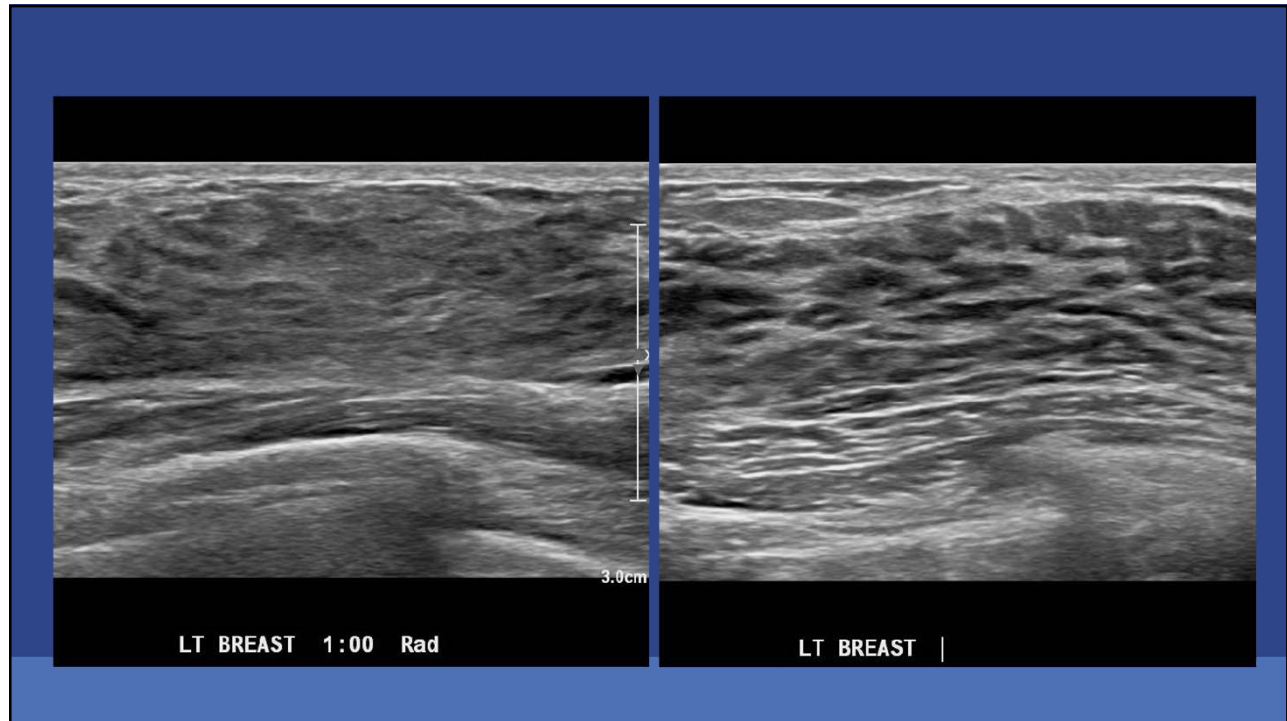


47



48

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49

BI-RAD Categories	BIRAD 0: Needs additional imaging
	BIRAD 1: Negative
	BIRAD 2: Benign
	BIRAD 3: Probably benign
	BIRAD 4: Suspicious for malignancy
	BIRAD 5: Highly suggestive of malignancy
	BIRAD 6: Known Biopsy proven malignancy

50

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Breast imaging can be a little tricky

Some pitfalls...

Watch your gains. It could lead to unnecessary procedures.

Can you can reproduce the mass in 2 planes. If you can't, why?

Make sure you're not just catching some dense tissue.

Know what a breast lobule looks like. Does it match the surrounding tissue?

Don't forget about "harmonics"

- This button can be your best friend sometimes.
- So often it will clear up a cyst or confirm real echoes within a structure.

51

Harmonics

Image with out harmonics



Same image with harmonics



52

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Harmonics

With out harmonics



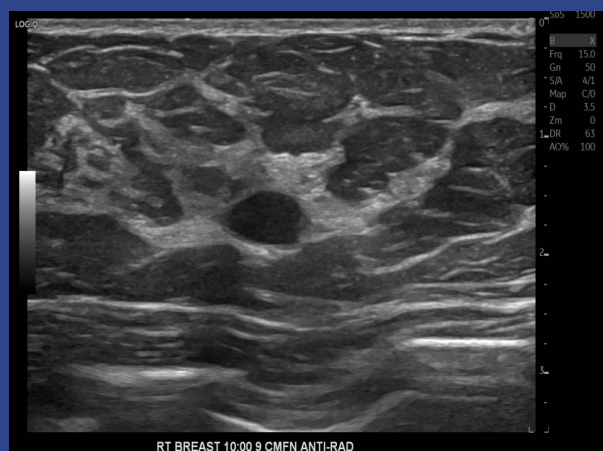
With harmonics



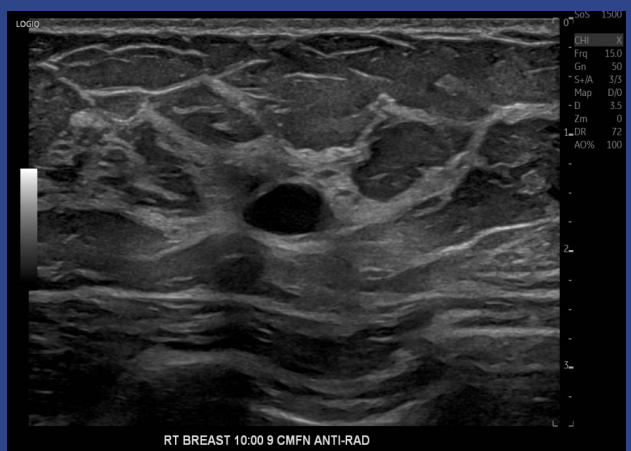
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Harmonics

With out harmonics



With harmonics



54

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Maximize your image quality

Image from an outside facility

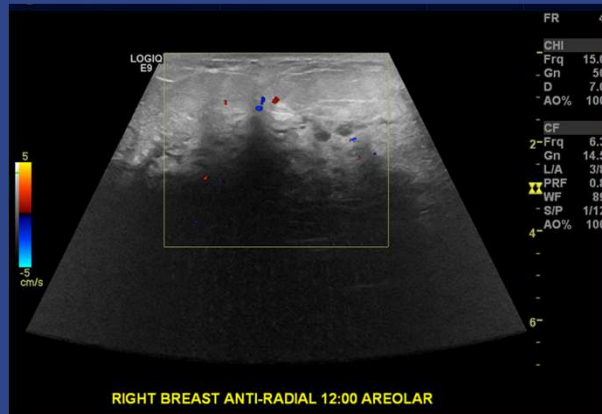
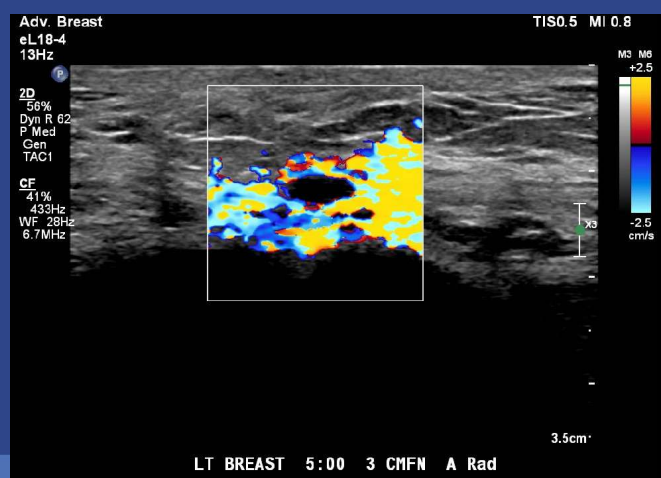
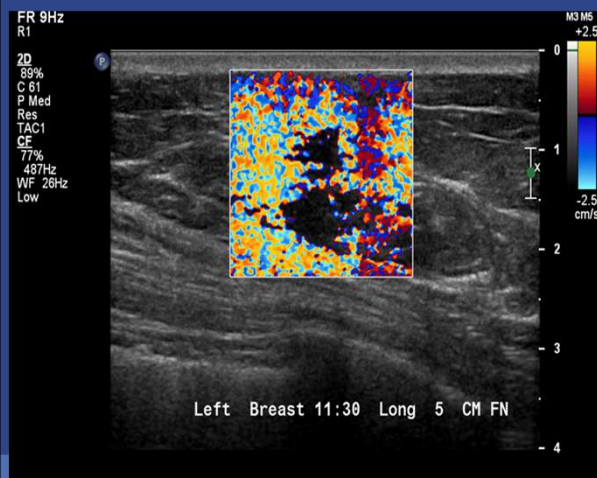


Image from our facility.



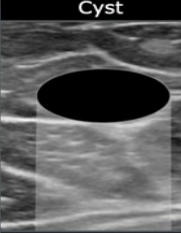
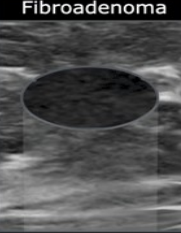

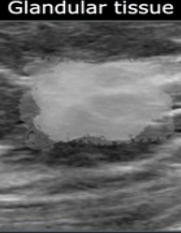
55

Fremitus



56


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Benign	Cyst	Fibroadenoma	Cancer	Glandular tissue	Malignant
					
	Anechoic pattern	Hypoechoic	Hypoechoic	Hyperechoic	
	Oval or round shape	Most common: • oval or round Less frequent: • lobulated	Most common: • irregular shape Less frequent: • round or oval	Locally prominent glandular tissue	
	Circumscribed margin	Circumscribed margin	Margin is not circumscribed: • Indistinct • angular • microlobulated • spiculated		
	Horizontal orientation	Horizontal orientation	Vertical orientation		
	Posterior Enhancement	Sometimes minimal posterior enhancement	Frequently posterior shadowing	No feature	
	No calcifications	May have gross calcifications	May have small calcifications in or outside mass	No	

57

Simple Cyst

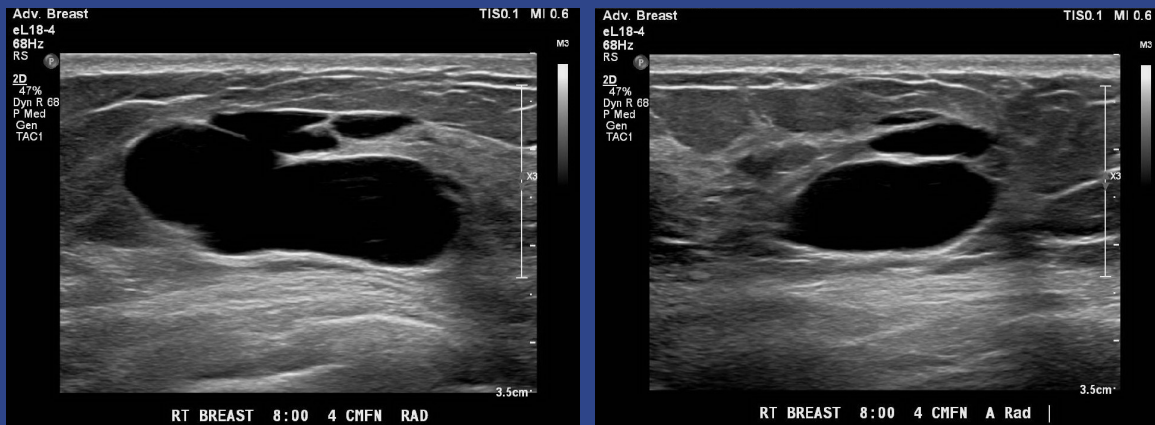
- Cyst is a fluid filled sac that can develop in the breast.
- They aren't cancerous
- On ultrasound they'll appear round, anechoic with through transmission.
- If engorged, can become painful



58

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Cyst with septations



59

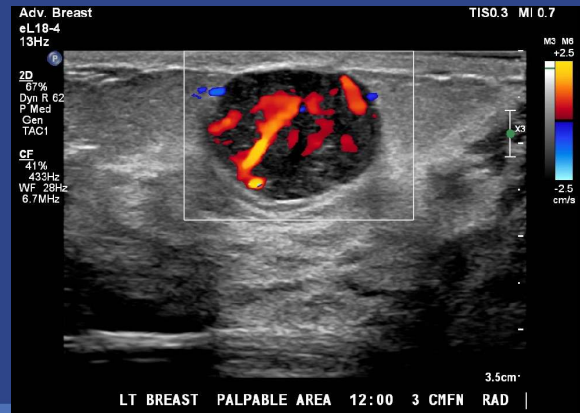
What do you think this is?



60

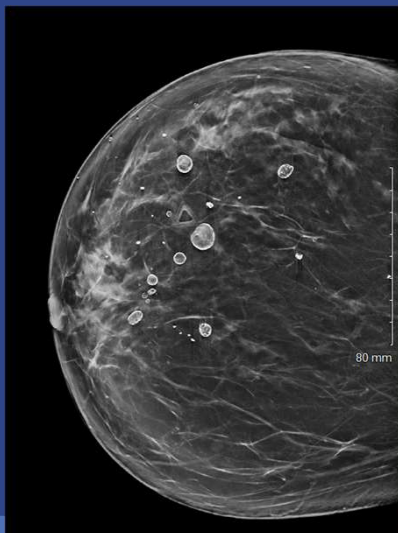
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Sometimes we can be fooled



61

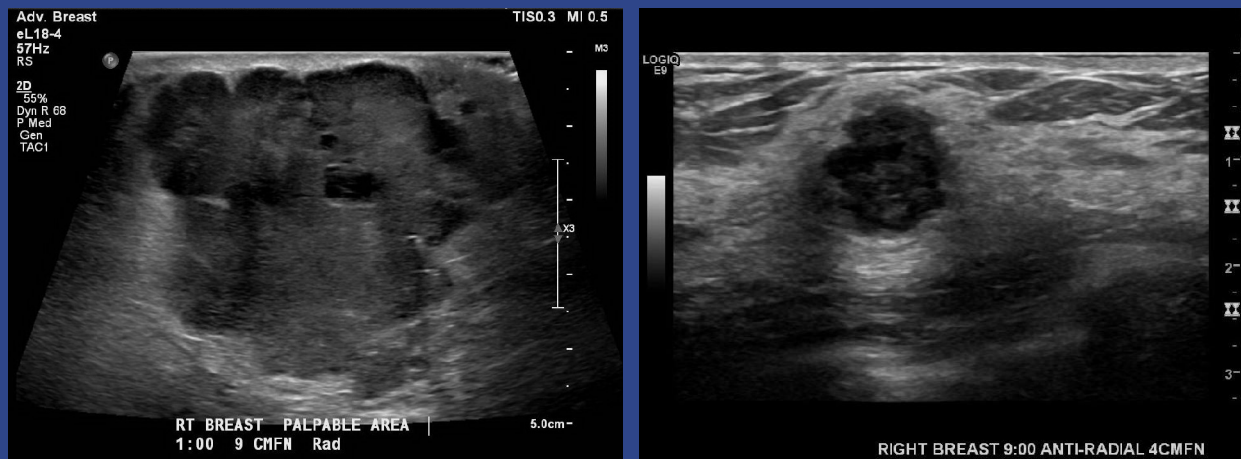
Oil cyst



62

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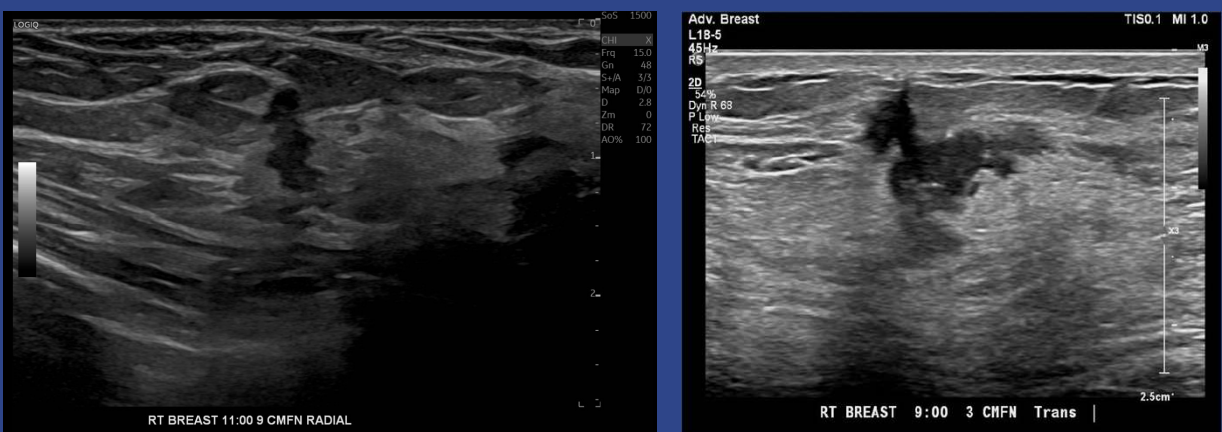
Macro and Micro lobular mass



63

Taller than wide

Irregular

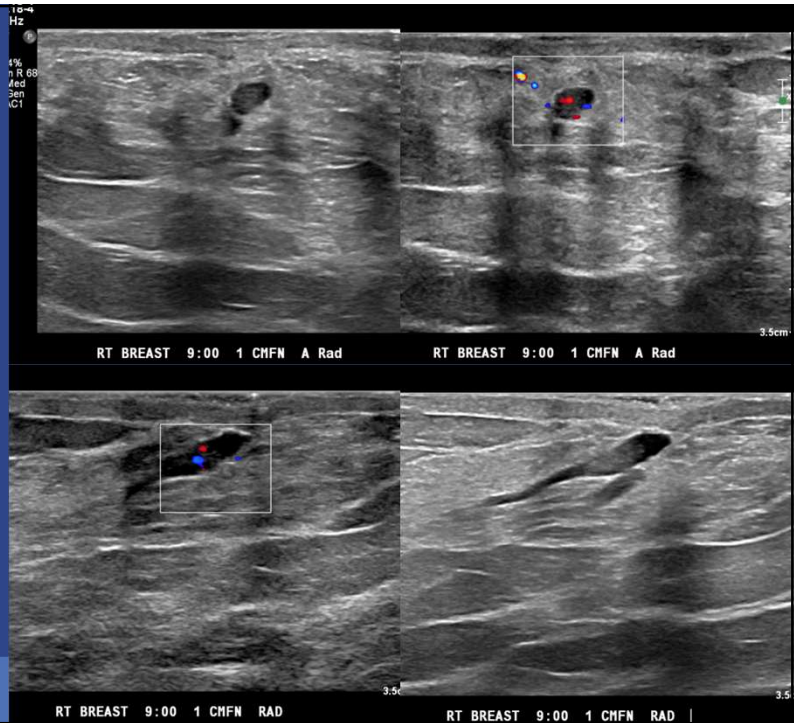


64

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Papilloma

- A Papilloma is a benign mass that develops in the milk duct of the breast.
- They can cause clear or bloody nipple discharge.
- If they're large enough, they might be palpable.
- They may or may not show on mammogram.
- Always put color on them.



65

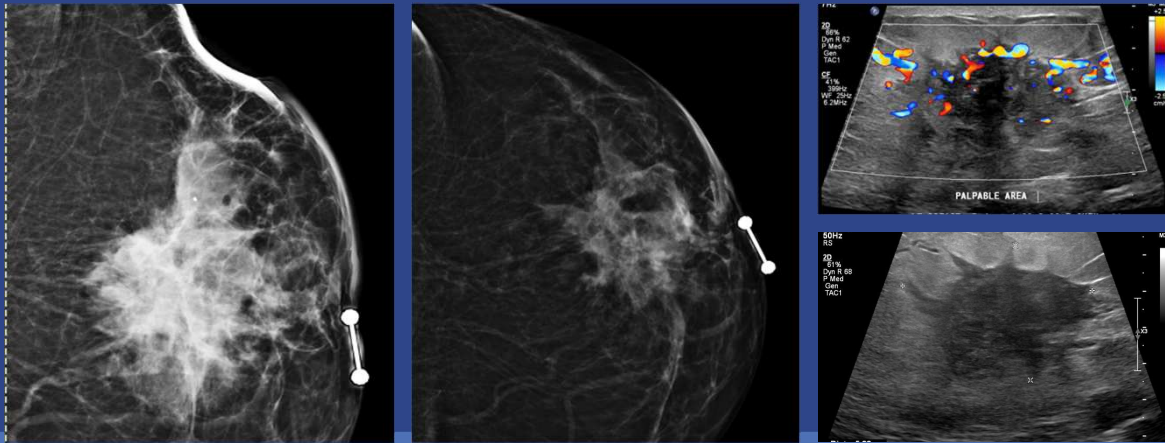
Breast abscess



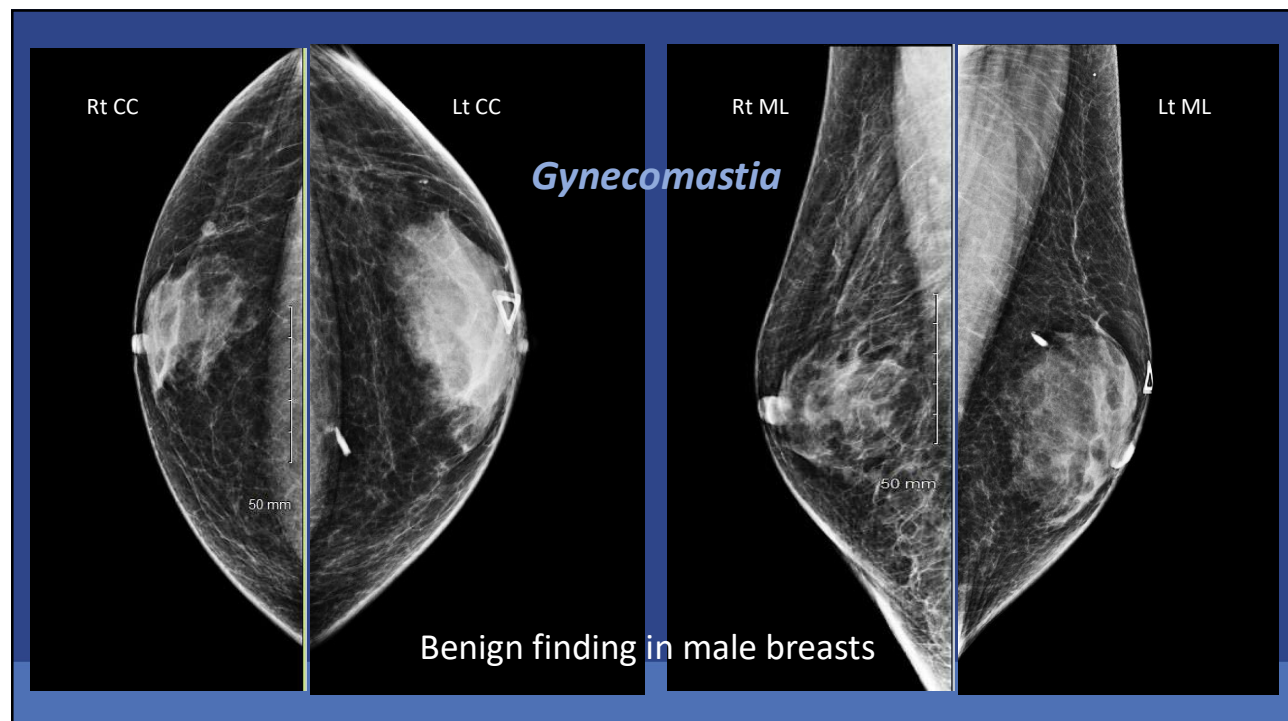
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Breast abscess

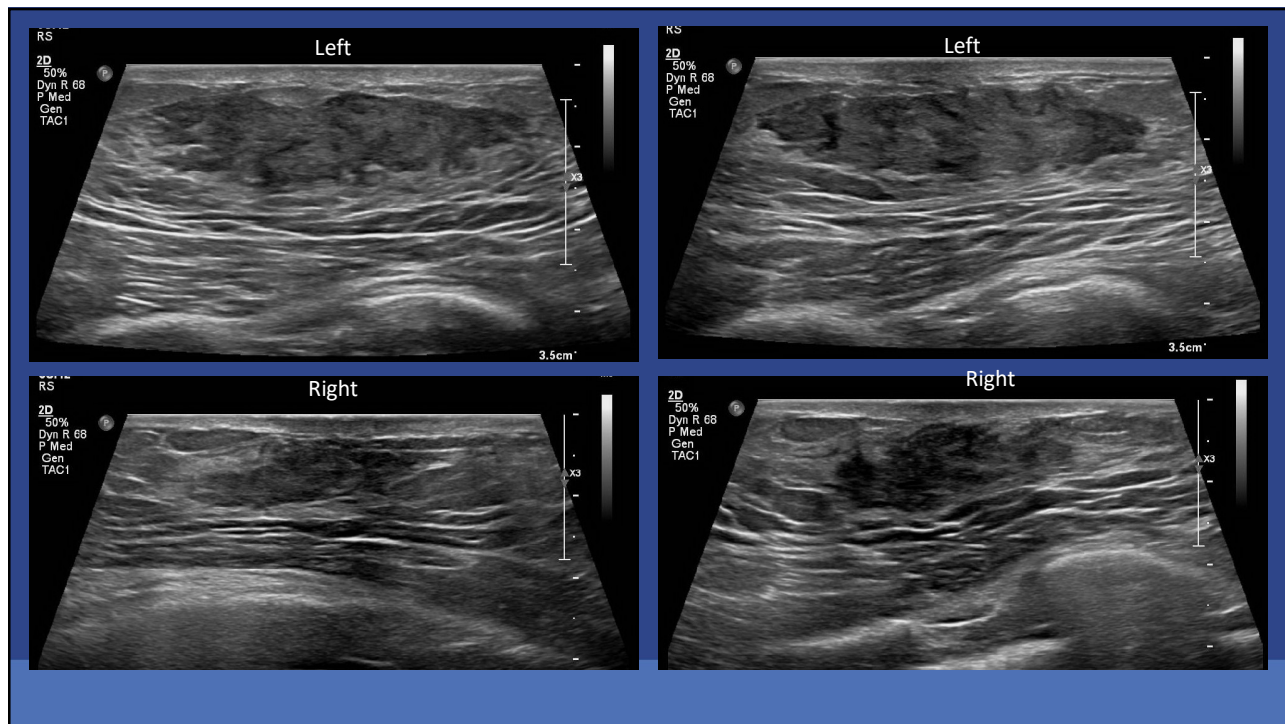


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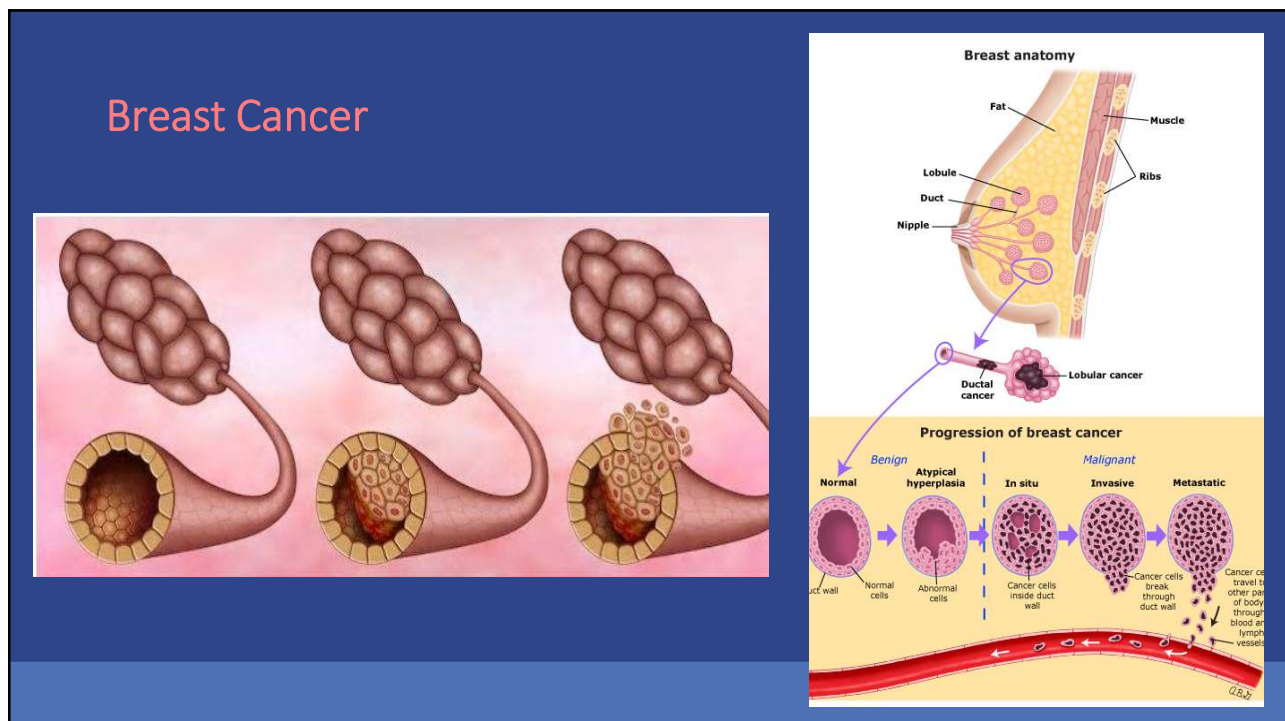


68

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69



70

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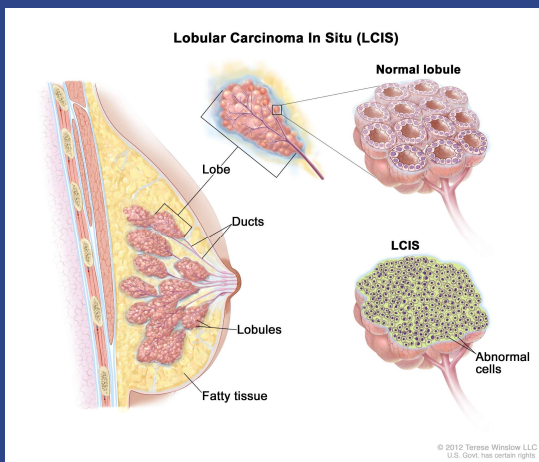
DCIS

- *Ductal carcinoma in situ (DCIS) are abnormal cells inside a milk duct
 - *DCIS is considered the earliest form of breast cancer
 - *It's noninvasive, meaning it hasn't spread outside of the milk duct
- Accounts for about 20-25% of all new breast cancers in the United States.



71

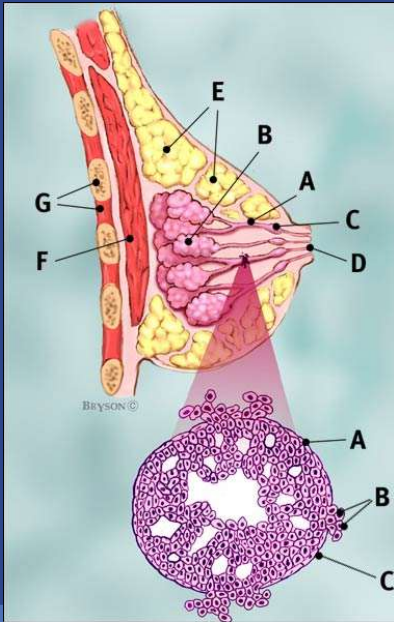
Lobular Carcinoma



- Lobular breast cancer, also called invasive lobular carcinoma (ILC), occurs in the breast lobes or lobules
- Lobules are the milk producing gland of the breast

72

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Breycan.org

Invasive ductal carcinoma

*IDC, also known as infiltrating ductal carcinoma, is cancer that began growing in a milk duct and has invaded the fibrous or fatty tissue of the breast outside of the duct

*IDC is the most common form of breast cancer.

*80% of breast cancers are invasive ductal carcinoma

73

Triple-Negative Breast Cancer

This is a great image from the CDC that explains Triple-Negative Breast Cancer.

Triple-Negative Breast Cancer



Think of a cancer cell as a house. To get inside to destroy the cancer, we must bypass 3 locks on the front door: estrogen, progesterone, and HER2.



If your cancer tests positive for any of these 3 locks, which are known as receptors, then doctors have a few keys they can use to get inside the cell to destroy it.



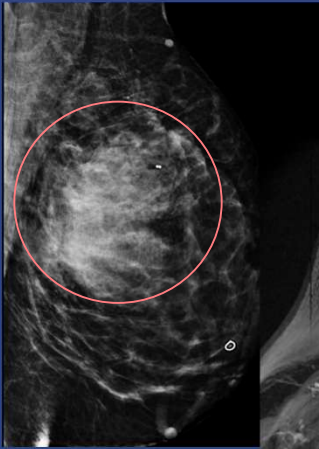
If you have triple-negative breast cancer, it means those locks aren't there. So the keys doctors usually use won't work. Fortunately, chemotherapy is still an effective option.

74

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Tripple negative Breast Cancer

Left mammo



MRI Breast



Ultrasound left Breast



75

Inflammatory Breast Cancer

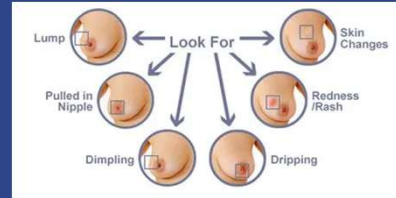
- *Inflammatory breast cancer is rare and very aggressive.
- *According to the American cancer society only about 1-5% of all breast cancer cases in the US are inflammatory
- *Spreads quickly, With in 3-6 months of onset.
- *At diagnosis, inflammatory breast CA is either stage III or IV
- *It usually affects younger women (younger than 40)

76

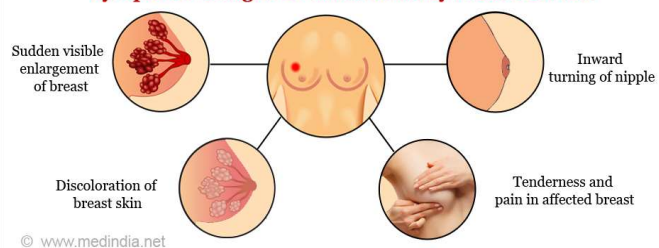
Inflammatory Breast Cancer



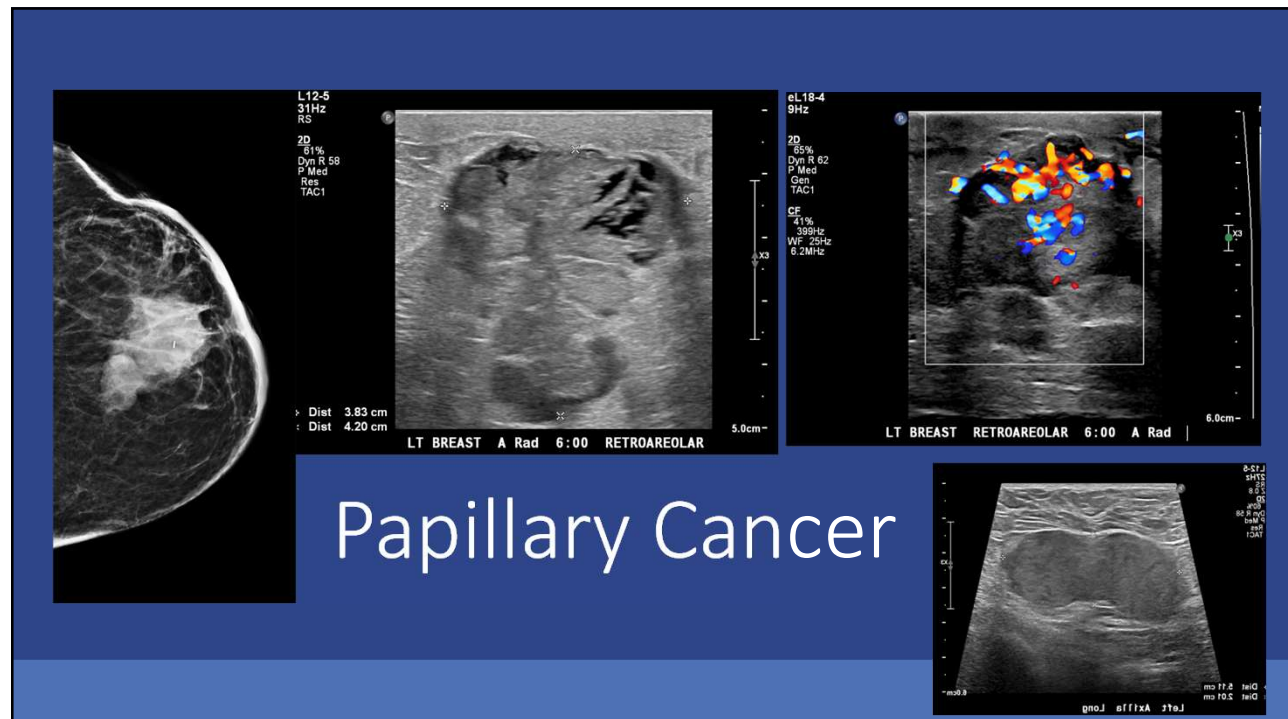
Breast



Symptoms & Signs Of Inflammatory Breast Cancer



77



78

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Ultrasound guided breast procedures

Core Biopsy

Cyst aspiration

FNA- fine needle aspiration

Needle localization

SAVI scout placement

79

Breast Biopsy

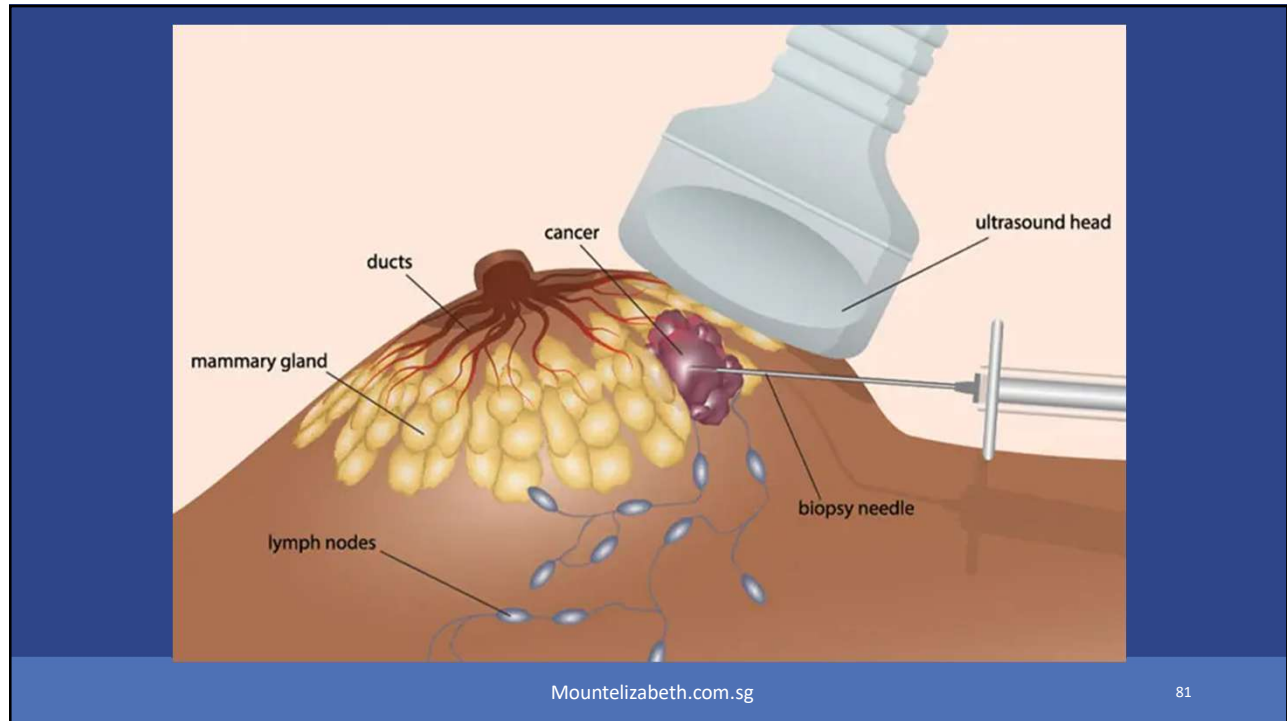


www.disnola.com

- Ultrasound guided breast biopsy is a procedure to remove a small piece of tissue to determine the finding of the mass.
- You want to position your patient in a supine position with their arm raised above their head.
- In some cases, you may have to slightly decub your patient depending on the location of the mass

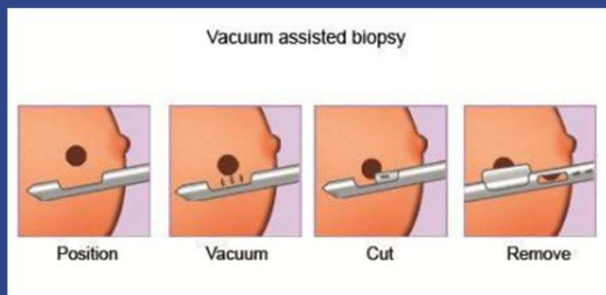
80

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81

Core Biopsy



www.researchgate.net

- A vacuum assisted biopsy device pulls the mass down into the barrel, takes a slice of the mass and then removes the sample into a chamber for storage.
- Each time the radiologist deploys the trigger, it takes additional passes.

82

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Core Biopsy

Needle placed posterior to mass

Barrel of the biopsy gun open



83

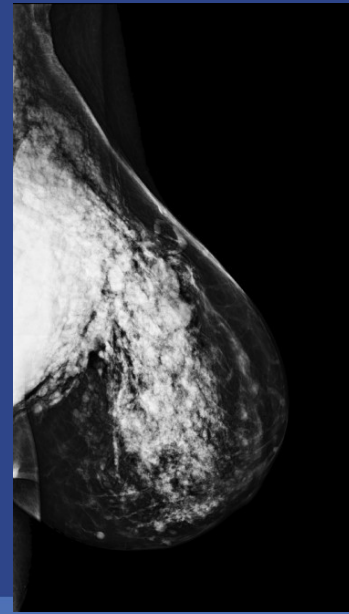
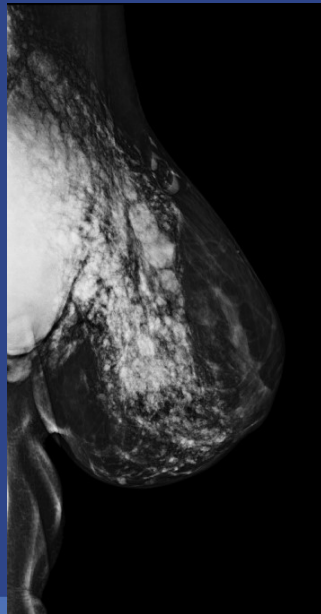


84

84

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What is that?!



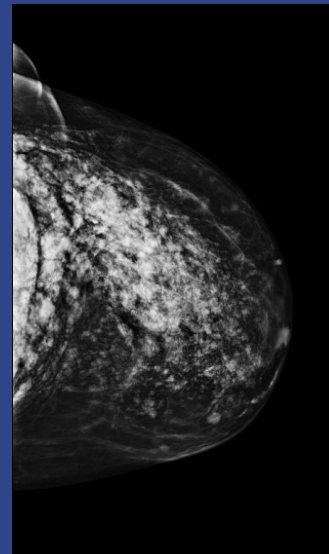
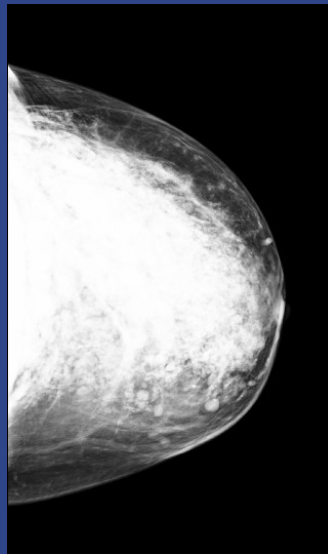
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85

Ruptured silicone
implant

Patient with silicone
implants that are
30+ years old

Patient fell which led
to the rupture of her
implant.



86

86

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Interesting case #2

- 52-year-old female
- No family history of breast cancer
- Comes in for a mammogram due to rapid growth of her right breast
- Patient has bilat breast implants that were placed 2012
- Type of breast implants: Gummy Bear implants (Textured implant)

87

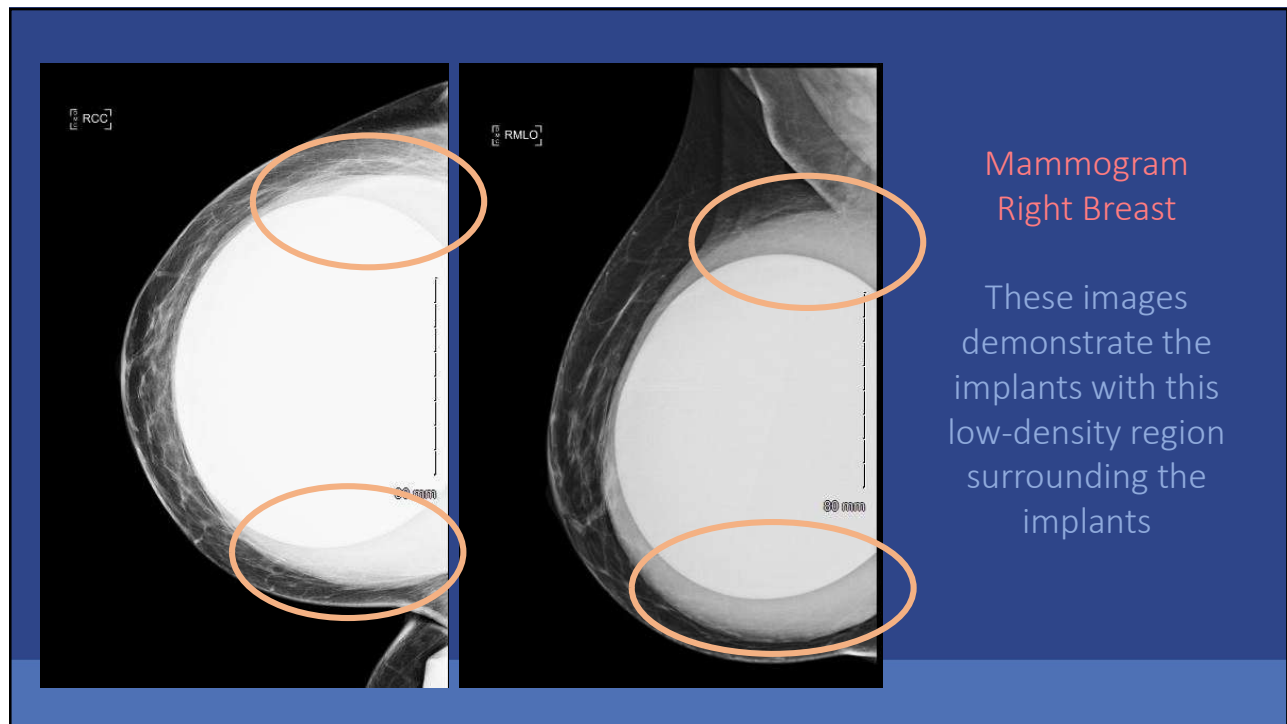
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Textured implants



88


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89

Mammogram report

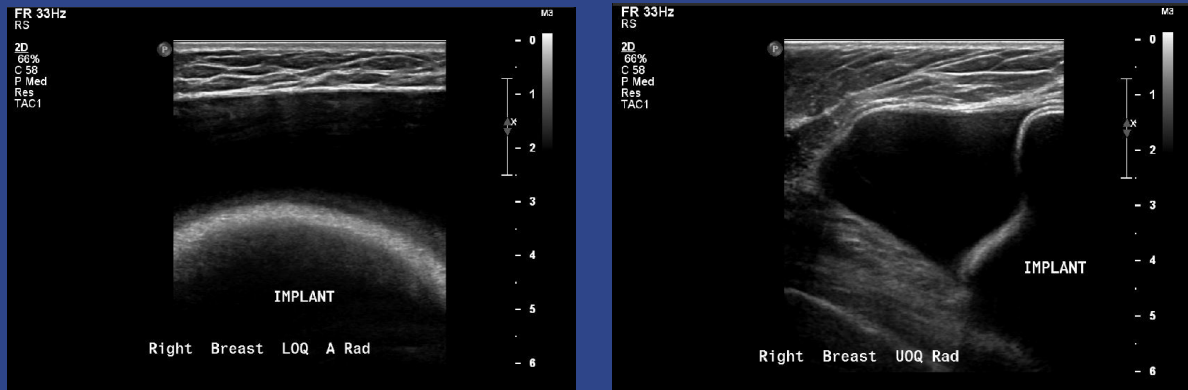
- *Fluid with soft tissue echogenicity component may represent seroma or complex fluid. However, breast implant associated anaplastic large-cell lymphoma (BIA-ALCL) is rare, but a known form of lymphoma associated with textured breast implants.
- *Ultrasound is recommended for further evaluation.



90

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Ultrasound images of the right breast

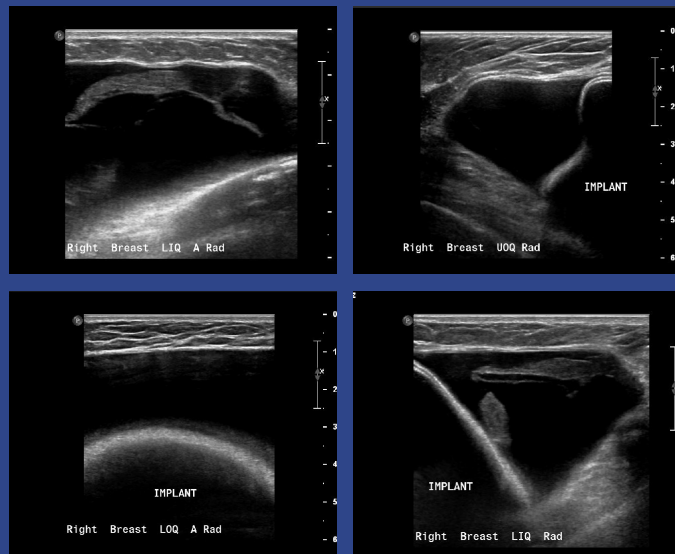


91

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Ultrasound images of the right breast


- You can see the fluid surrounding the implant in each quadrant of the breast



92

92

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Right Breast LIQ A Rad

Right breast ultrasound report

- Ultrasound confirmed a complex fluid collection
- Ultrasound guided aspiration was recommended


93

Ultrasound guided breast aspiration



FR 39Hz
RS
2D
62%
C 59
P Med
Res
TAC1

Right Breast Lateral
ASPIRATION



FR 42Hz
RS
2D
62%
C 59
P Med
Res
TAC1

Right Breast Lateral
ASPIRATION

94

94

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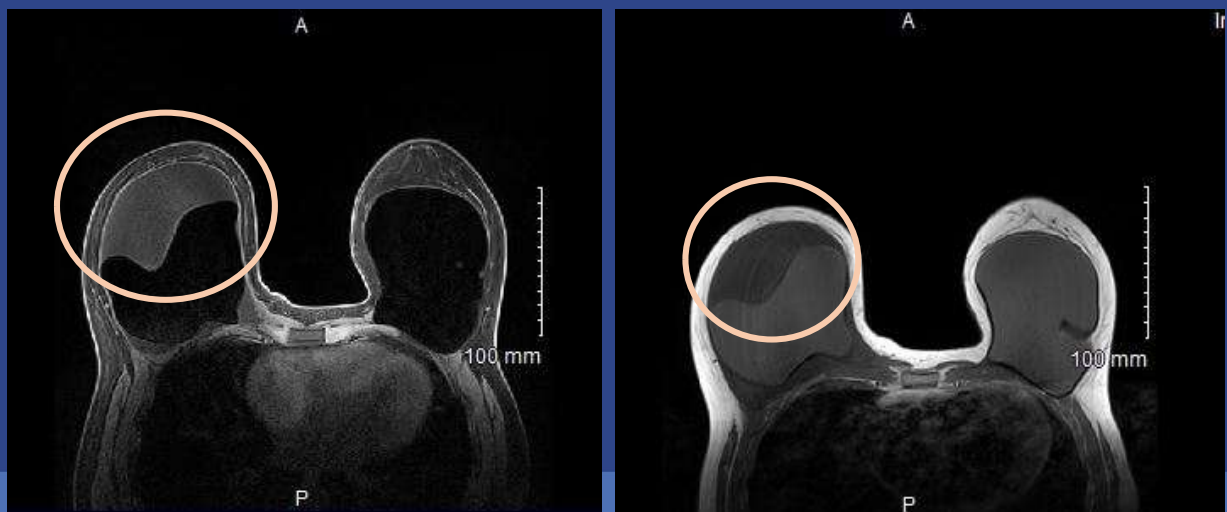
Breast ultrasound aspiration

- 100 cc of yellow colored fluid was aspirated for diagnostic purpose
- Results came back positive for BIA-ALCL: Breast implant associated anaplastic large-cell lymphoma

95

95

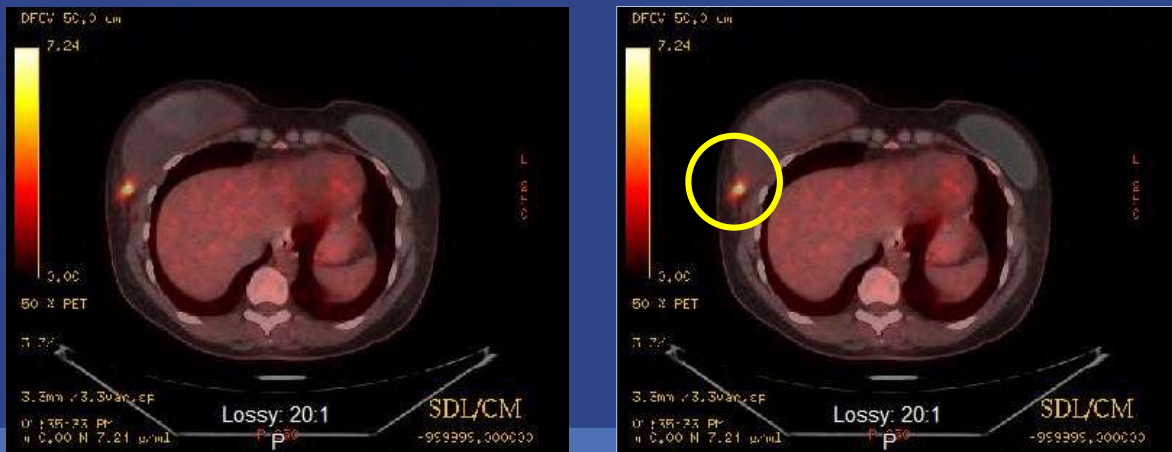
Mri of the breast



96

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Pet scan (nuclear medicine)



97

Operative report

- Right breast implant removal and total capsulectomy
- Removal of a suspicious soft tissue mass along the right breast in the inferior lateral aspect
- Drainage of 280 ml of seroma fluid from the right breast
- Left breast implant removal and total capsulectomy
- Stage IIA BIA-ALC. The disease had spread outside of the capsule and has involved the skeletal muscle as well.
- Radiation was recommended
- *Conclusion: She's been cancer free for 3 years now and is doing great!*

98

98

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Interesting case #3

- 28-year-old female who complains of an area of pain for 6 months, but when she rubs it, it goes away.
- Only family H/O Breast cancer was her aunt
- No personal history of cancer
- Because of her age, we start with an ultrasound

99

99



100

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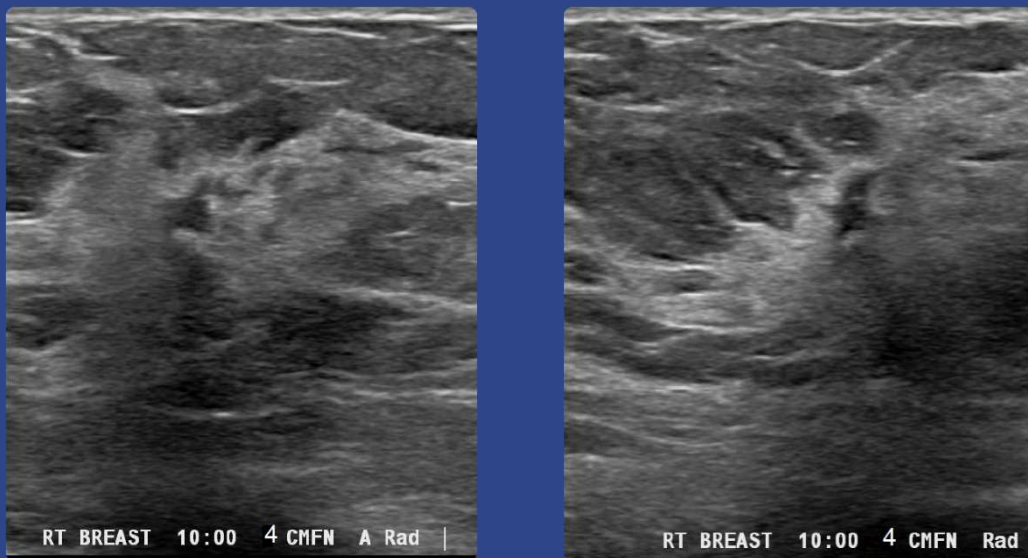
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Scanned area of pain



101

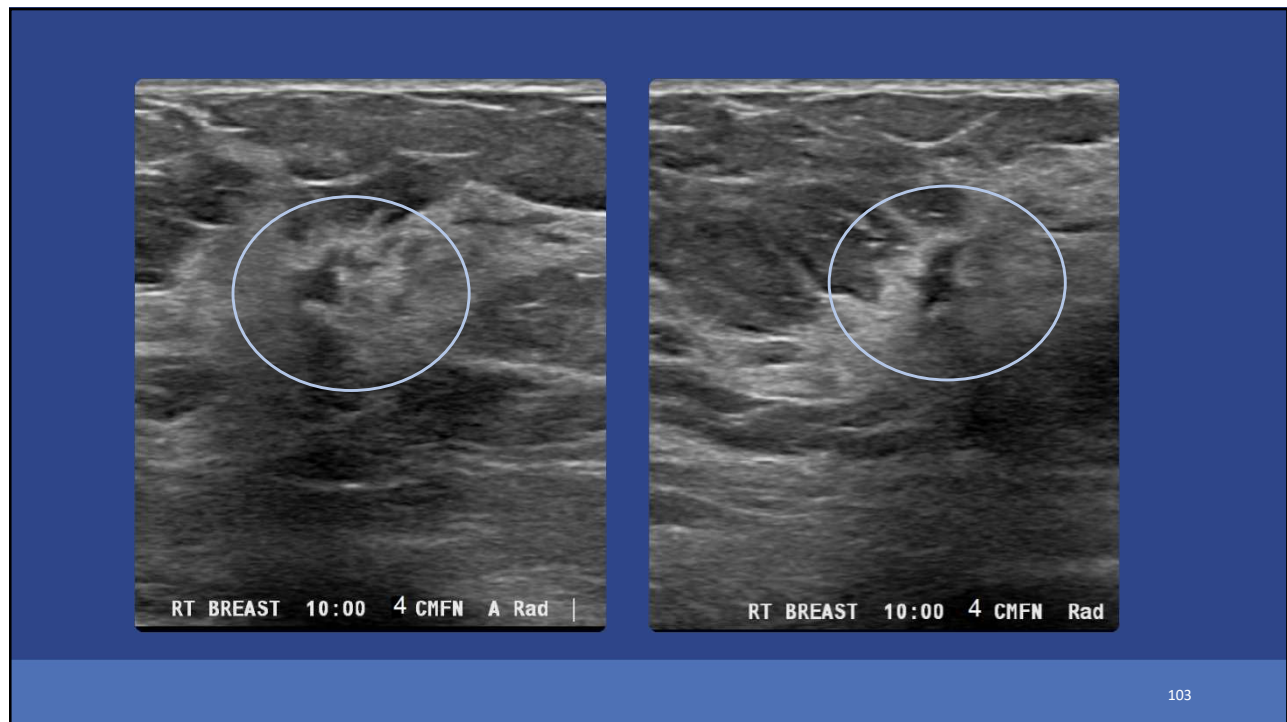
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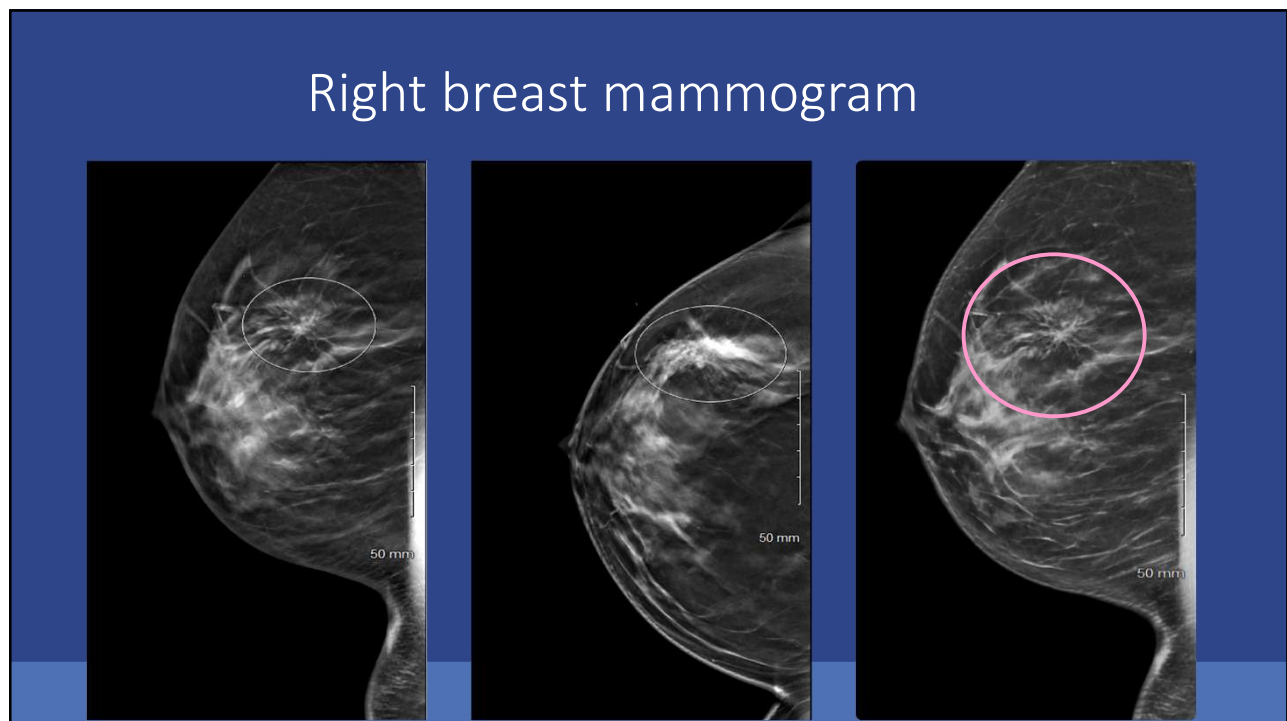
102

102

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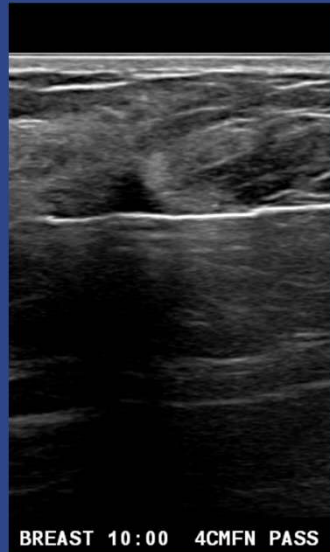
103



104

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- Ultrasound guided breast biopsy was performed, along with a post biopsy mammogram to document the clip placement



105

105

Conclusion:

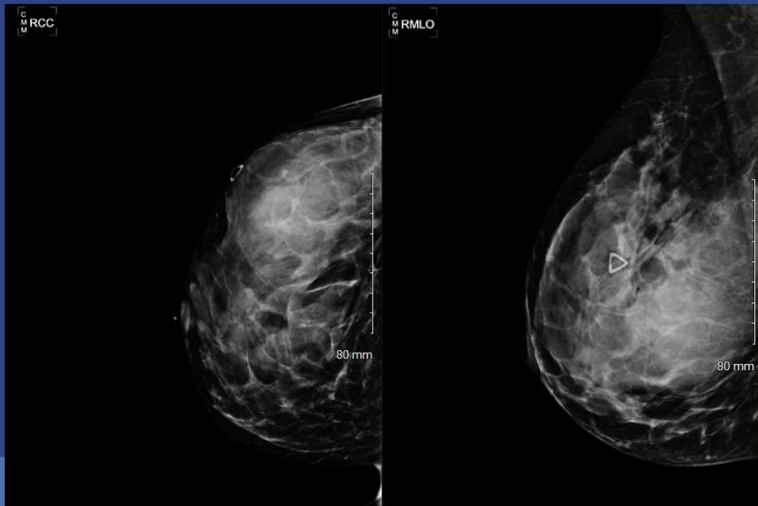
- Biopsy results: Invasive Ductal Carcinoma
- Patient underwent multiple rounds of chemotherapy
- Patient elected to have a bilat mastectomy due to her age

106

106

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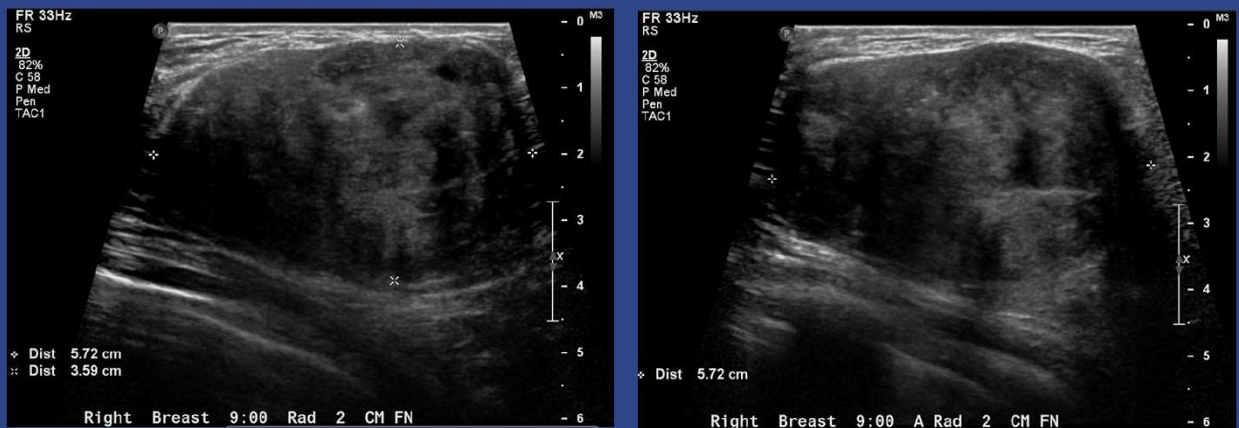
Interesting case #4



- 47-year-old with a palpable lump in her right breast
- Family history: Mother had Breast cancer in her 60's

107

Right breast ultrasound



108

108

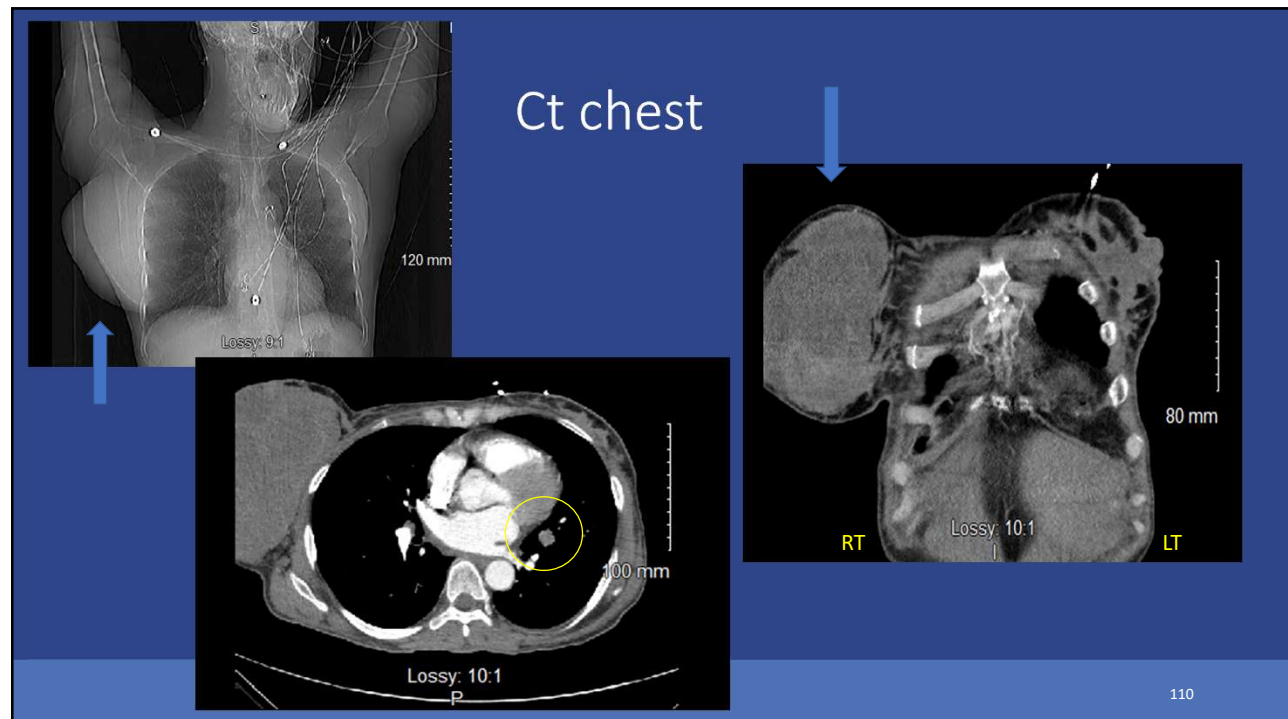
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Right breast ultrasound biopsy



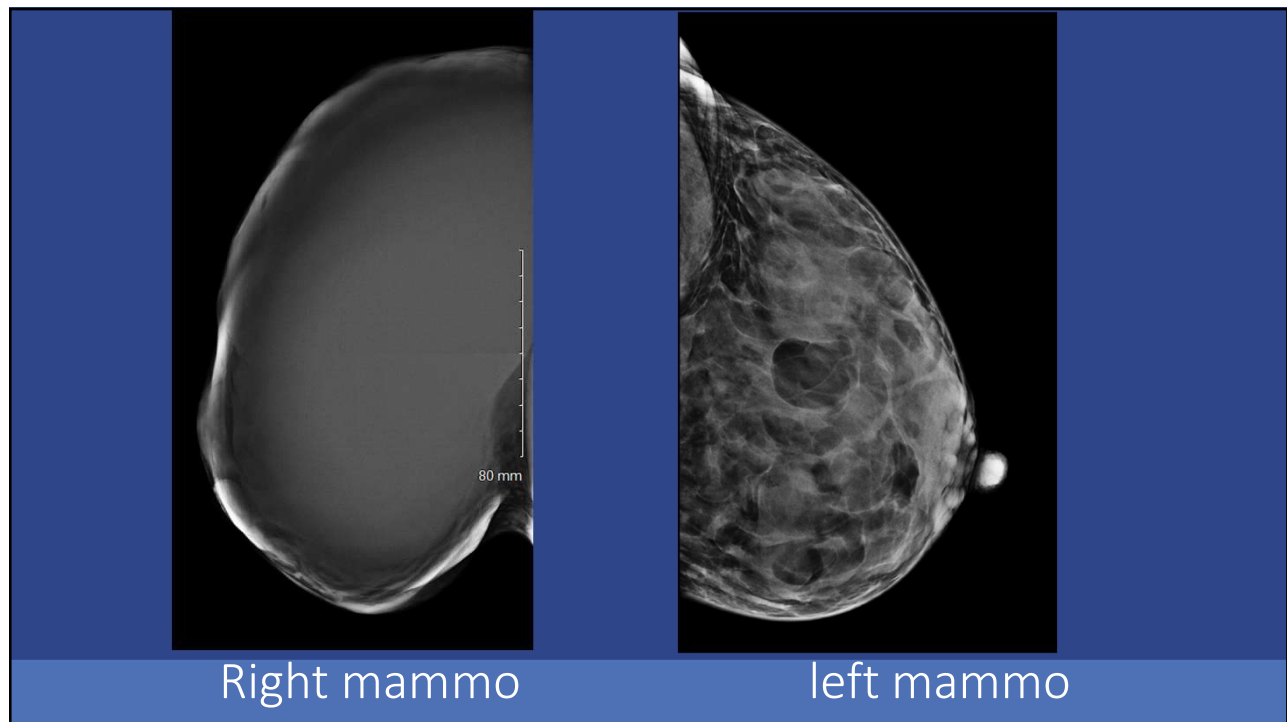
Biopsy was performed
Findings: Invasive lobular carcinoma
Patient was scheduled to have the mass removed *and never did*

109

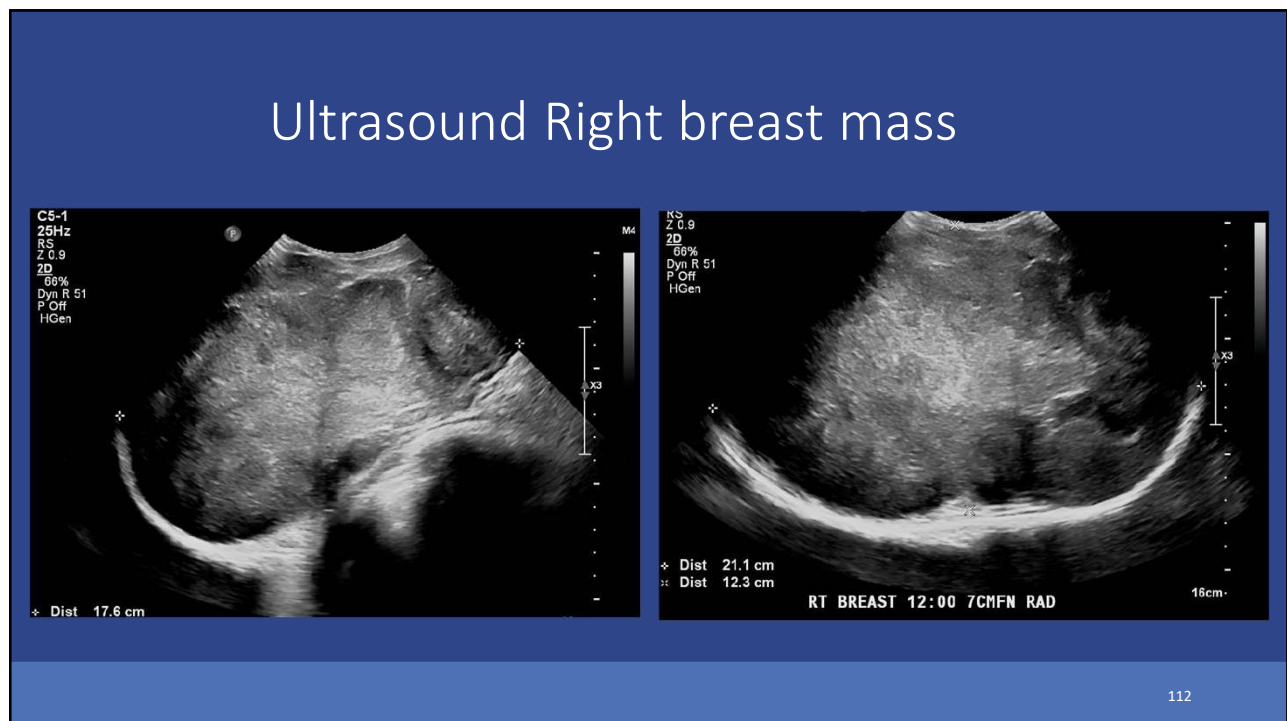


110

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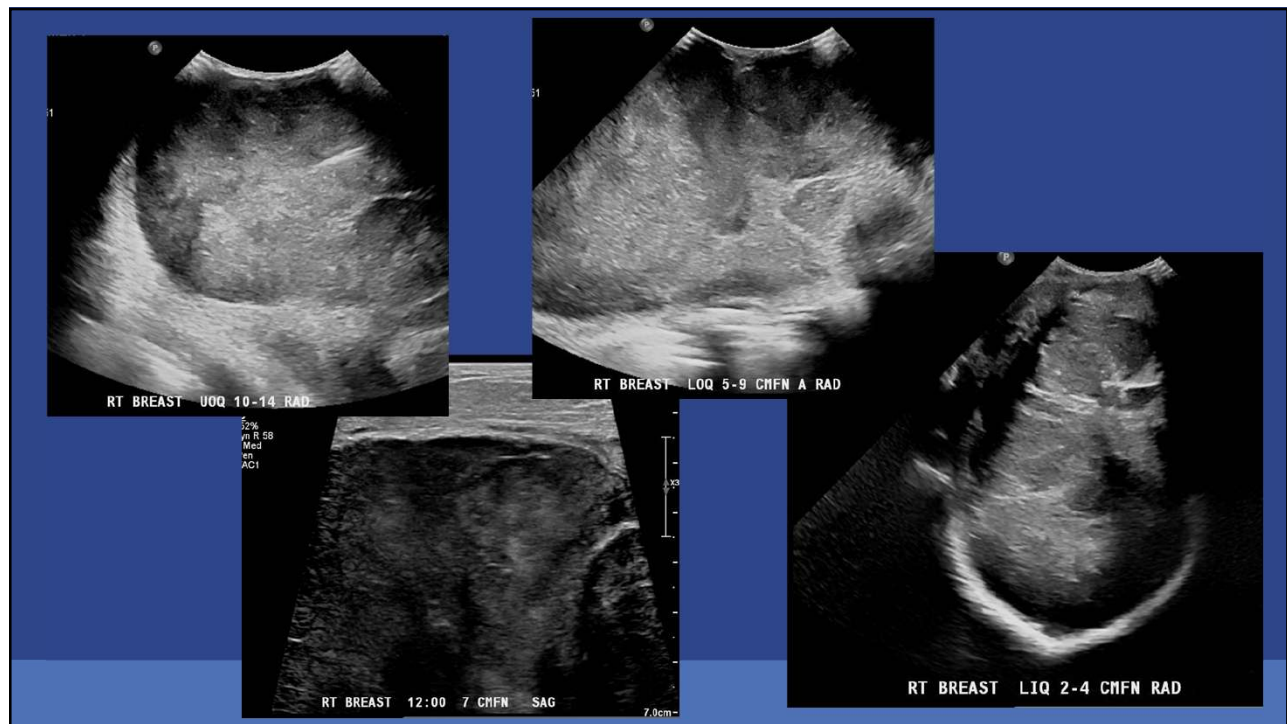


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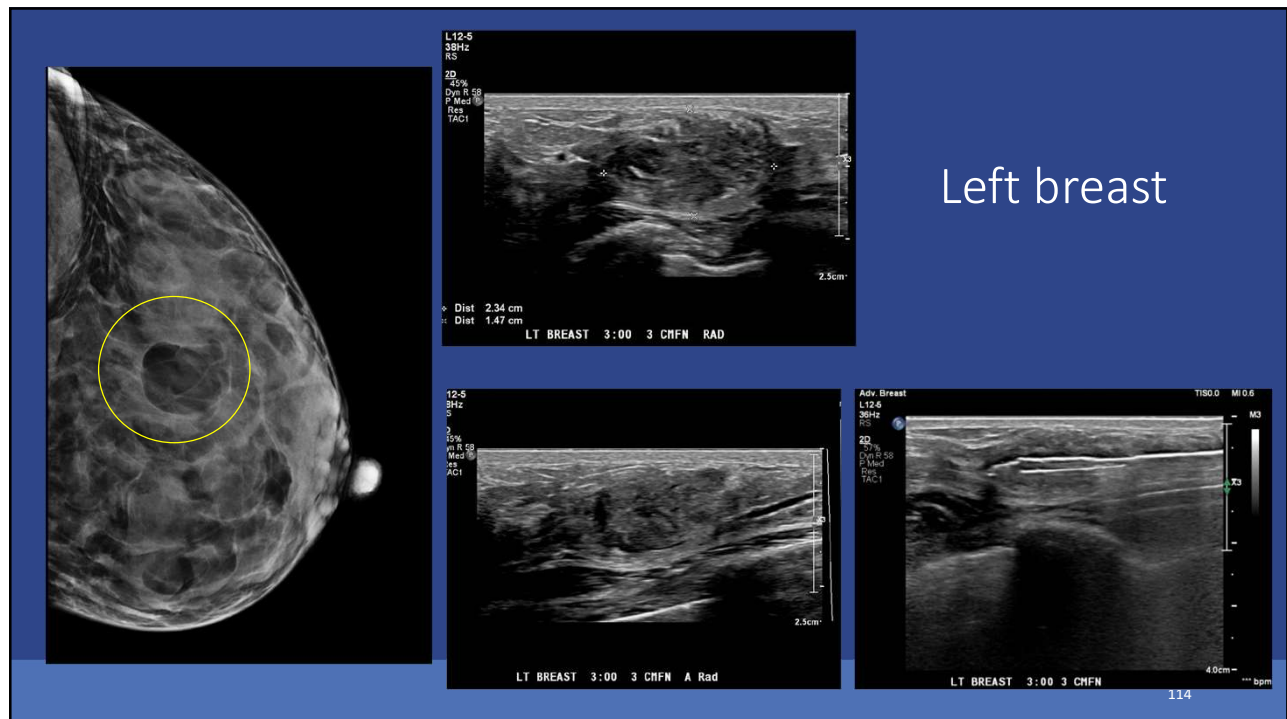


112

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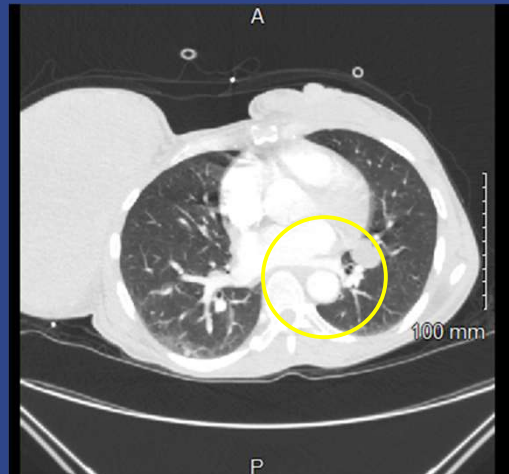
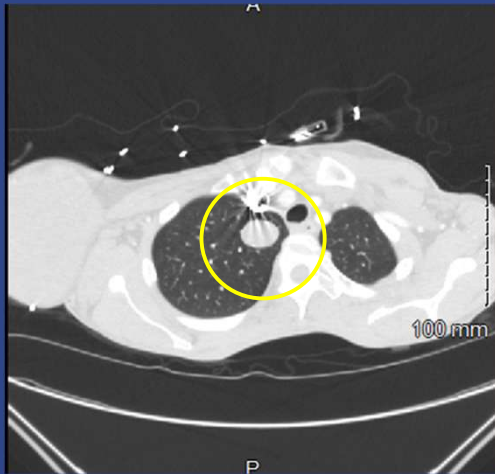
113



114

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One month later



115

115



After working in a breast center all day, you start seeing things besides breast masses.



Any questions?

116

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