

# PREOPERATIVE THERAPY IN INVASIVE BREAST CANCER

Reviewing the State of the Science and Exploring New Research Directions

## Imaging the Breast Before Preoperative Therapy

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# Objectives

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- Review recommendations for imaging the breast prior to preoperative therapy
- Clarify goals of pre-therapy imaging
- Understand benefits and limitations of current imaging tools
  - Mammography, Ultrasound, MRI
- Clarify issues regarding placing markers at tumor site before initiating preoperative therapy

# Recommendations for Women with Current Breast Cancer Diagnosis

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- Complete mammographic evaluation
  - (diagnostic mammography for all lesions)
- Complete sonographic evaluation
  - (diagnostic US for all palpable lesions, all masses, AD, FAD)
- Core needle biopsy of all suspicious lesions depending on clinical impact
- *MRI for evaluation of extent of disease in known breast and unsuspected disease in contralateral breast, regardless of breast density, depending on clinical impact*

# Evolving Paradigms: 20<sup>th</sup> Century

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1900      Radical Mastectomy

1970      Breast conserving surgery  
            followed by radiation, chemorx

1990      Chemotherapy *prior*  
            *to surgery*

# Goal of Imaging Prior to Preoperative Therapy: *Accurate Staging*

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- Within the breast(s)
  - T stage
    - Tumor histology and size
- Outside of the breast
  - N stage
    - Nodal involvement
- Outside the breast and nodes
  - M stage
    - Liver, lungs, bones

# Staging: determining extent of disease within the breast(s)

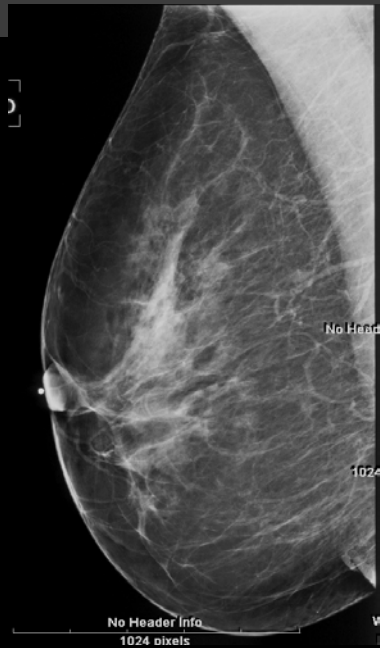
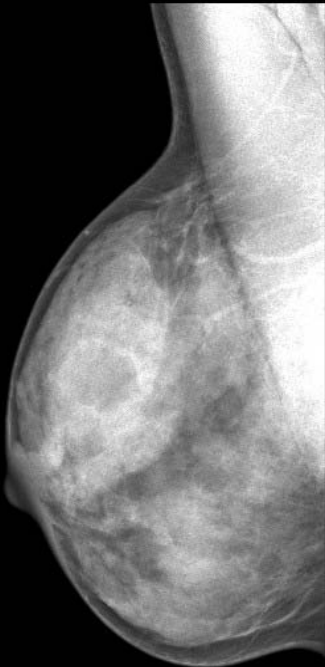
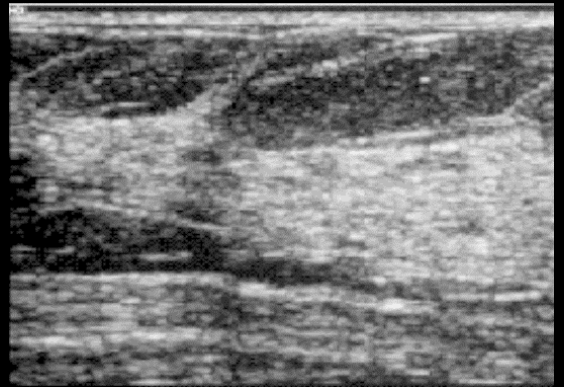
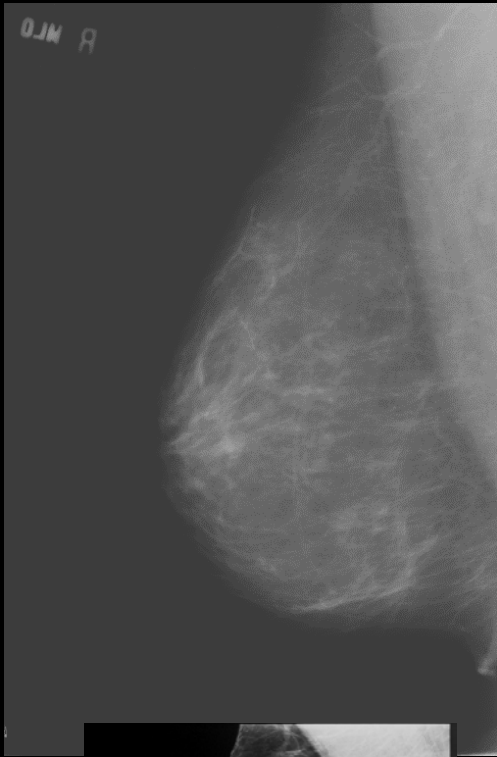
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- T stage
  - *In situ* or invasive
  - Size
  - Extension to chest wall or skin
- Multi-focal
  - Multiple lesions within a quadrant
- Multi-centric
  - Multiple lesions in more than one quadrant or the equivalent
- Bilateral

# Rationale for Determining Accurate Extent of Disease Within the Breast(s)

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- In patient considered for preoperative therapy
  - To determine if patient is candidate for breast conservation post therapy
  - To establish accurate baseline prior to initiating therapy
  - To accurately diagnose the specific types of cancers in the breast (mixed histologies can occur)

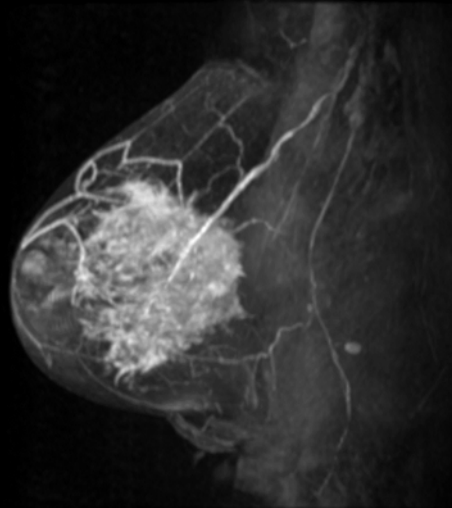
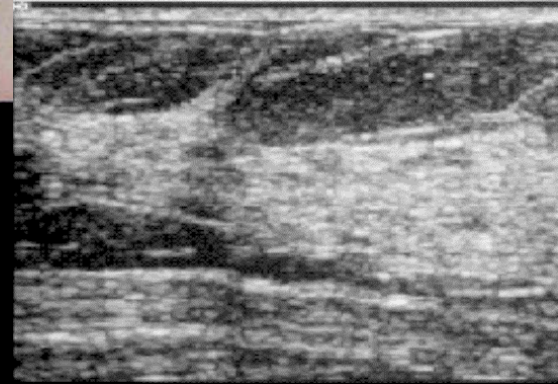
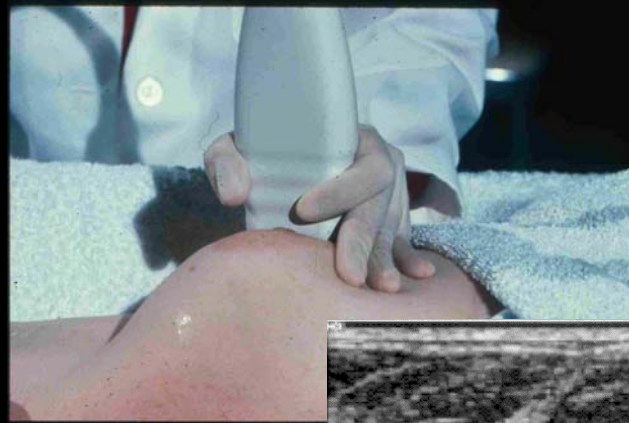
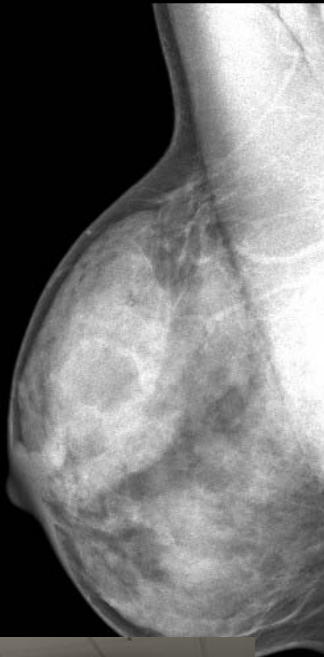




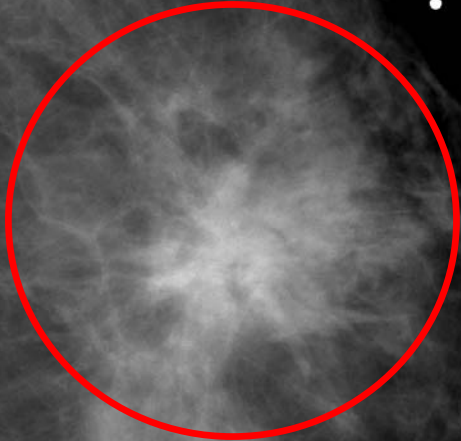
# Limitations of Mammography and Ultrasound for Extent of Disease

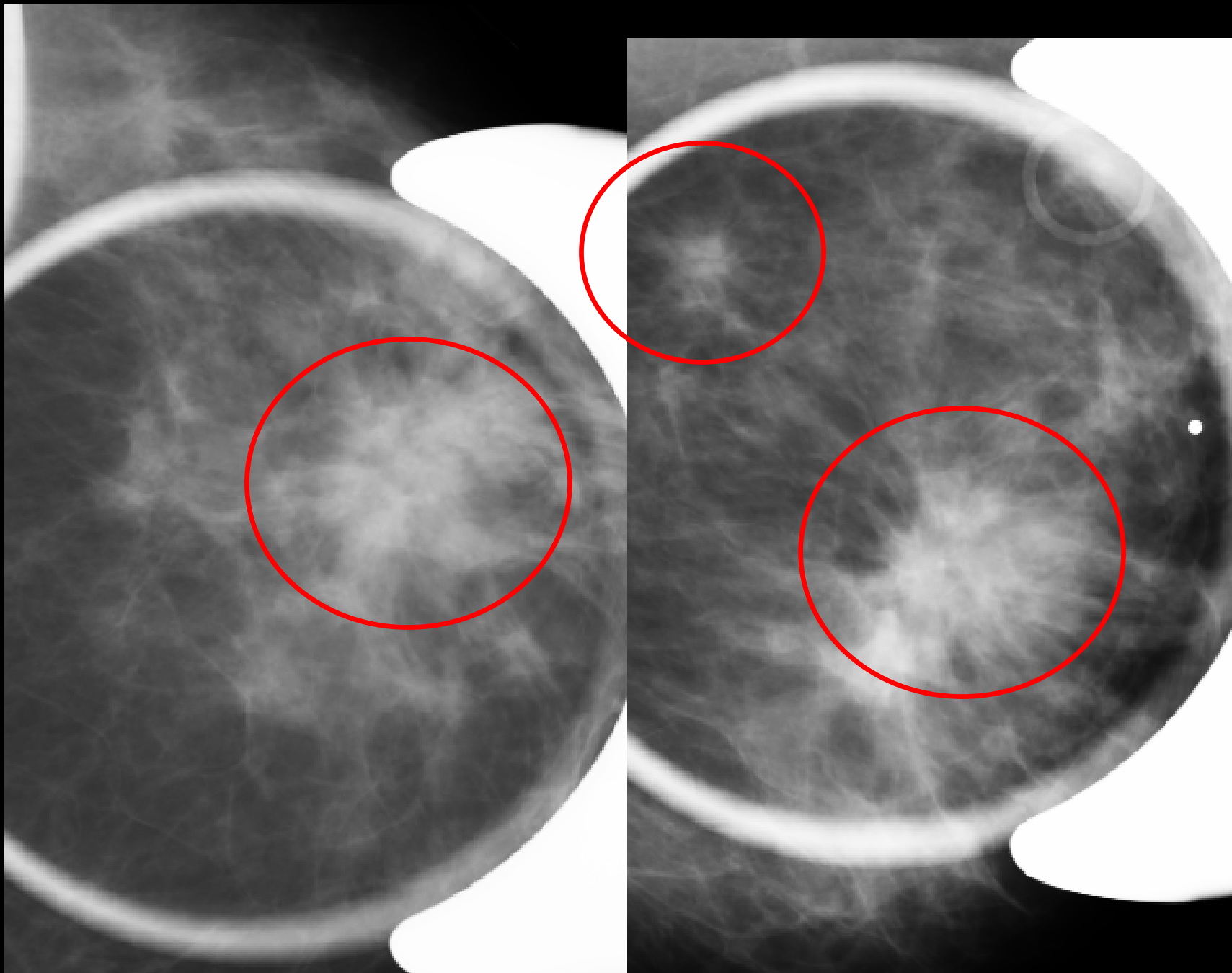
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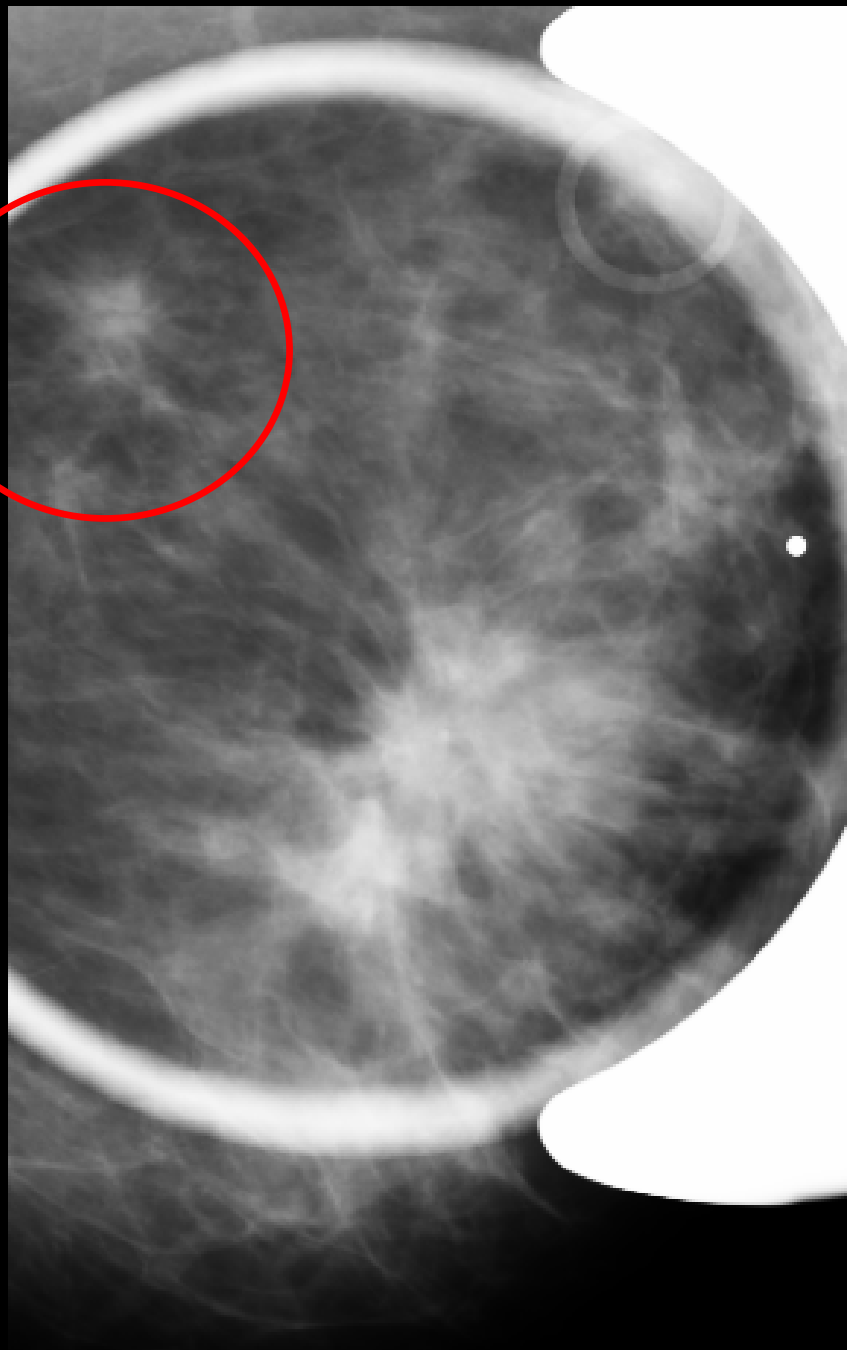
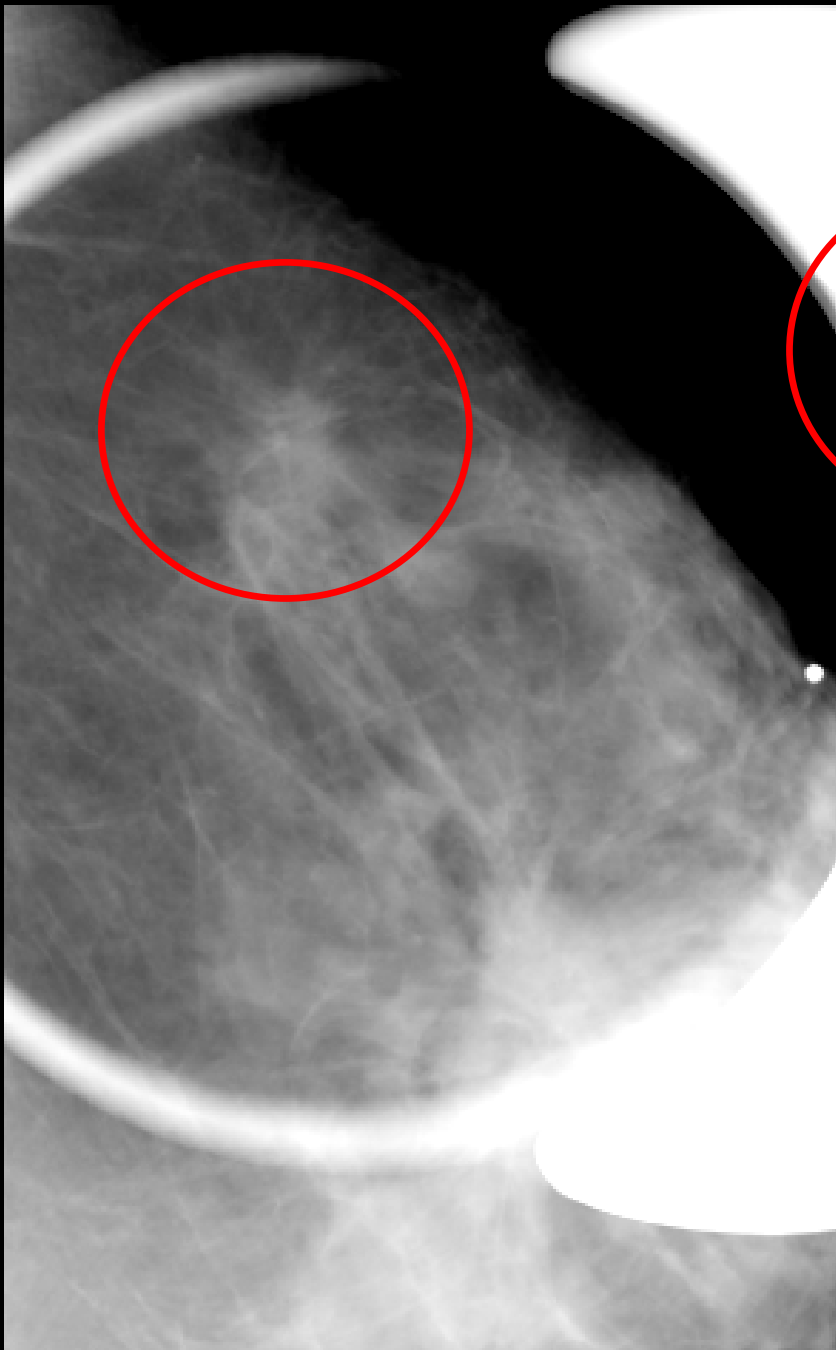
- Mammography: limited sensitivity for women with dense breast tissue, young women, certain cancer types (ILC, DCIS)
- Ultrasound: limited sensitivity for women with fatty breast tissue, certain cancer types (ILC, DCIS), operator dependent

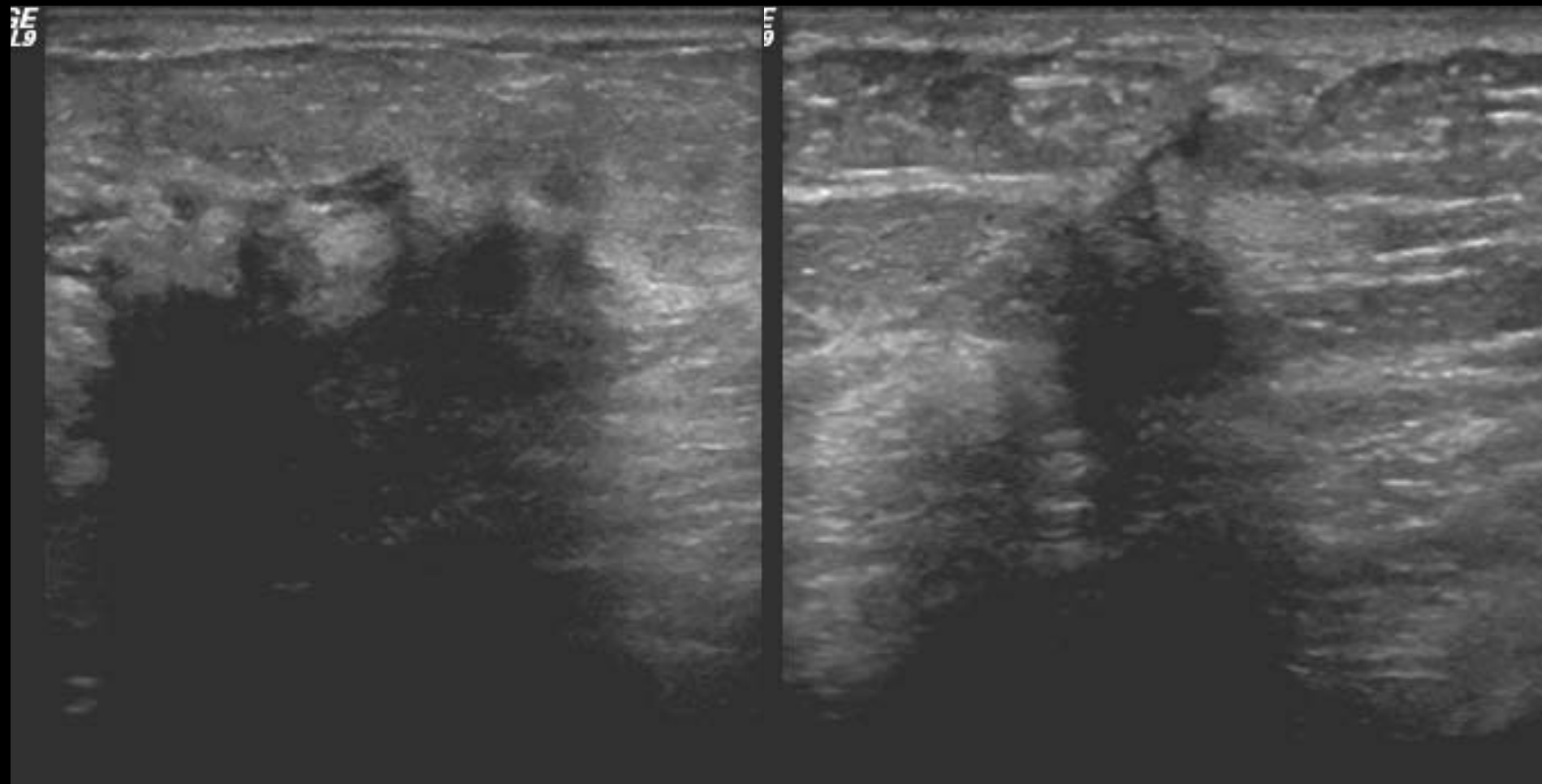


49 year old woman with palpable thickening left breast

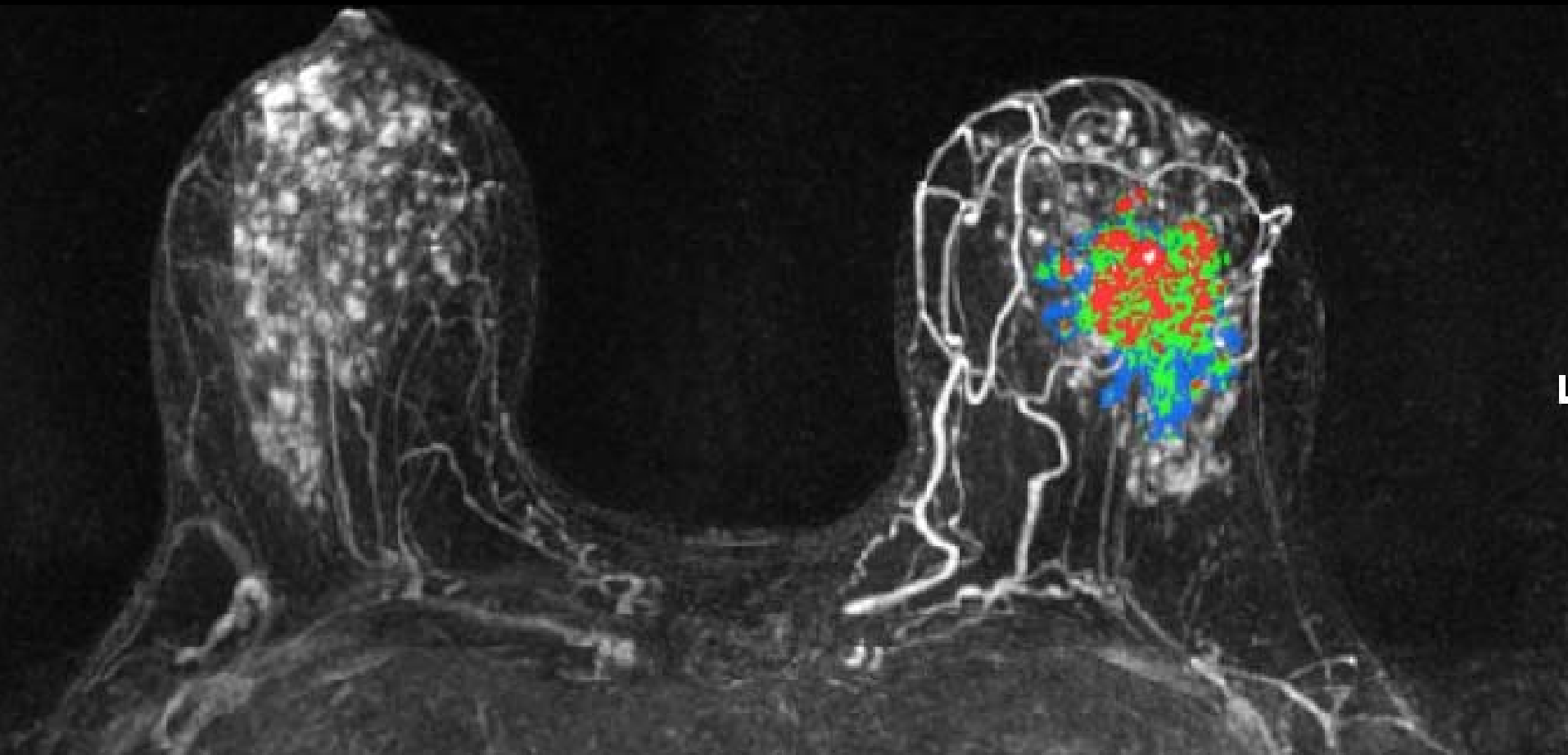






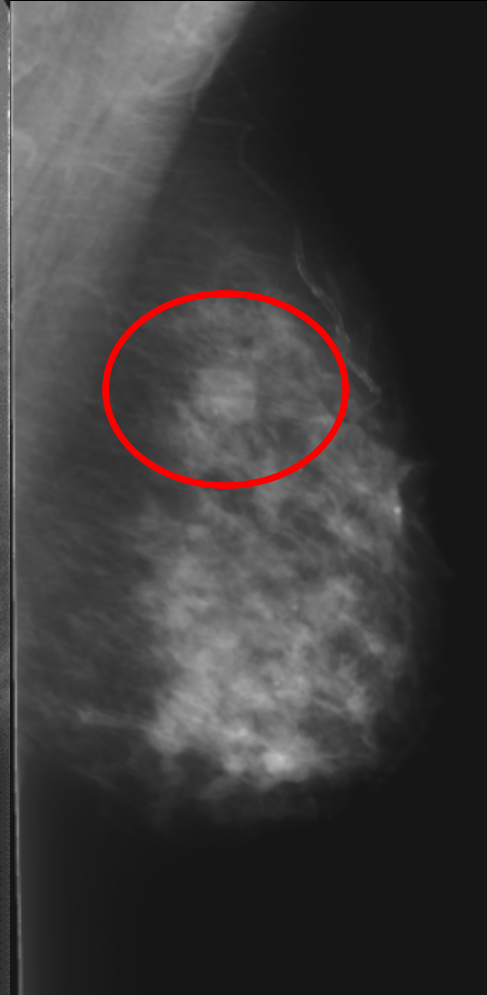
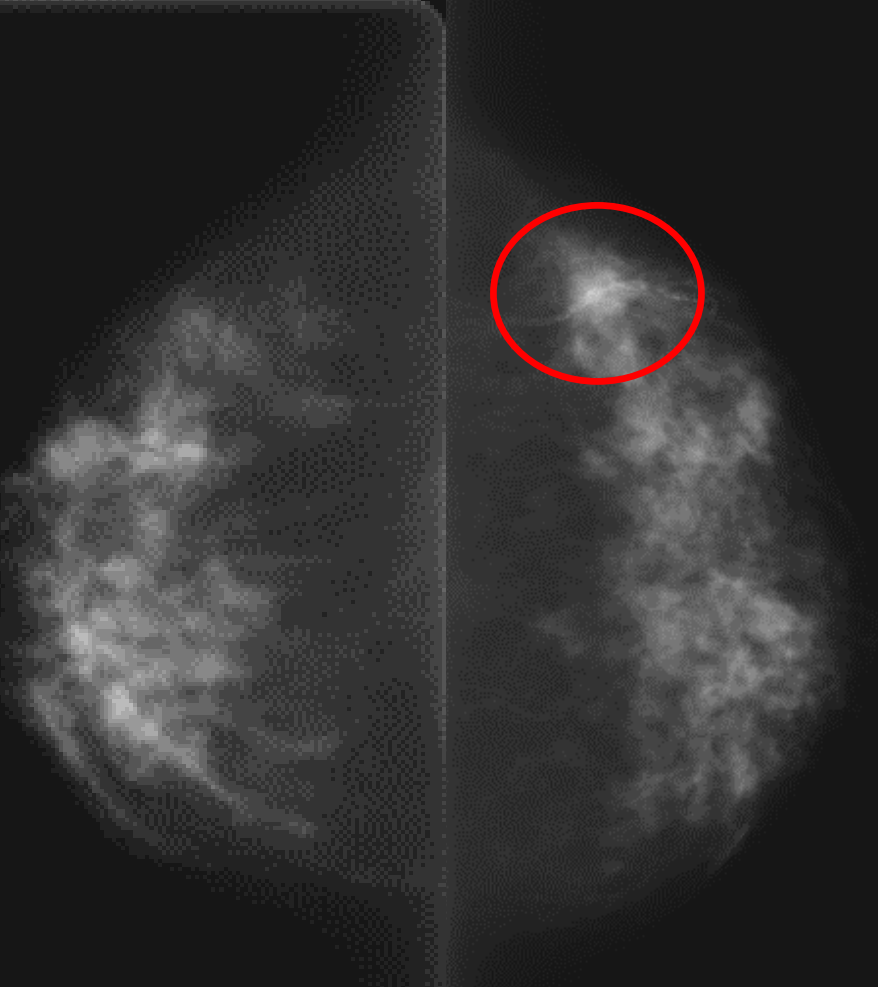


Central mass and 2 o'clock mass, multifocal bordering on multicentric

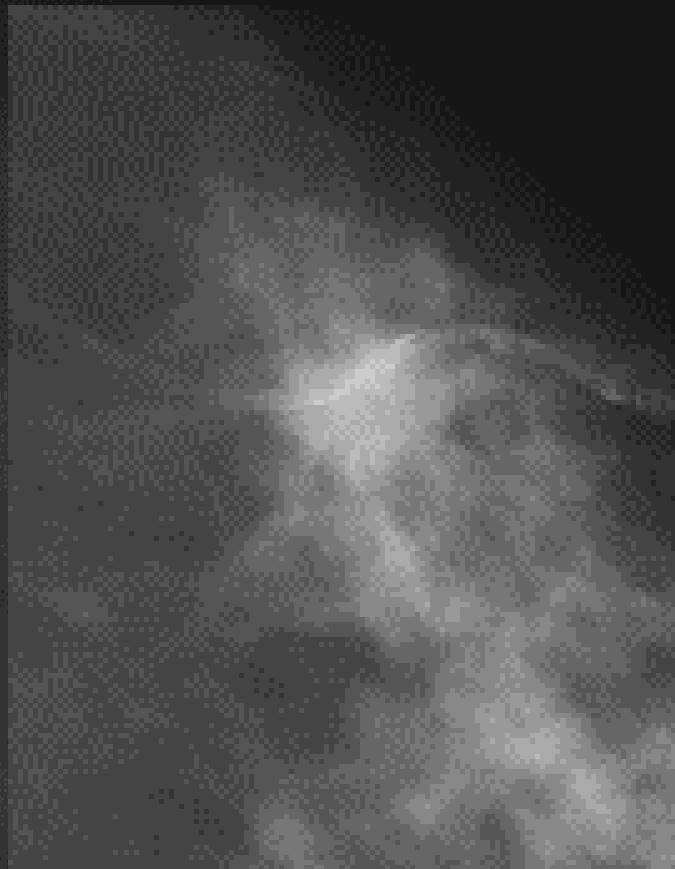


MRI demonstrates confluent large mass spanning over 6 cm and involving more than one quadrant

57 yo female presents for  
screening mammography





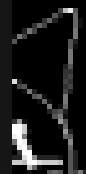


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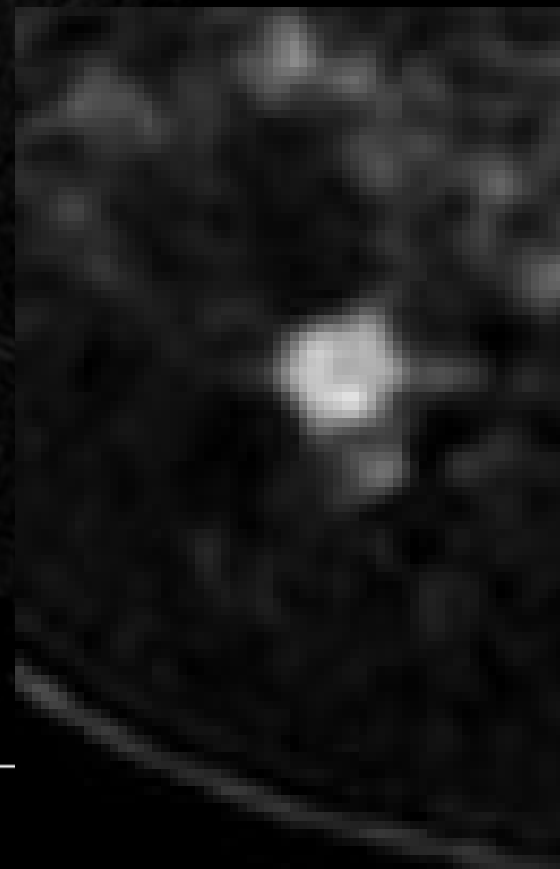
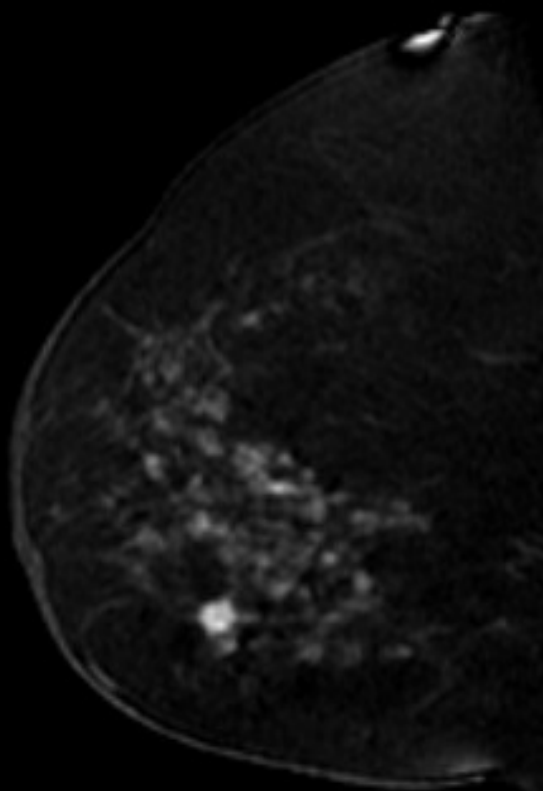
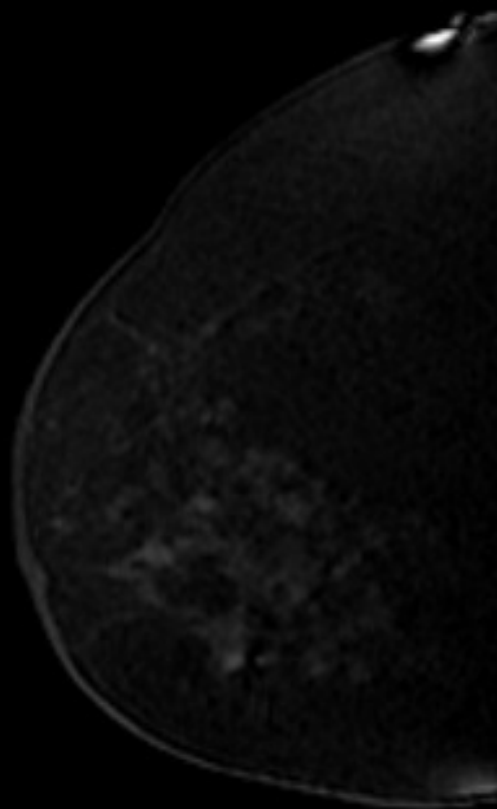
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TR=18.5  
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PIL

: 20x20 cm  
256x256  
oom: 170%

Same patient .....right breast



# Additional Ipsilateral Malignancy on Diagnostic MR:

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Author, Year	Number of Malignant Cases	Number (%) Additional Malignancy	Number (%) Multi-focal	Number (%) Multi-centric
Harms, 1993	29 breasts	10 (34)	3 (10)	7 (24)
Orel, 1995	64 women	13 (20)	NA	NA
Mumtaz, 1997	92 breasts	11 (12)	1 (1)	10 (11)
Fischer, 1999	336 women	54 (16)	30 (9)	24 (7)
Bedrosian, 2003	267 women	49 (18)	NA	NA
Liberman, 2003	70 women	19 (27)	14 (20)	5 (7)
Schelfout, 2004	170 women	33 (19)	12 (7)	17 (10)
Schnall, 2005	423 women	41 (10)	NA	NA
<b>Total</b>	<b>1451</b>	<b>230/1451 (16)</b>	<b>60/697 (9)</b>	<b>63/697 (9)</b>

# Extent of disease: Comparative Sensitivities

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Histology	Mammo	US	MRI
IDC	81%	94%	95%
ILC	34%	86%	96%
DCIS	55%	47%	89%

# Contralateral Occult Cancer Diagnosed by MRI Alone

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Study	Cancer yield
Rieber, 1997	9% (3/34)
Fischer, 1999	3% (15/463)
Liberman, 2003	5% (12/223)
Lee, 2003	4% (7/182)
Viehweg, 2004	3% (4/119)
Berg, 2004	3% (3/111)
Lehman, 2005	4% (4/103)
<b>Total</b>	<b>4% (48/1235)</b>

# MRI Evaluation of the Contralateral Breast in Women with a Recent Diagnosis of Breast Cancer: ACRIN 6667

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- 25 sites from the US, Canada, Germany
- Mixture of academic and community practices
- 969 women
  - 58% IDC    20% DCIS

American College of Radiology Imaging Network (NCI/NIH)  
Connie Lehman (PI) and Constantine Gatsonis (Statistician)

# Objectives

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- Review recommendations for imaging the breast prior to preoperative therapy
- Clarify goals of pre-therapy imaging
- Understand benefits and limitations of current imaging tools
  - Mammography, Ultrasound, MRI
- **Clarify issues regarding placing markers at tumor site before initiating preoperative therapy**



# Rationale for Marking the Tumor Prior to Preoperative Therapy

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- Identify the location of the tumor for surgeon and/or pathologist in the event the tumor is no longer visible after therapy
  - Particularly relevant if breast conservation planned

# Tumor Marking Prior to Therapy

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- Current approaches are not standardized
- Collaborative decision (multidisciplinary approach of surgeon, medical oncologist, radiologist) but clear driver needed
- Caution with “wait and see” approach with risk that tumor is no longer visible after treatment initiated

# Considerations for Marker Placement: Who, What, When, How?

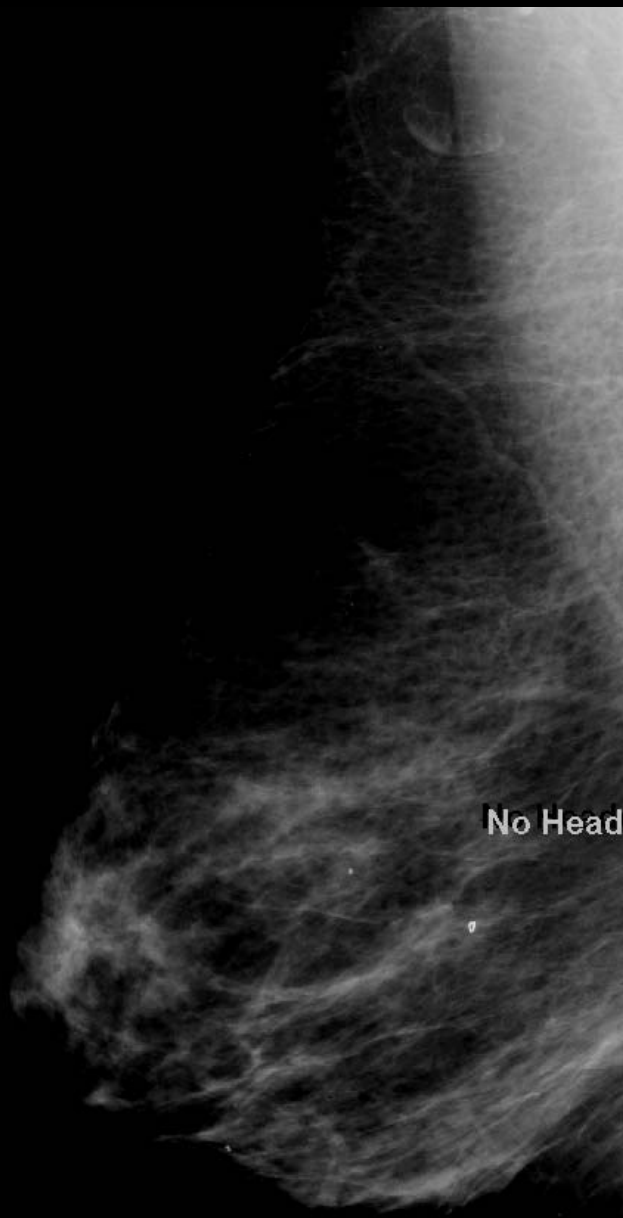
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- Who requests
  - surgeon or medical oncologist or radiologist
- Which lesions
  - all lesions biopsied
  - all cancers
  - only cancers planned for BCT
  - only cancers planned for preoperative therapy followed by BCT
- When placed
  - time of initial biopsy prior to known diagnosis of cancer
  - post initial biopsy and cancer diagnosis/prior to treatment
  - post therapy initiation
- How
  - single marker central to tumor
  - multiple markers bracketing tumor

# Possible “Standard” Protocol

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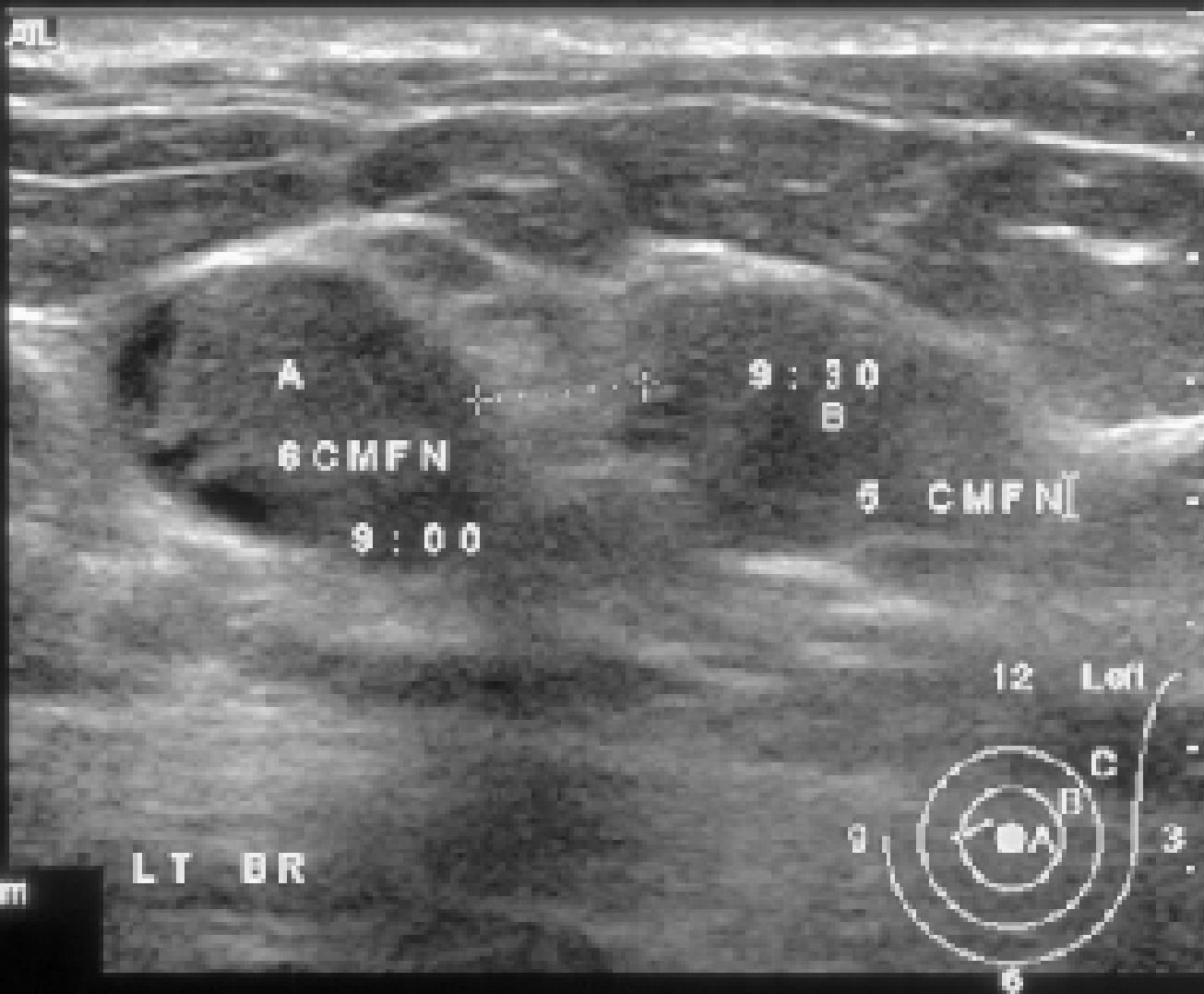
- Radiologist places marker at the time of initial diagnostic biopsy centrally in all large (> 2 cm), highly suspicious lesions
- For biopsy proven cancers that have not had a marker placed, surgeon/medical oncologist requests marker placement for all candidates for preoperative therapy
  - Marker placed prior to therapy initiated
  - Single central or multiple peripheral markers based on surgeon preference

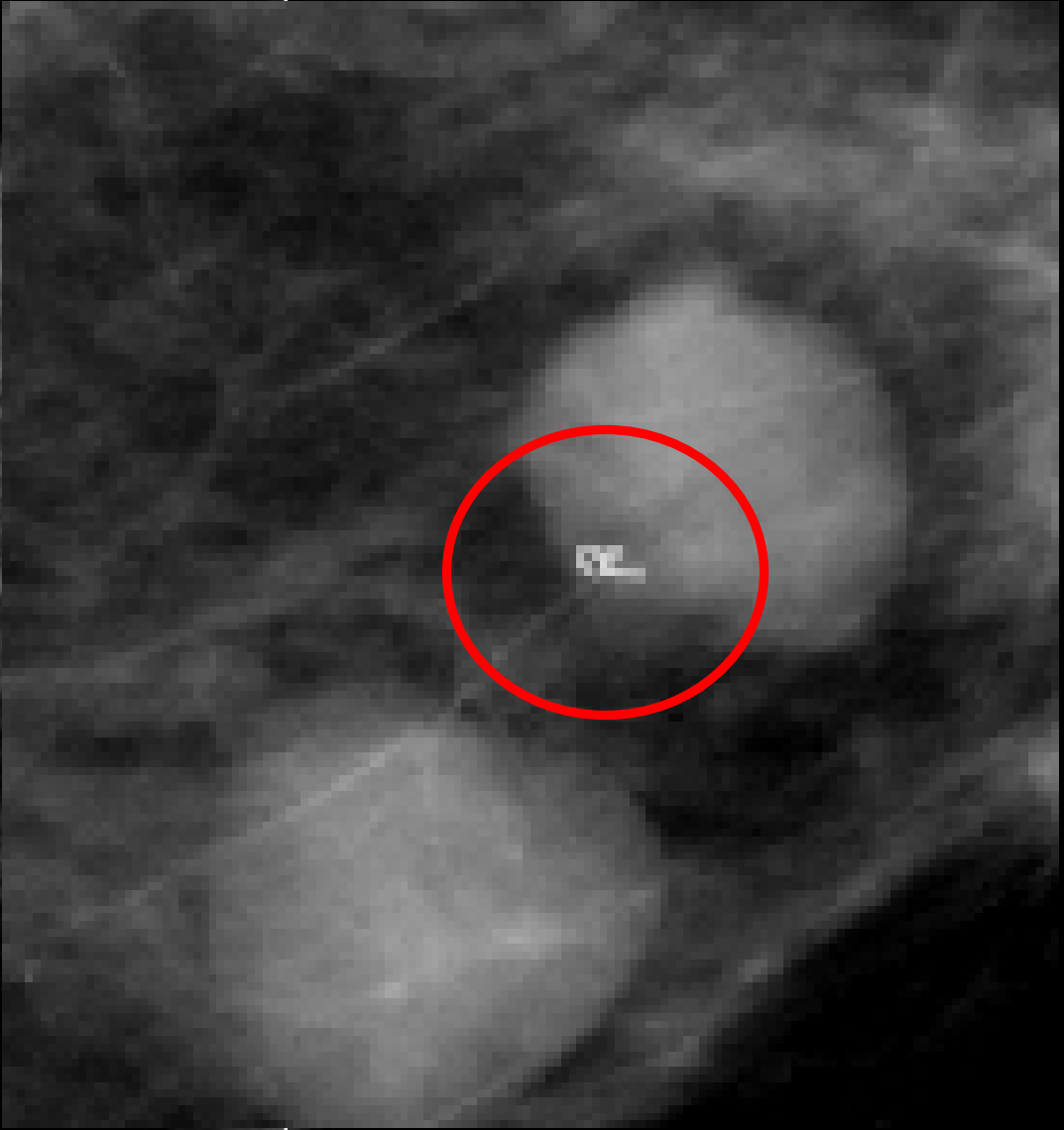


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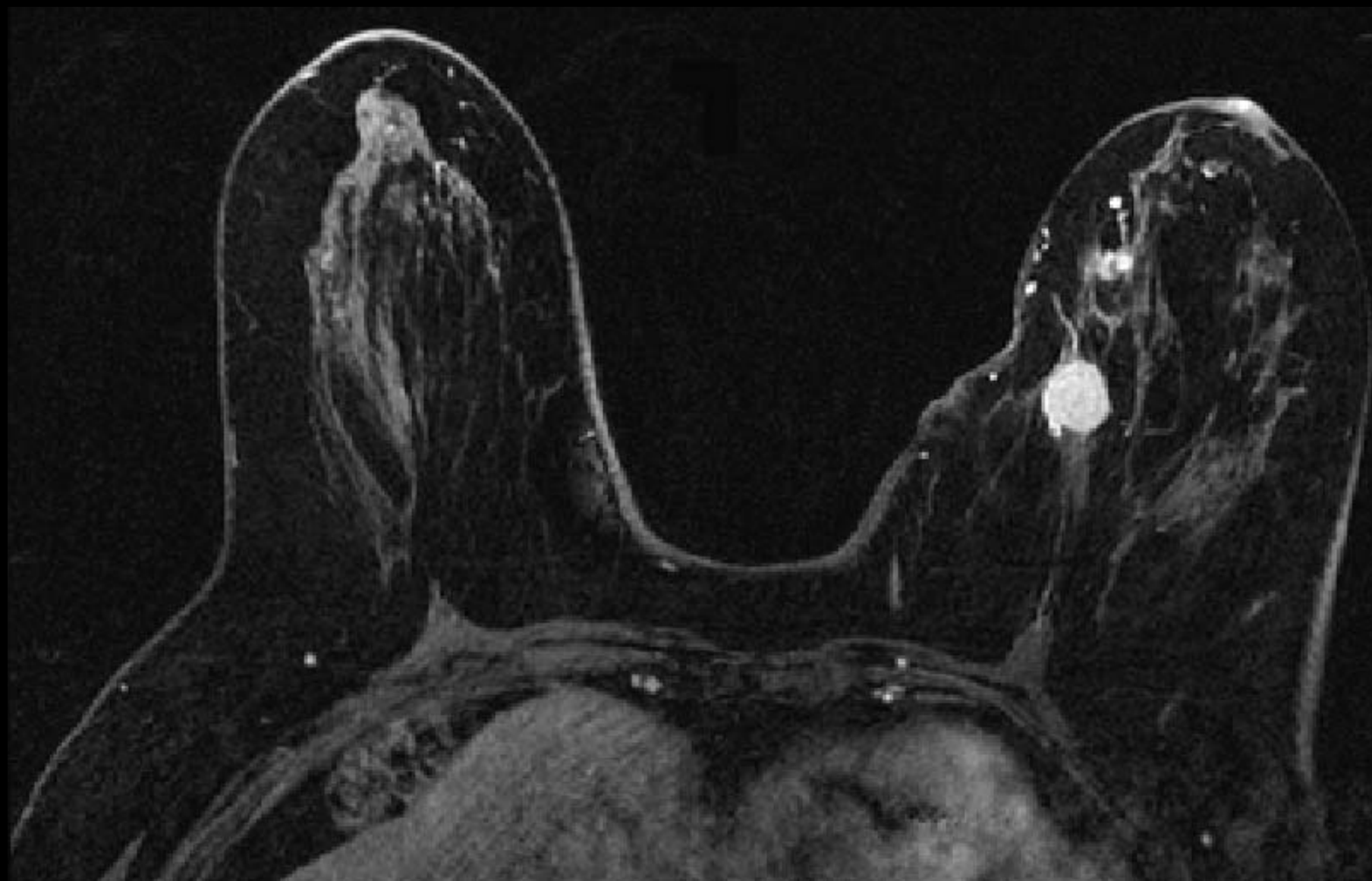


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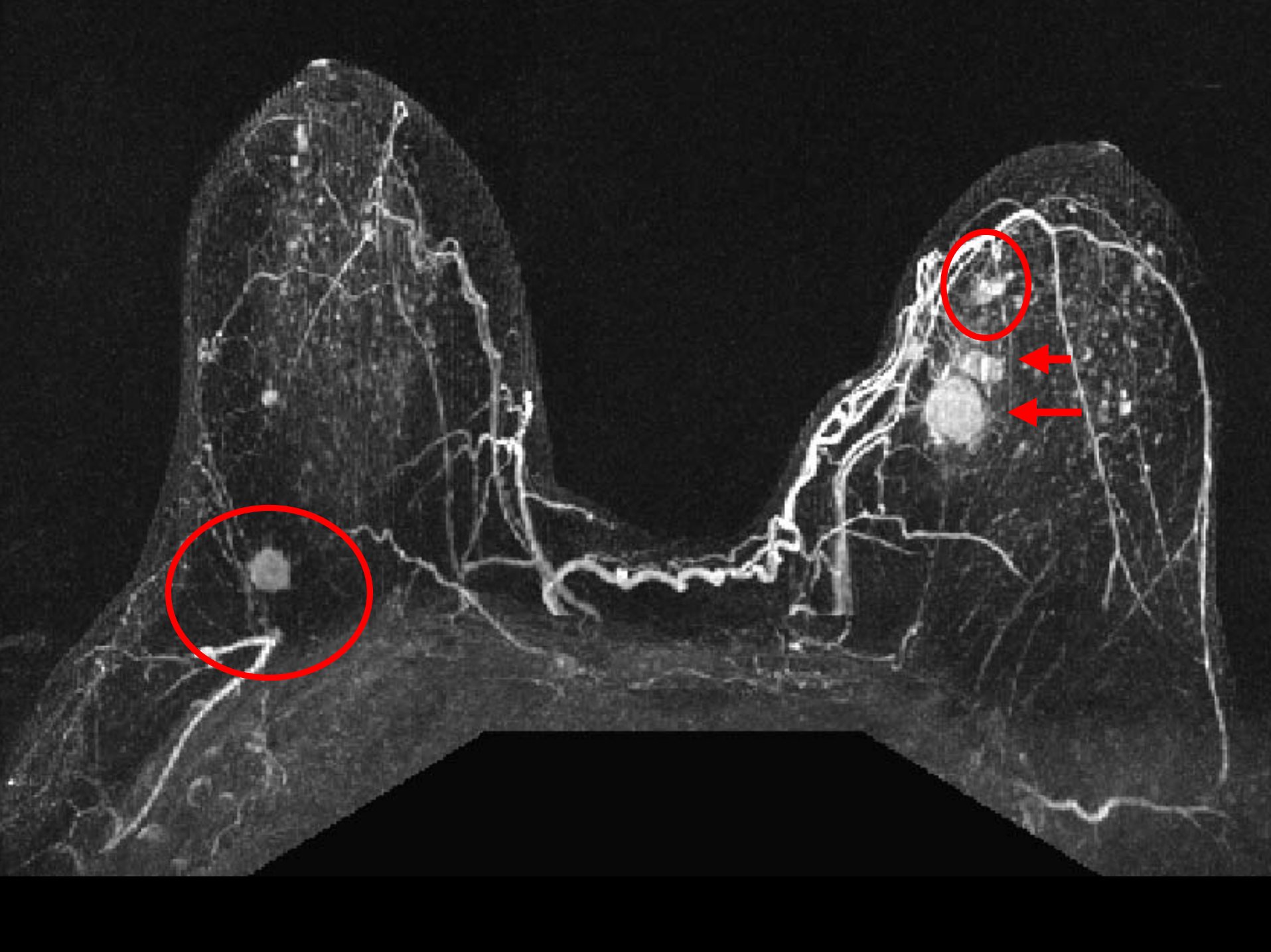


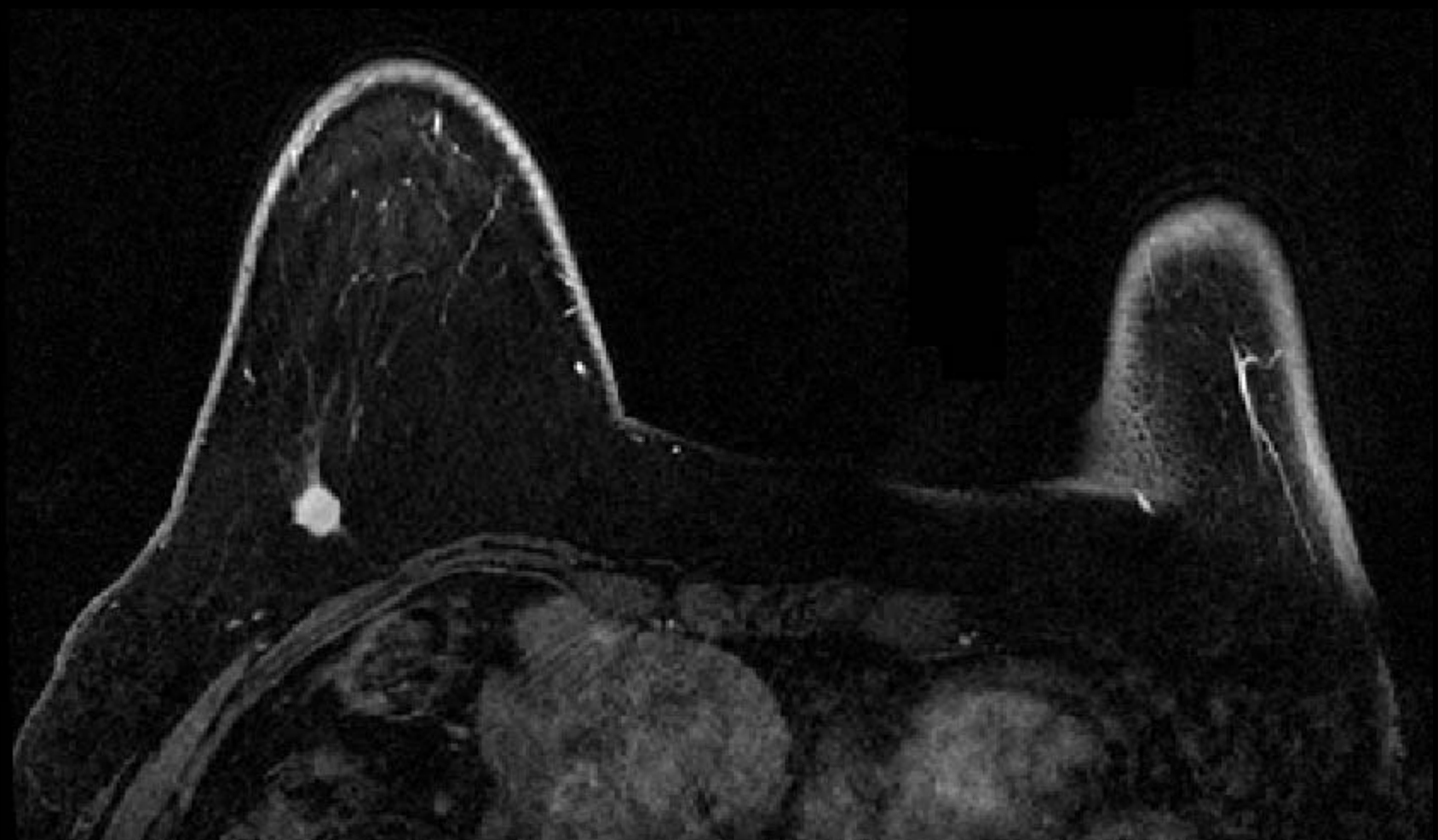


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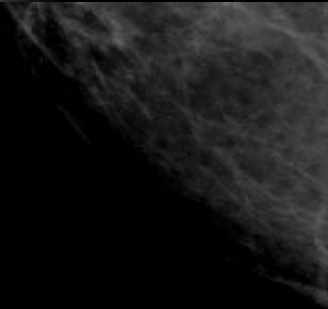
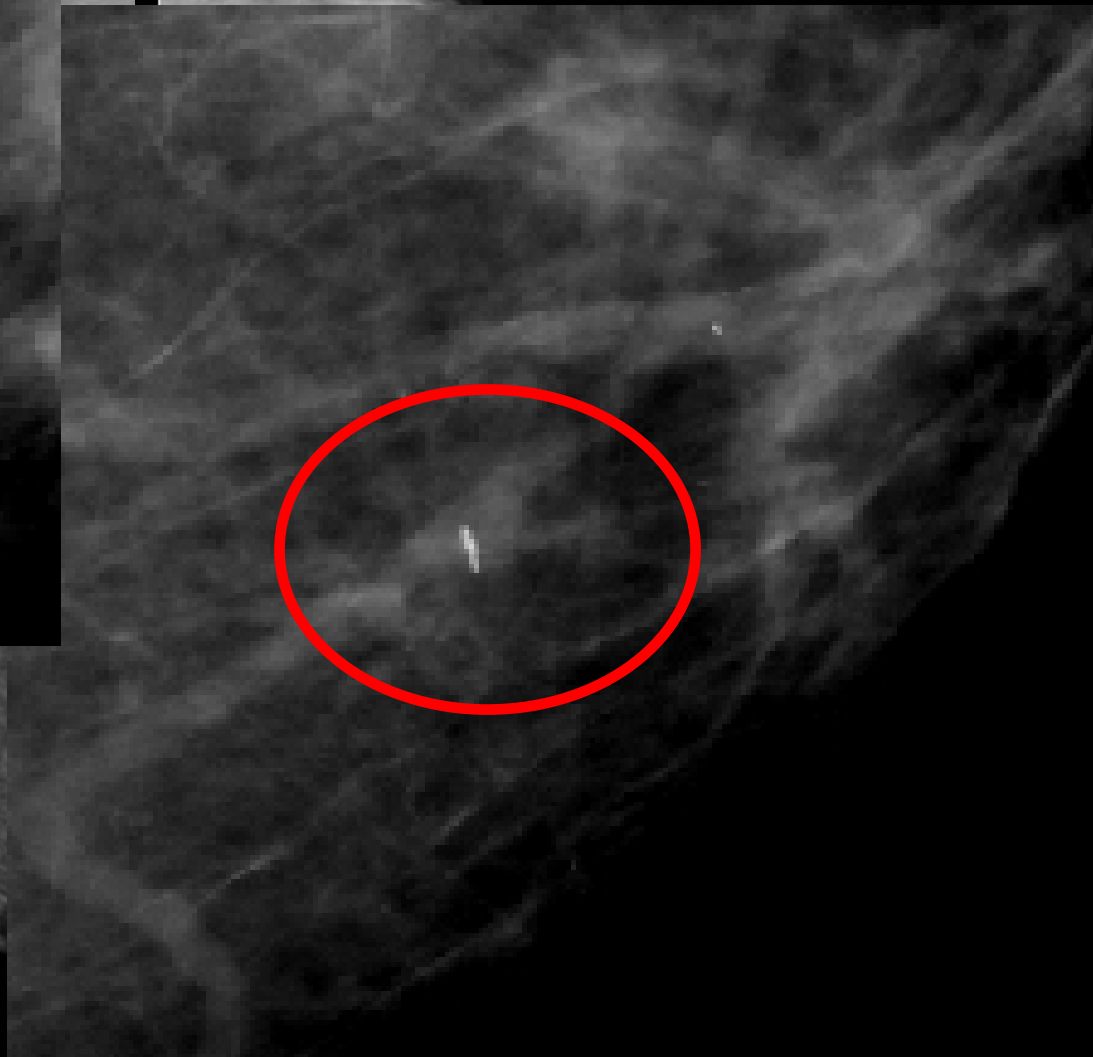


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# Recommendations for Women with Current Breast Cancer Diagnosis

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- Complete mammographic evaluation
  - (diagnostic mammography for all lesions)
- Complete sonographic evaluation
  - (diagnostic US for all palpable lesions, all masses, AD, FAD)
- Core needle biopsy of all suspicious lesions depending on clinical impact
- MRI for evaluation of extent of disease in known breast and unsuspected disease in contralateral breast, regardless of breast density, depending on clinical impact

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***Thank you!***