

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

- 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

- 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: 20th Century

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*

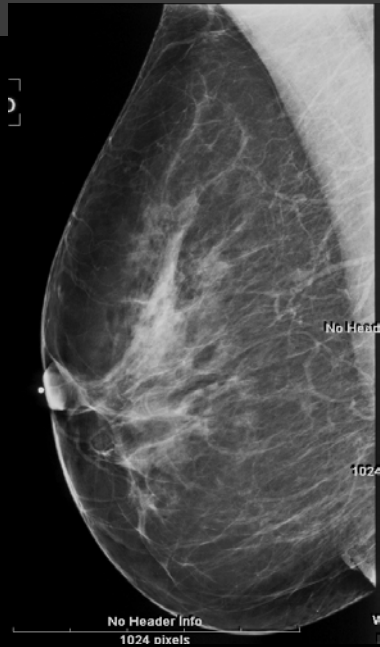
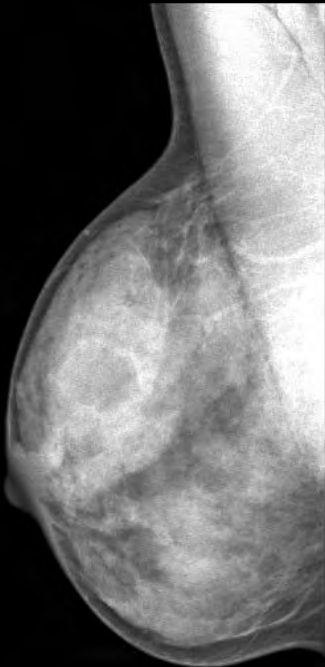
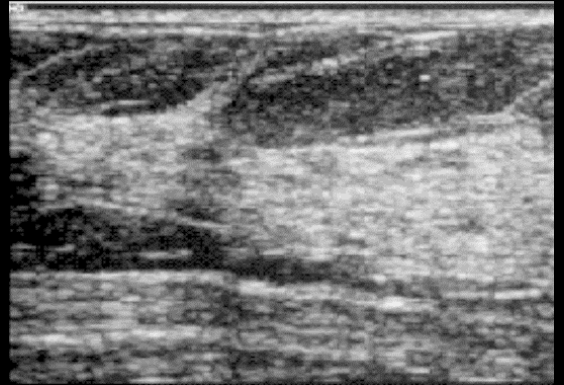
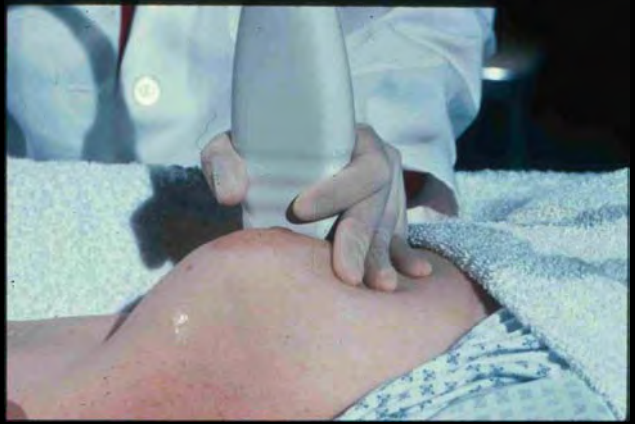
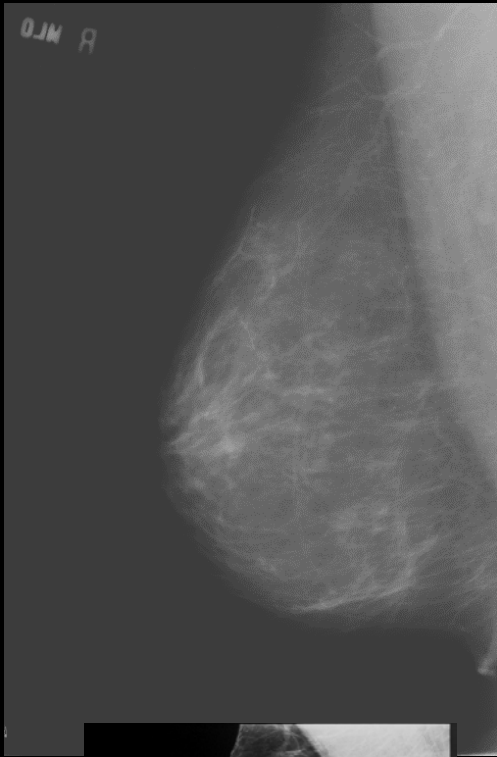
- Within the breast(s)
 - T stage
 - Tumor histology and size
- Outside of the breast
 - N stage
 - Nodal involvement
- Outside the breast and nodes
 - M stage
 - Liver, lungs, bones

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

- 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

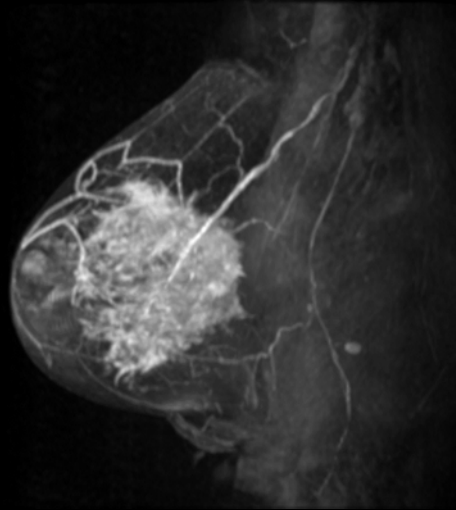
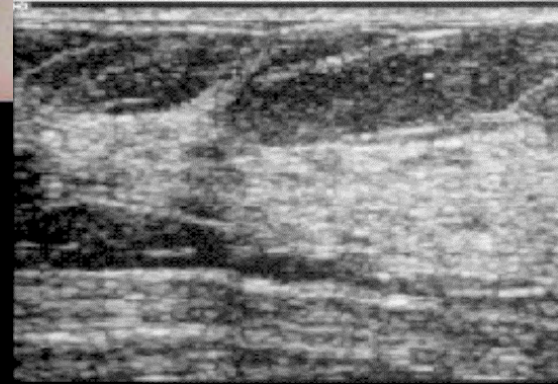
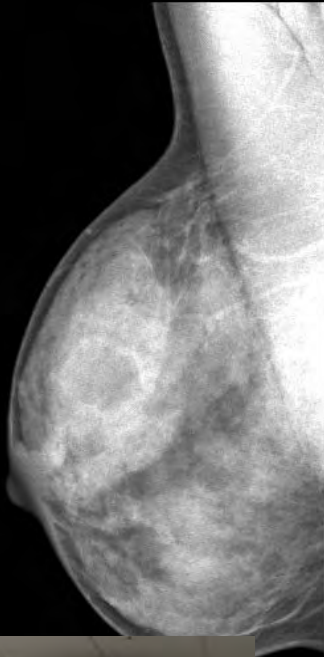
Rationale for Determining Accurate Extent of Disease Within the Breast(s)

- 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)

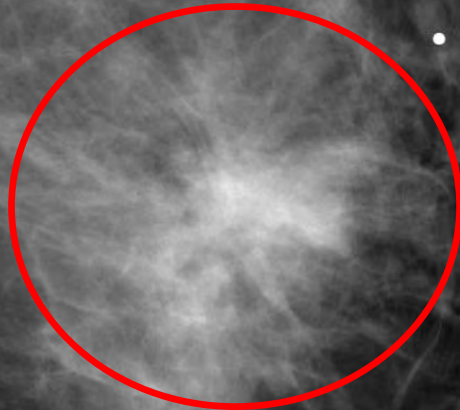
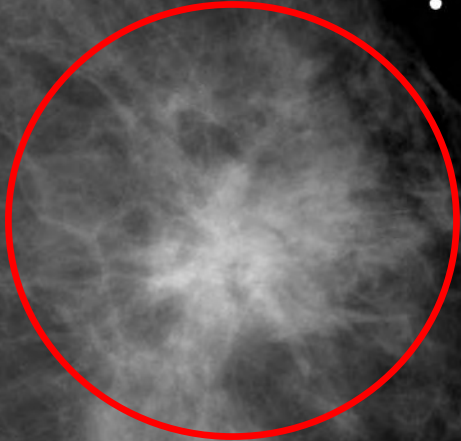


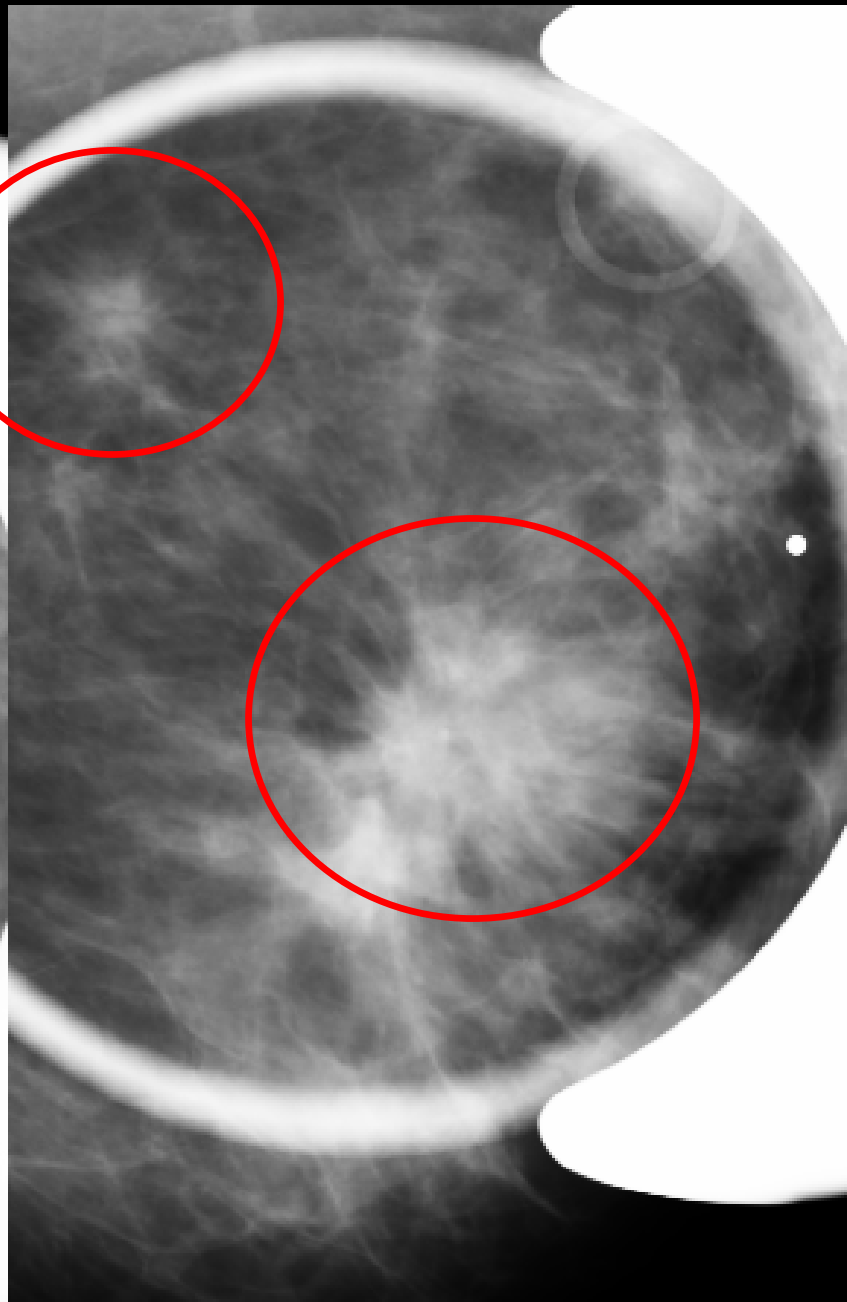
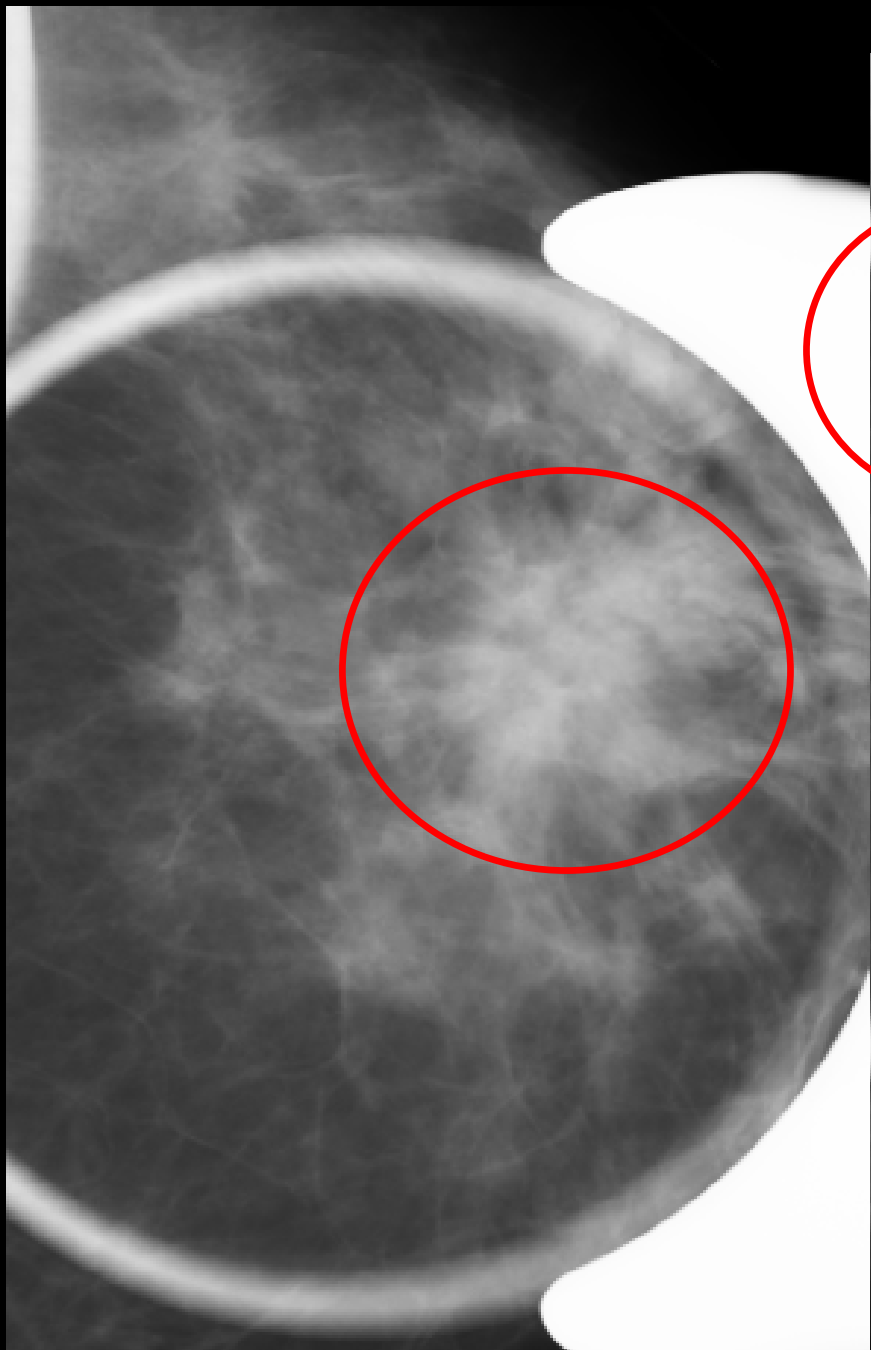
Limitations of Mammography and Ultrasound for Extent of Disease

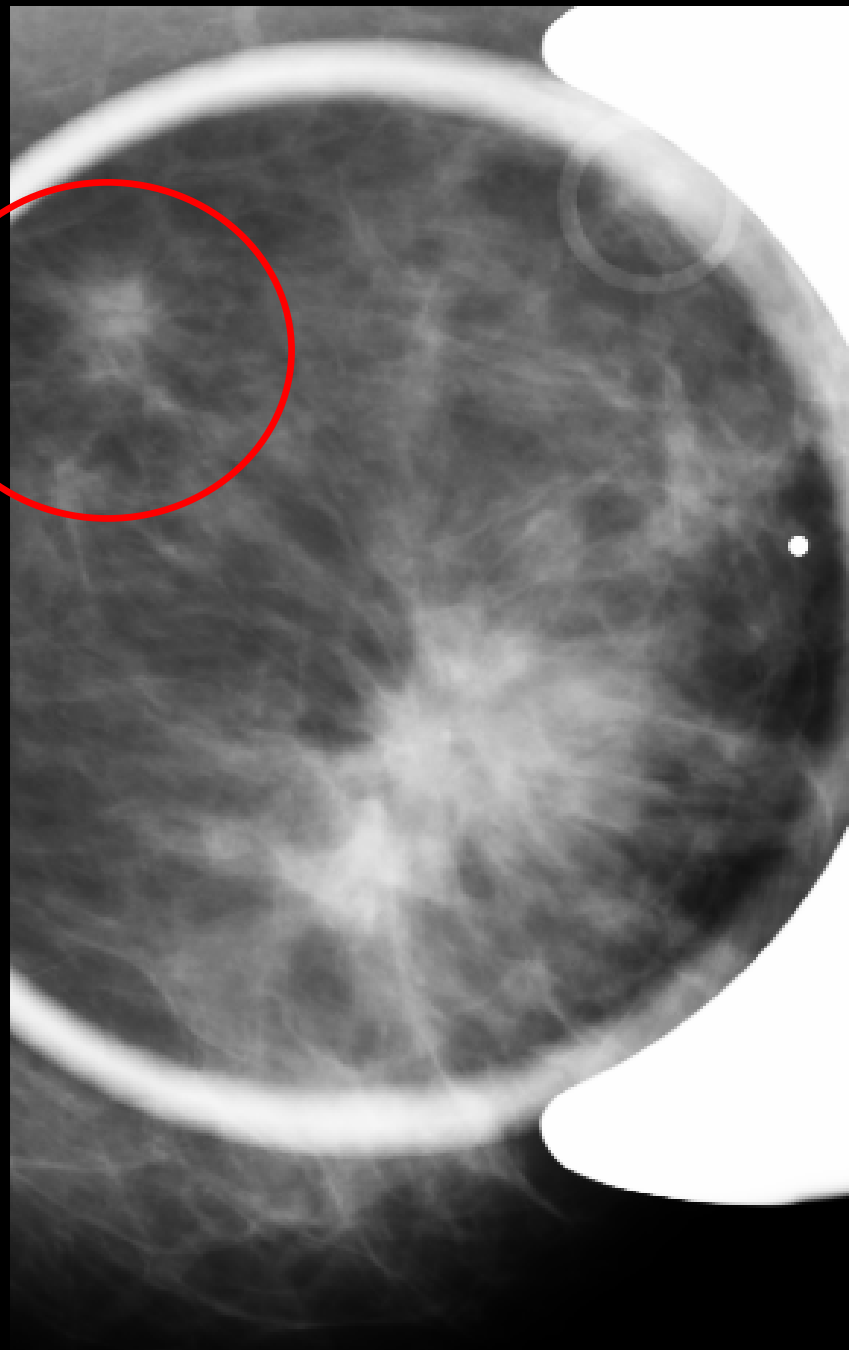
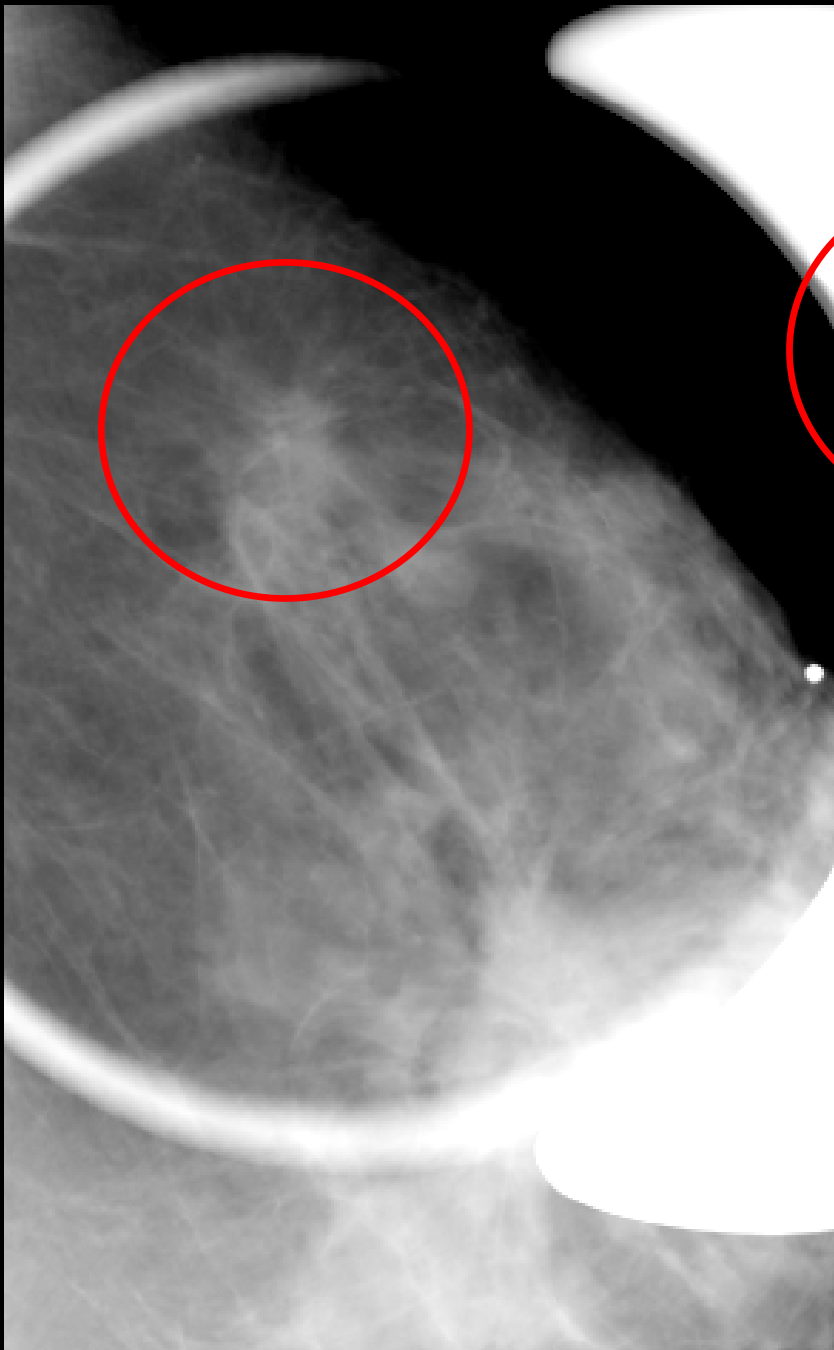
- Mammography: limited sensitivity for women with dense breast tissue, young women, certain cancer types (ILC, DCIS)
- Ultrasound: limited sensitivity for women with fatty breast tissue, certain cancer types (ILC, DCIS), operator dependent

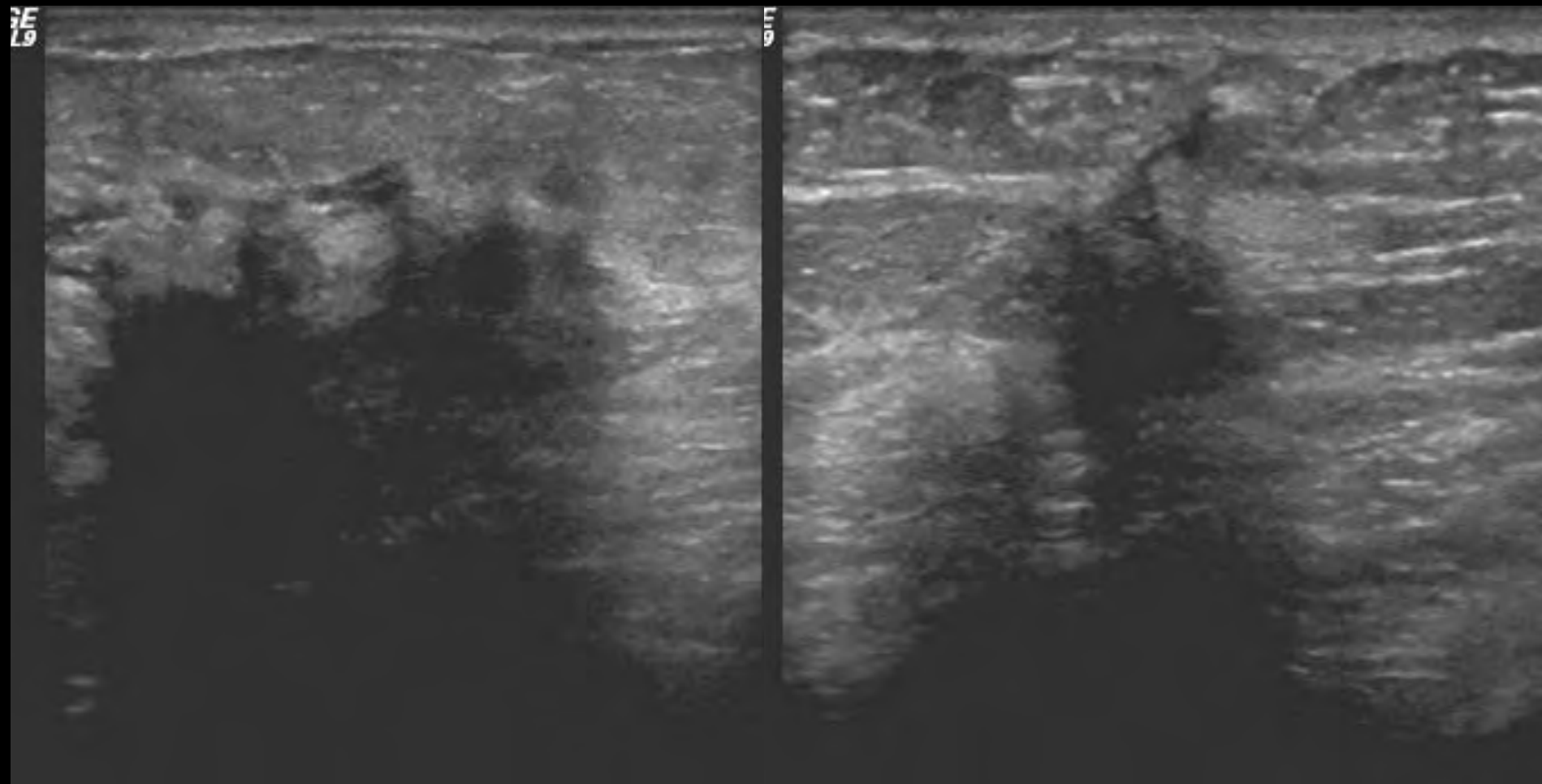


49 year old woman with palpable thickening left breast

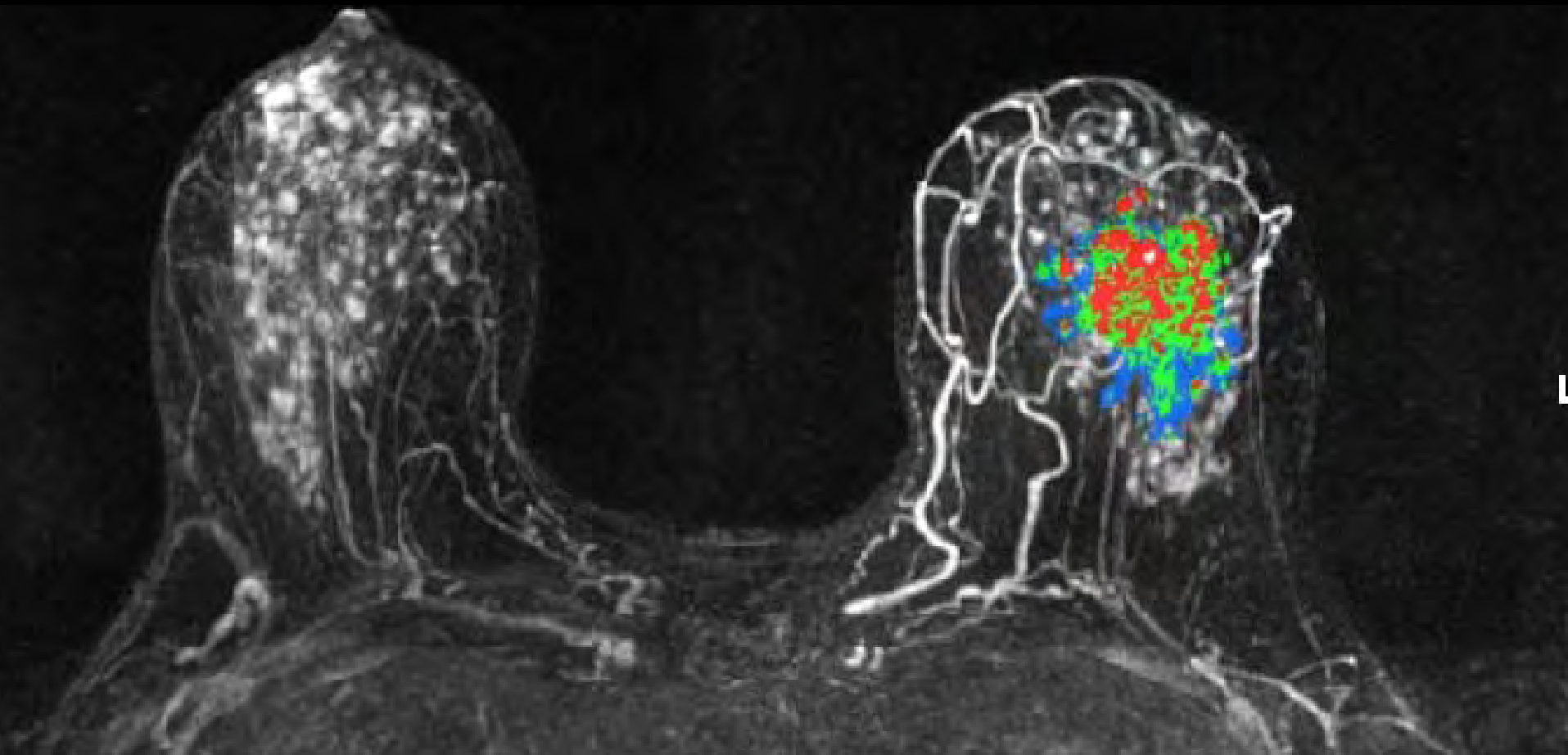






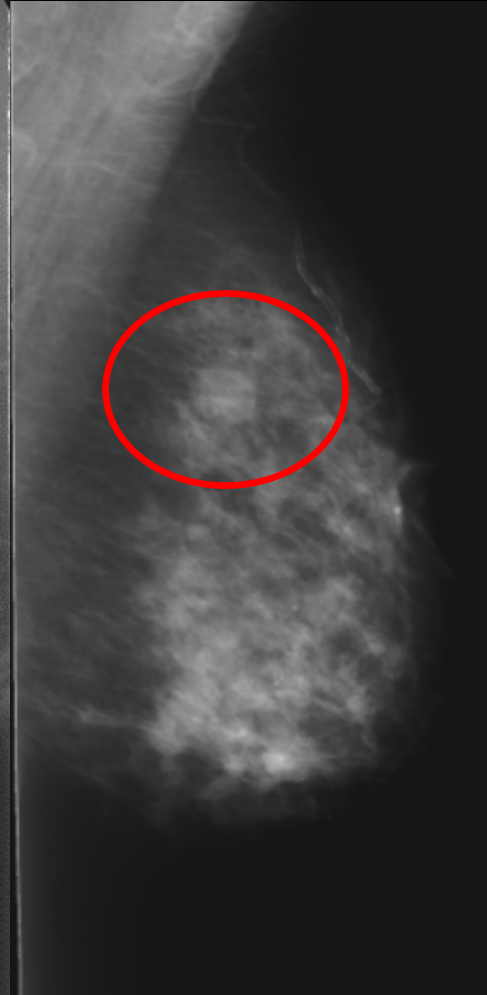
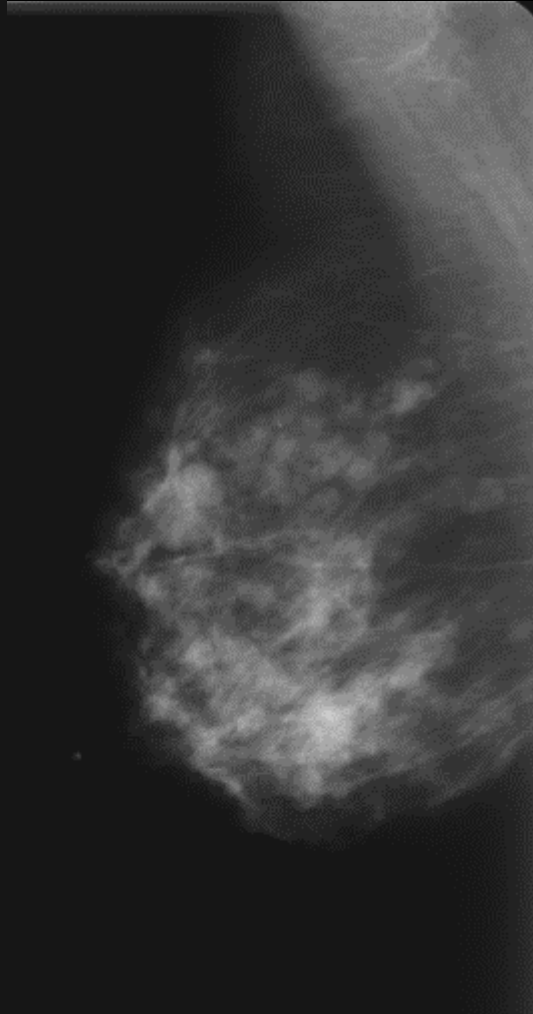
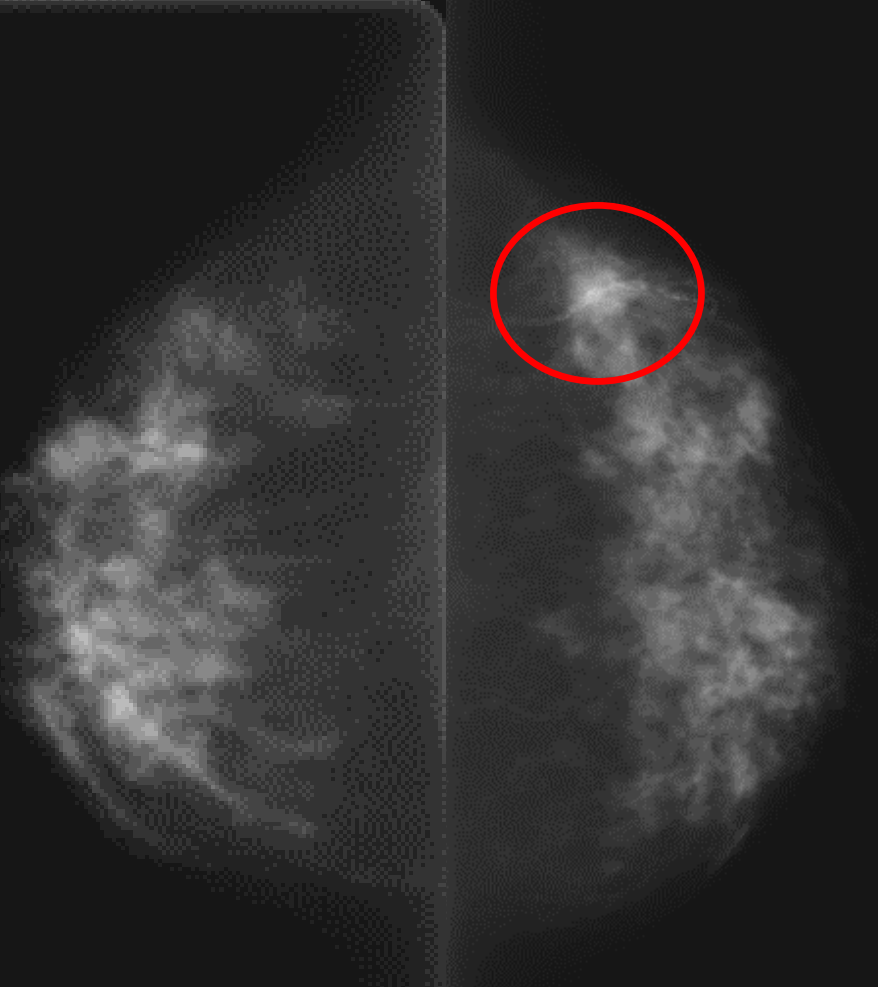


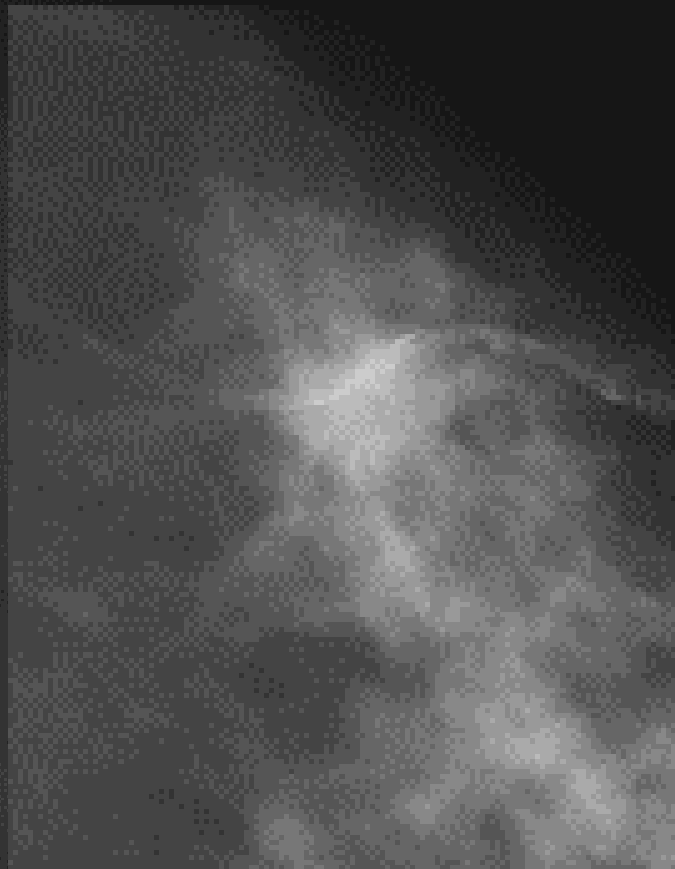
Central mass and 2 o'clock mass, multifocal bordering on multicentric



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

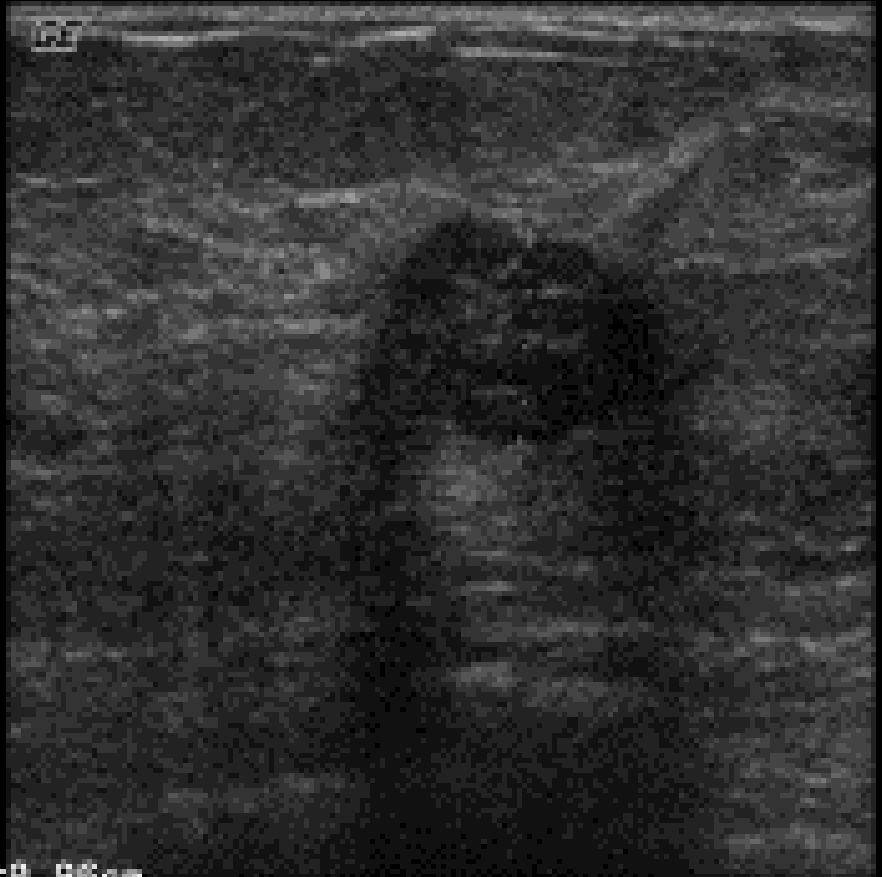
57 yo female presents for
screening mammography



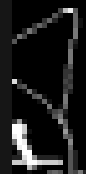


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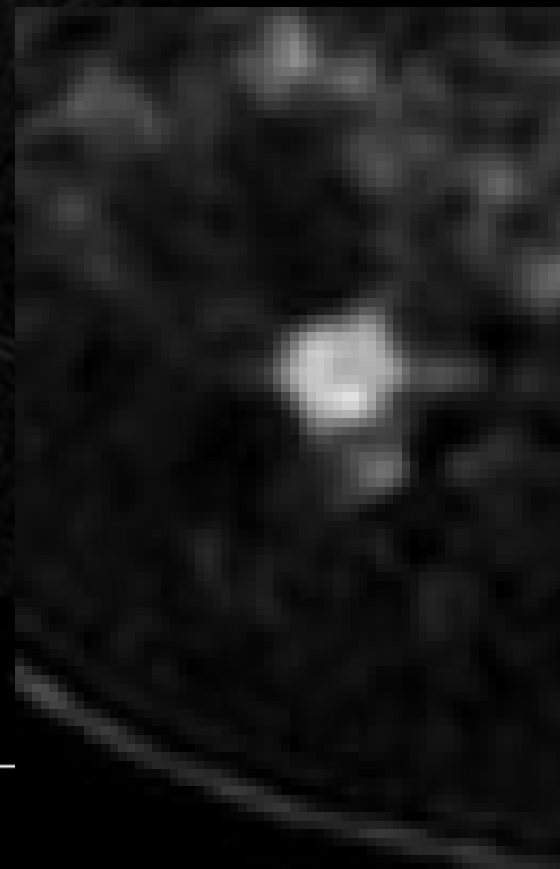
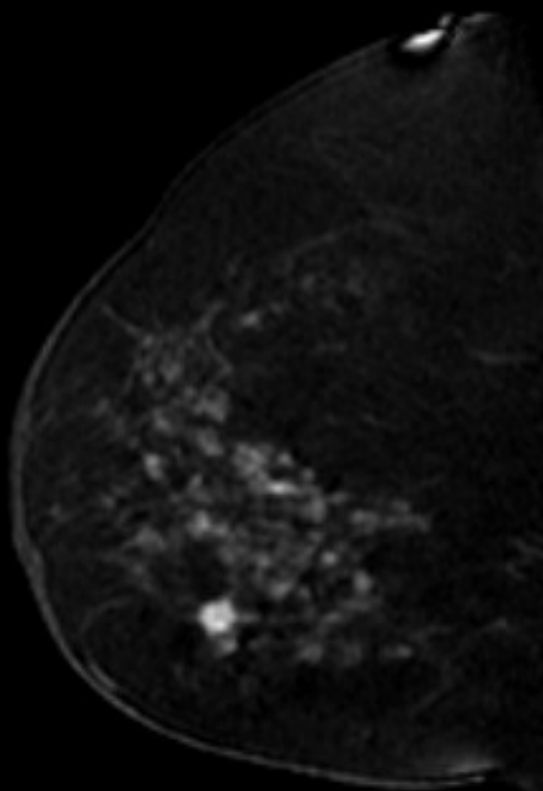
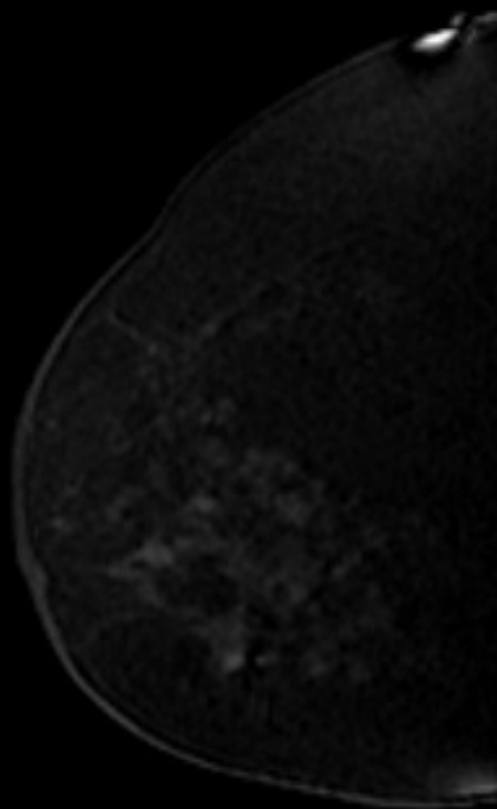
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PIL

: 20x20 cm
256x256
oom: 170%

Same patientright breast



Additional Ipsilateral Malignancy on Diagnostic MR:

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
Lieberman, 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
Total	1451	230/1451 (16)	60/697 (9)	63/697 (9)

Extent of disease: Comparative Sensitivities

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

Contralateral Occult Cancer Diagnosed by MRI Alone

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)
Total	4% (48/1235)

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

- 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

- 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

- 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

- 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?

- 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

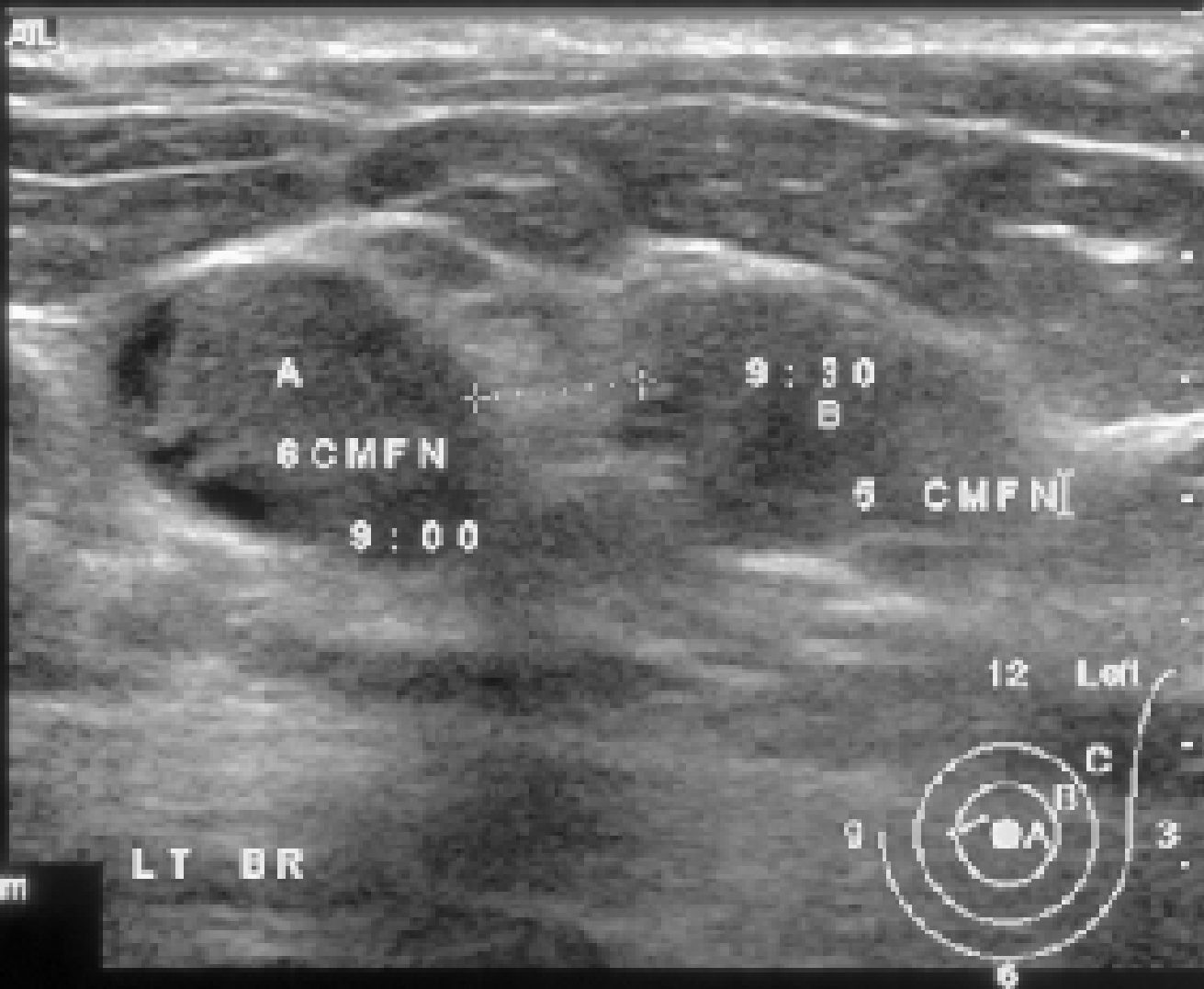
- Radiologist places marker at the time of initial diagnostic biopsy centrally in all large (> 2 cm), highly suspicious lesions
- For biopsy proven cancers that have not had a marker placed, surgeon/medical oncologist requests marker placement for all candidates for preoperative therapy
 - Marker placed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

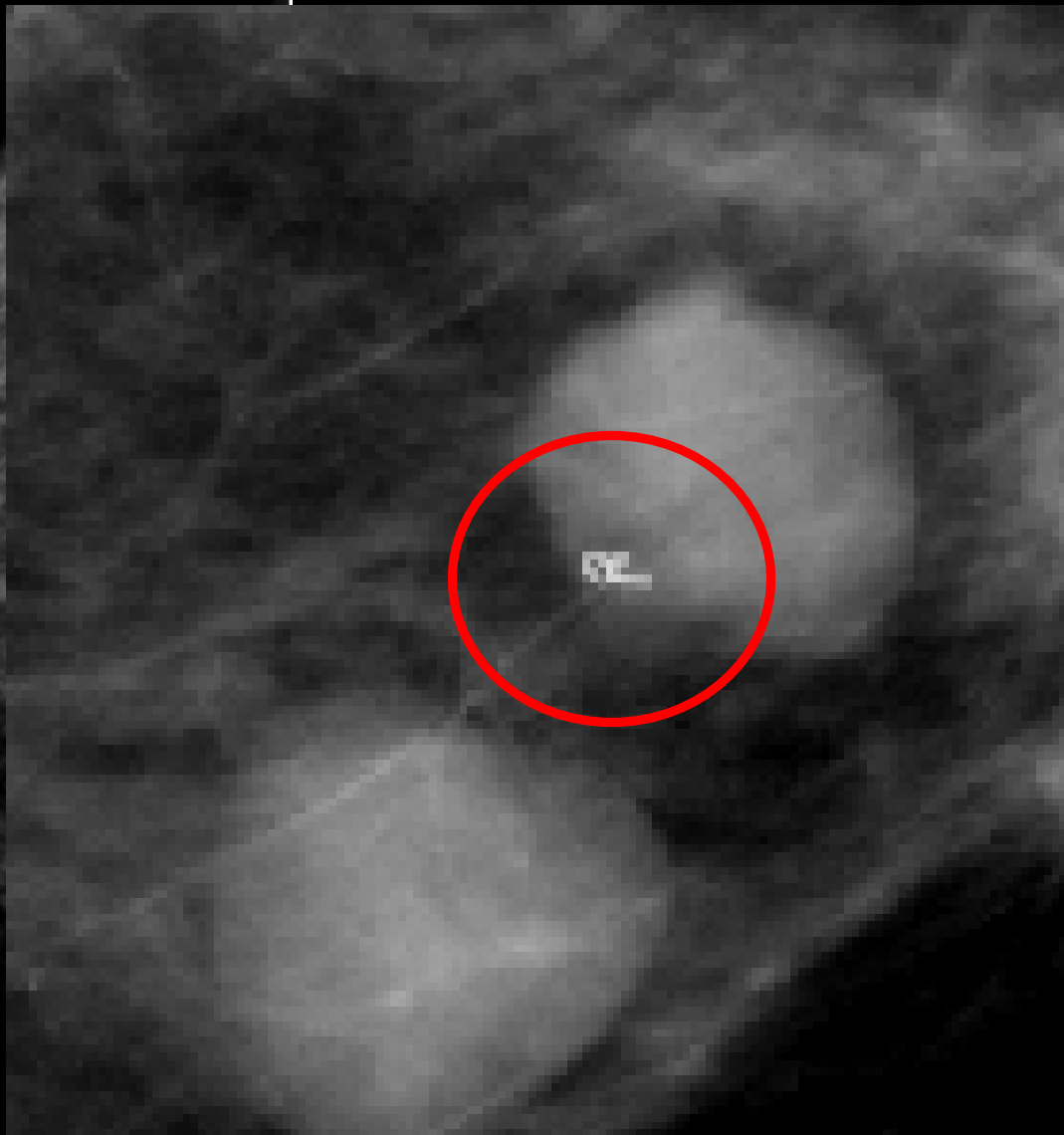


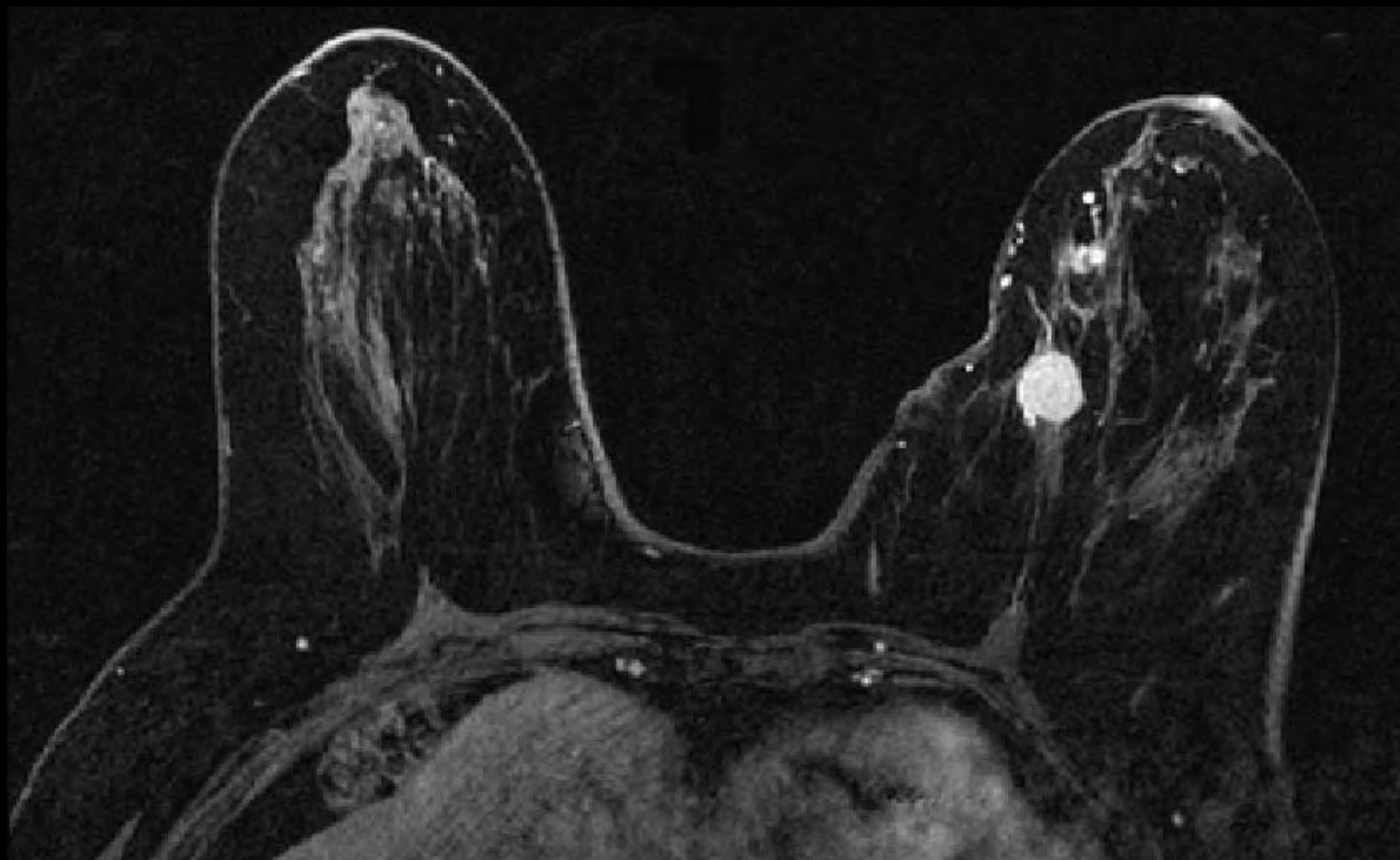
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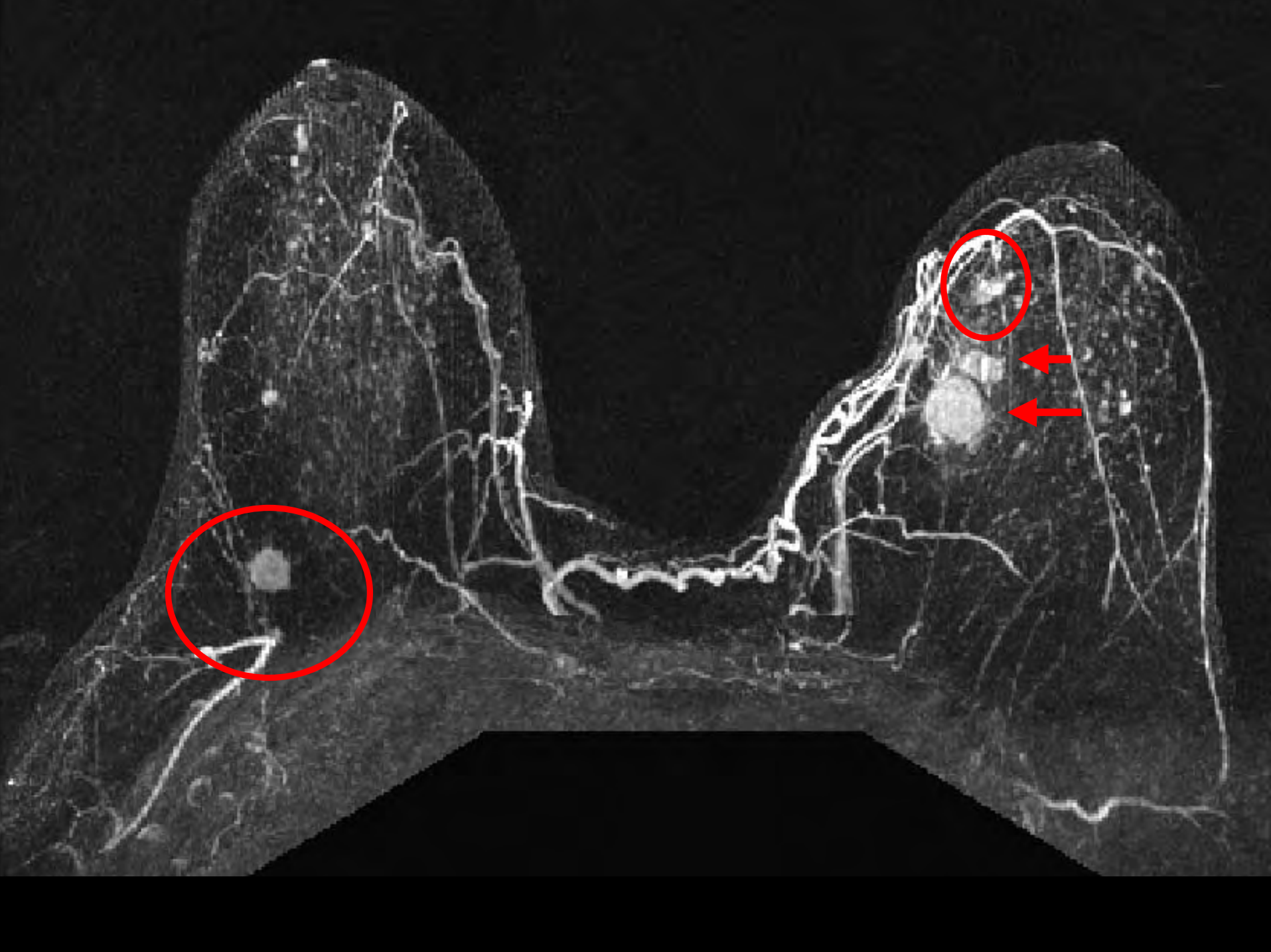


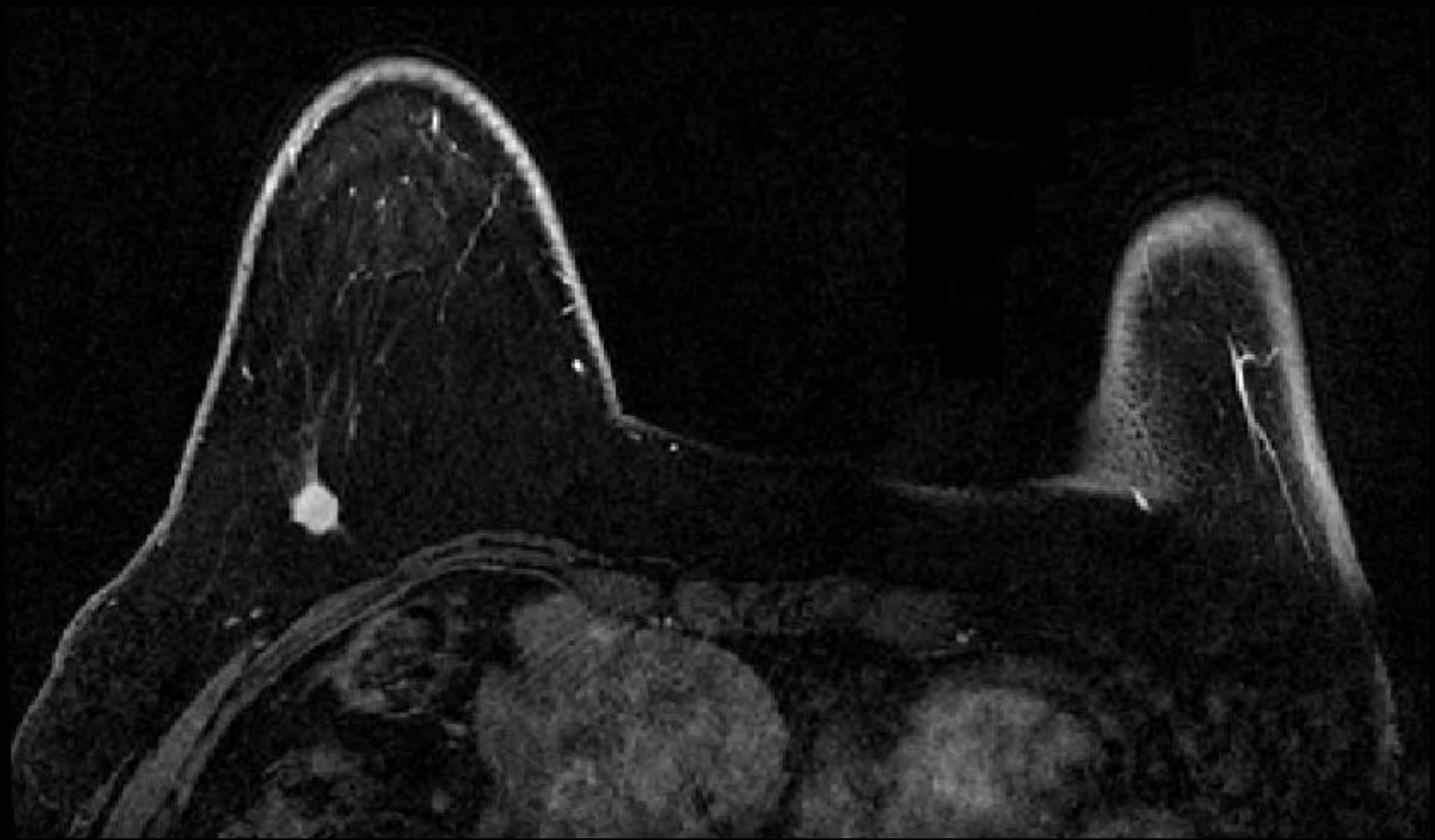
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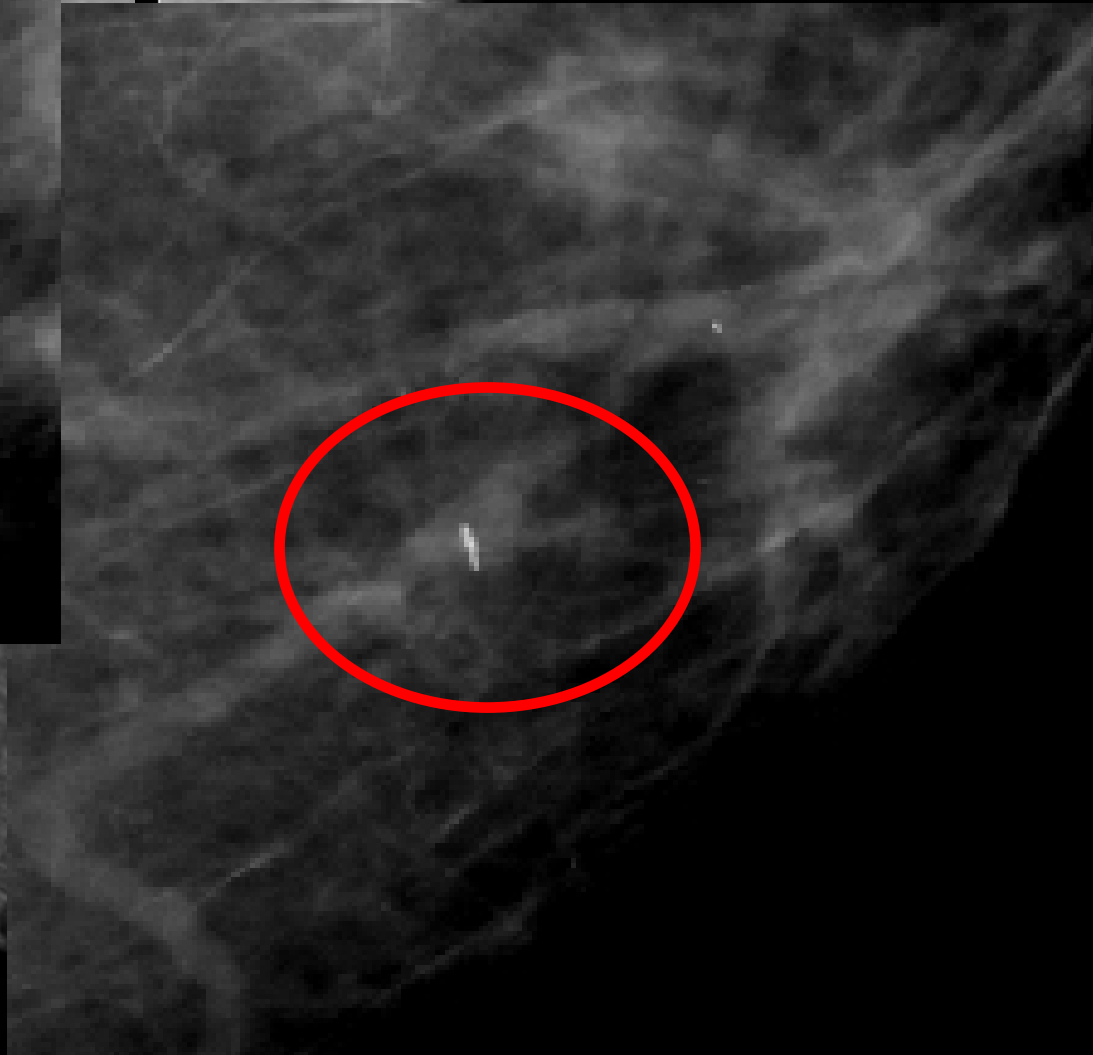
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RT BREAST 7 O'CLOCK 6 CM TO N TRANS

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Recommendations for Women with Current Breast Cancer Diagnosis

- 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!