

2nd International Congress of Breast Disease Centers

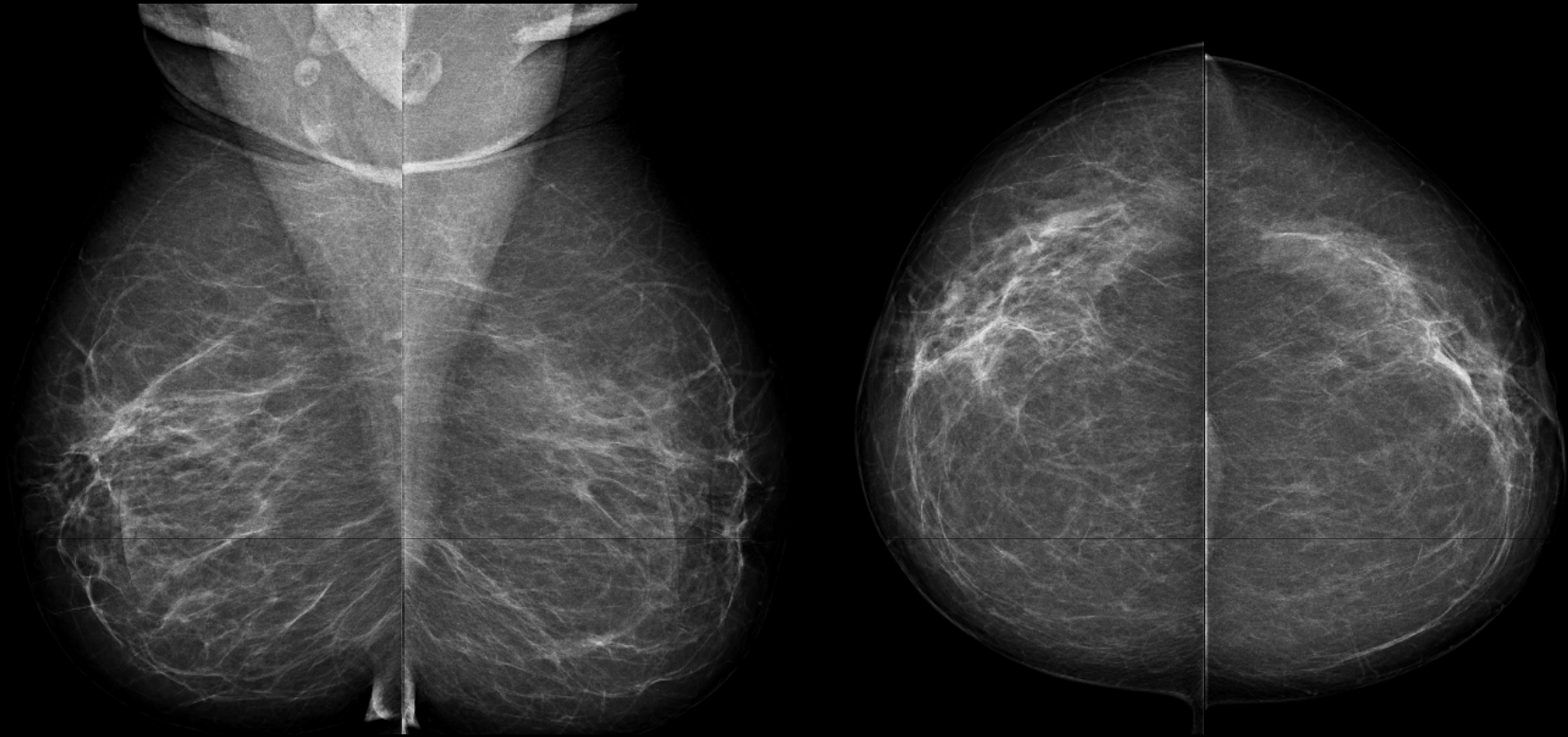
Paris, February 9-10, 2012

**Role of MRI in the initial diagnosis
of breast cancer**

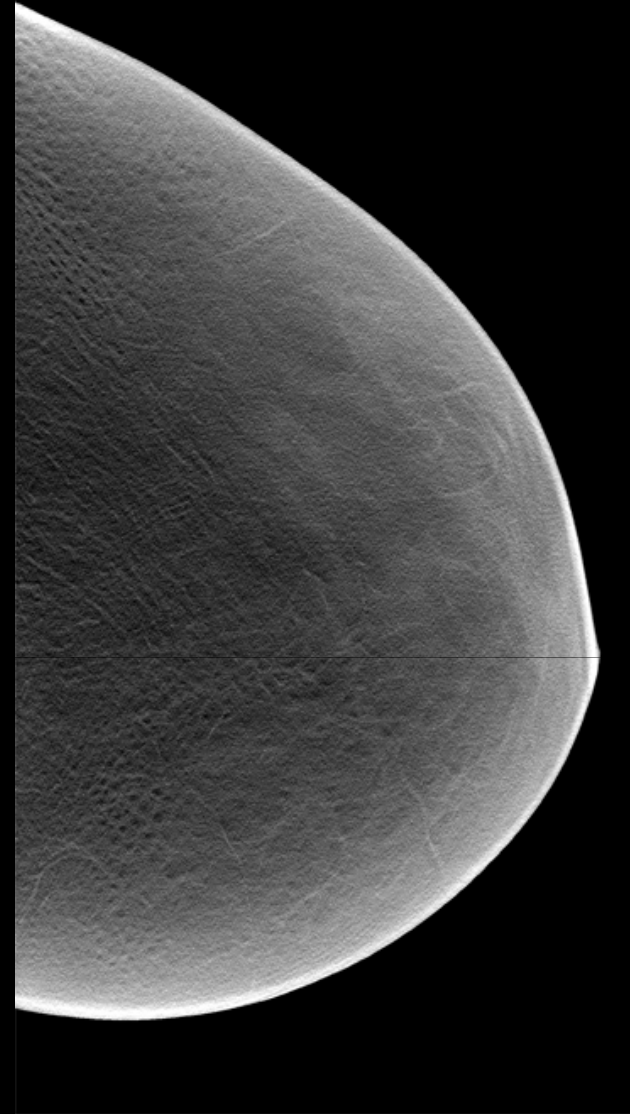
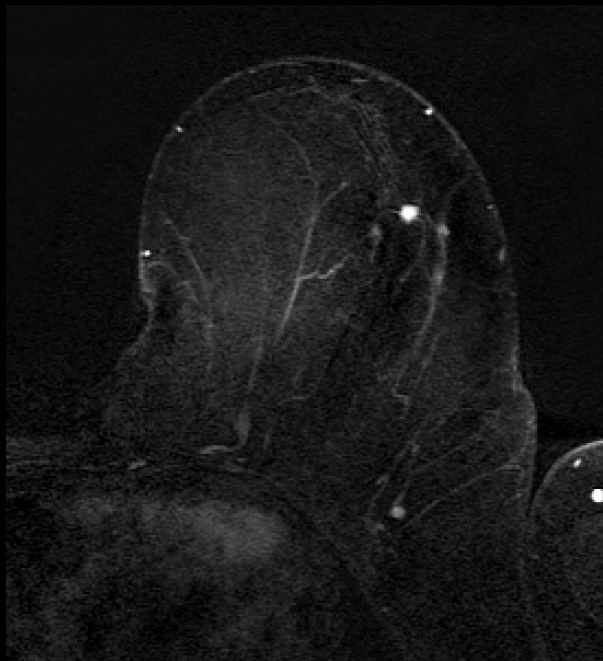
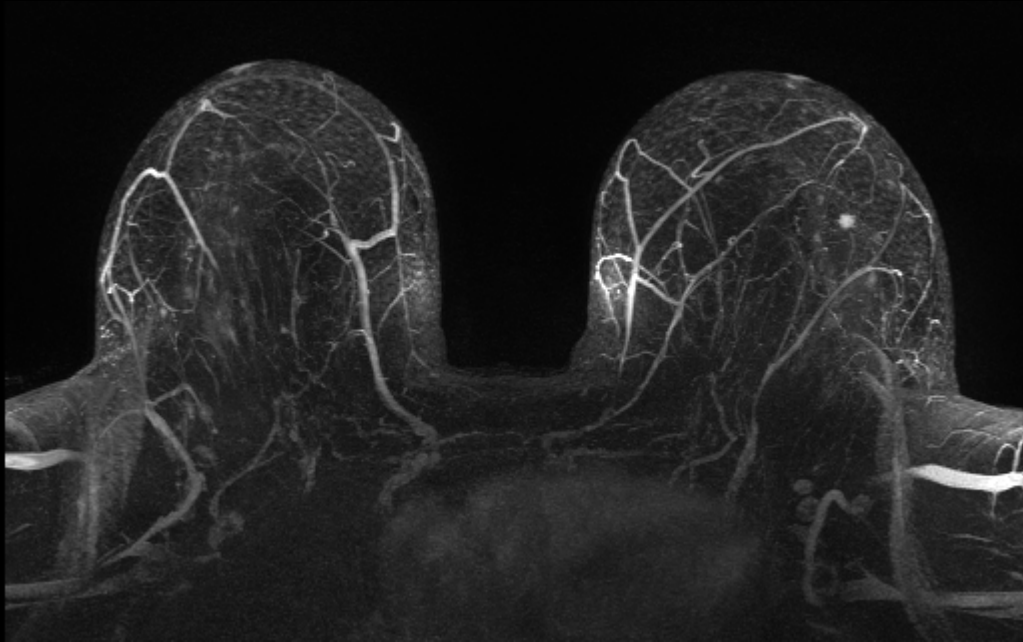
Ulrich Bick

MRI of the Breast

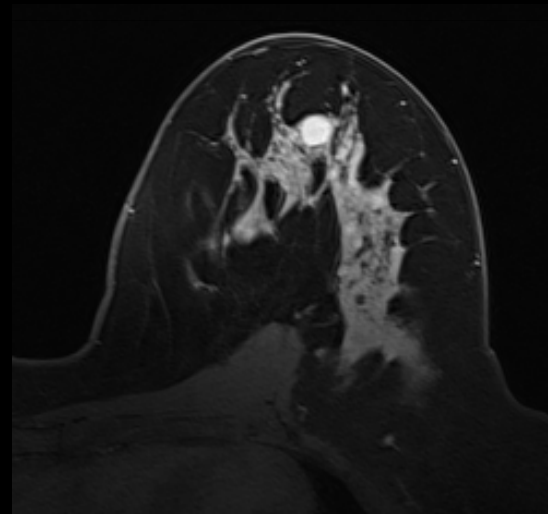
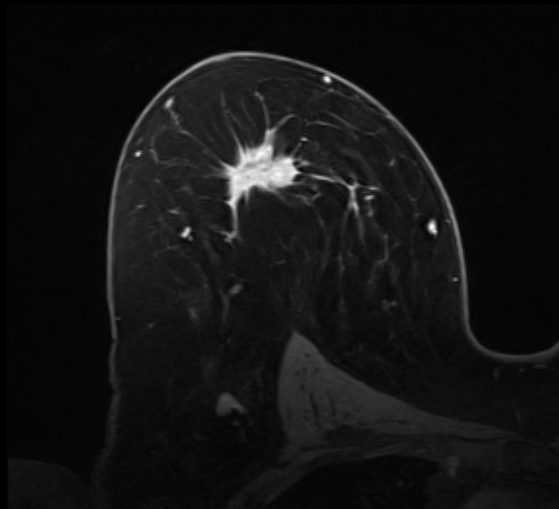
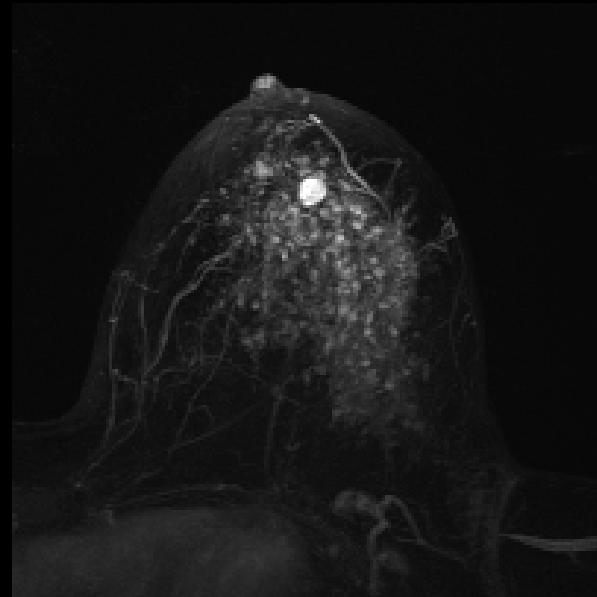
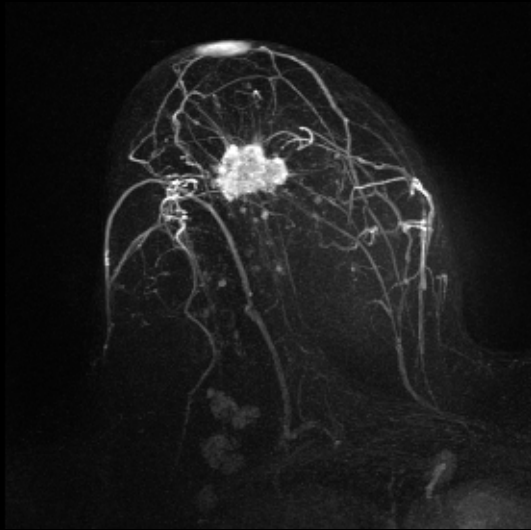
- **Highest sensitivity for both invasive and in-situ lesions of all imaging modalities**
- **Specificity and ppv will vary with lesion size and individual breast cancer risk**
- **Evaluation of MRI always in conjunction with history, clinical exam and other imaging modalities (mammography, ultrasound)**



39-year-old asymptomatic patient with known BRAC2 mutation in the family, first high-risk screening round

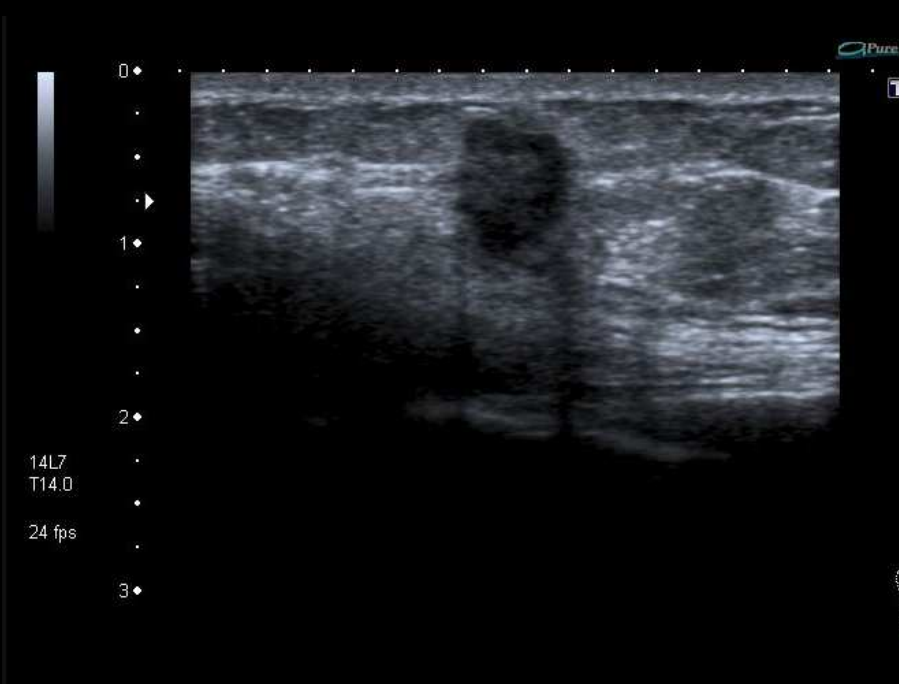


***5-mm invasive-ductal carcinoma
pT1a pN0(sn) G2***

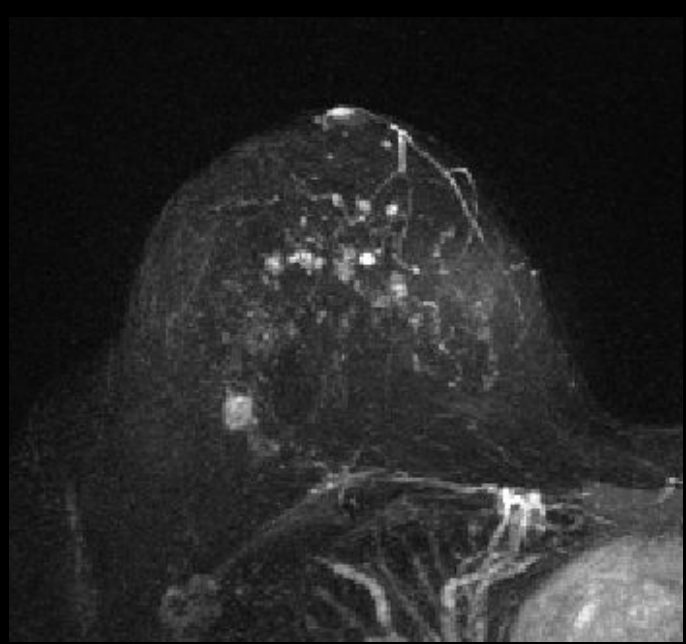
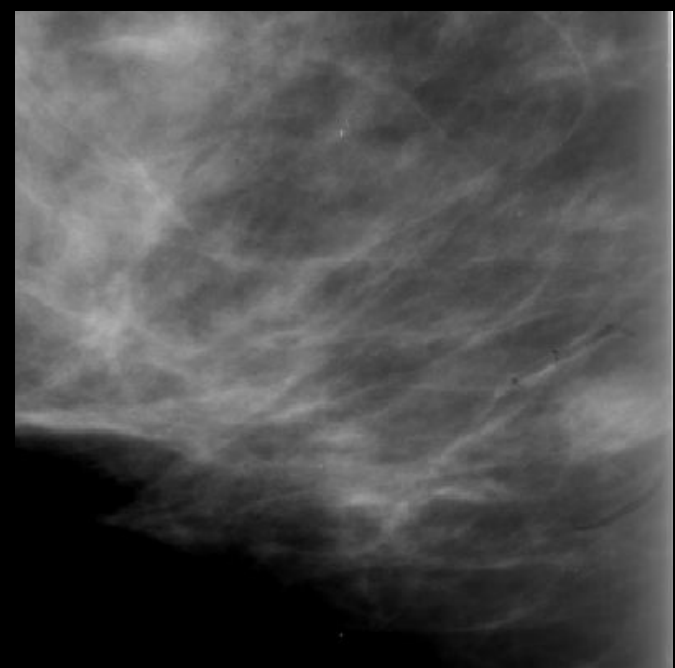


malignant

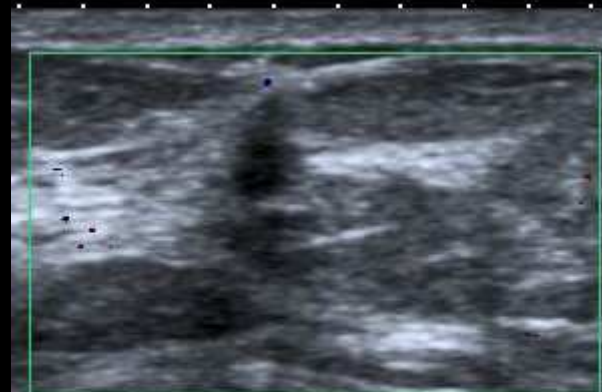
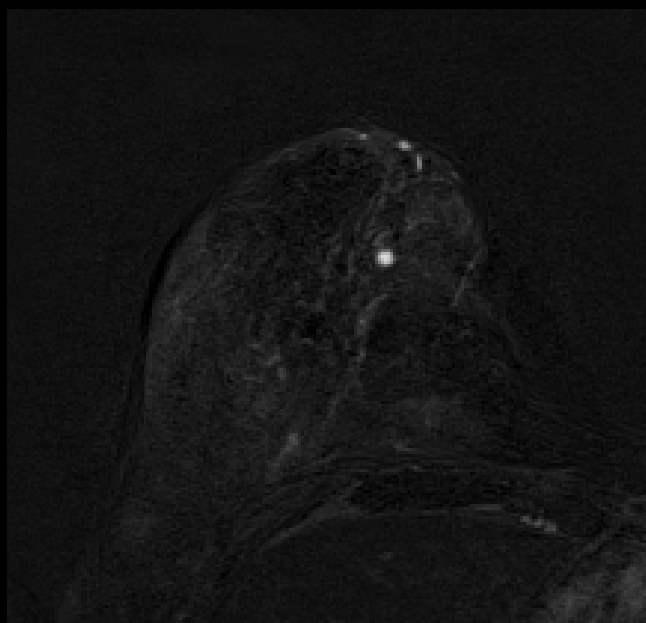
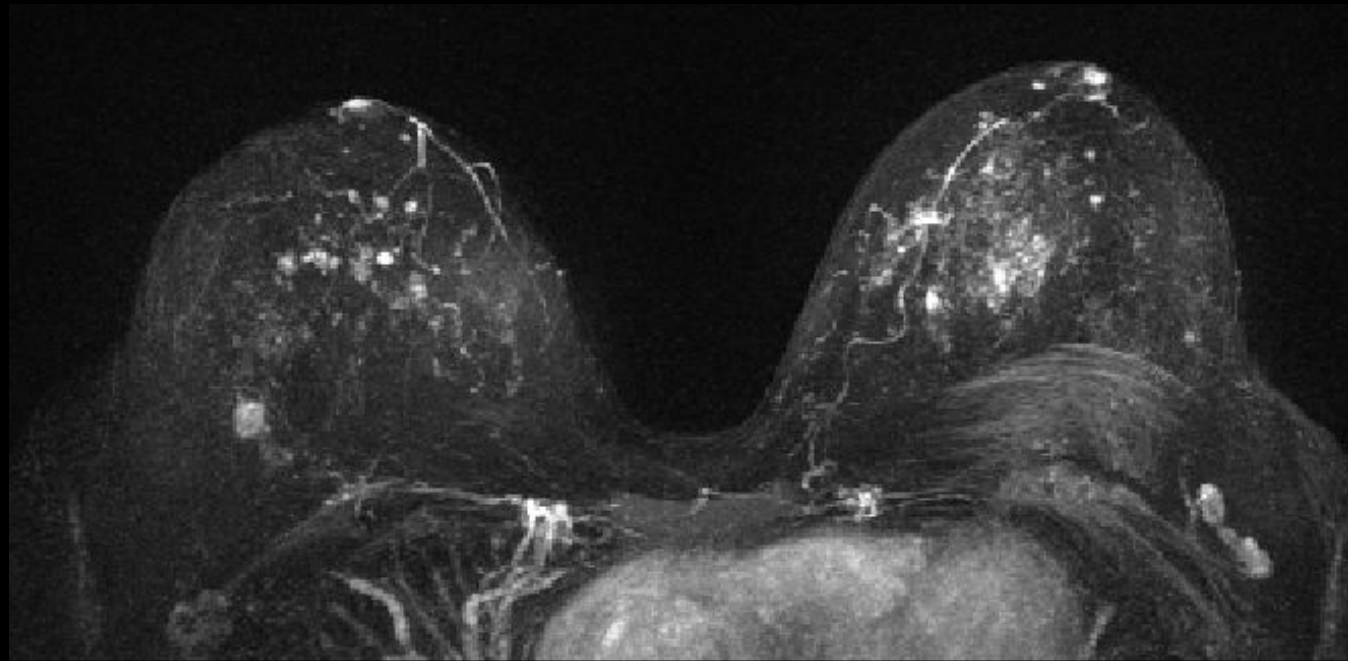
benign

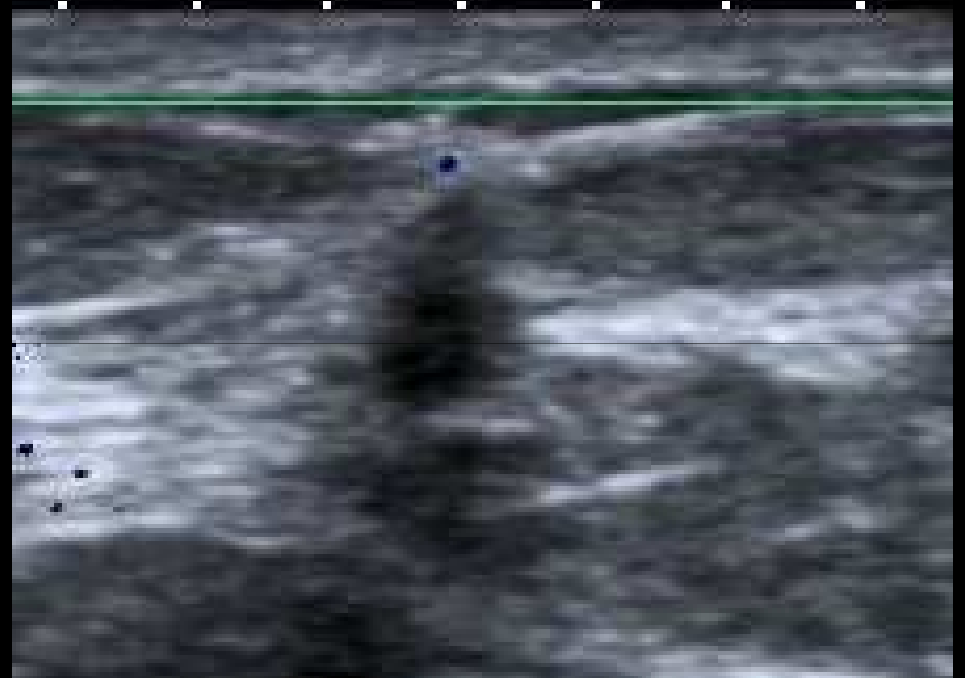
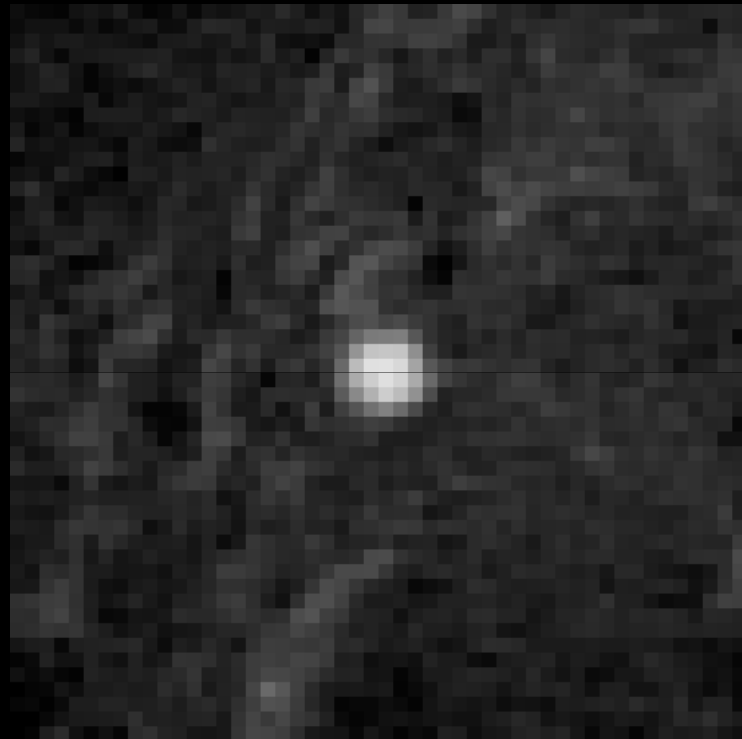


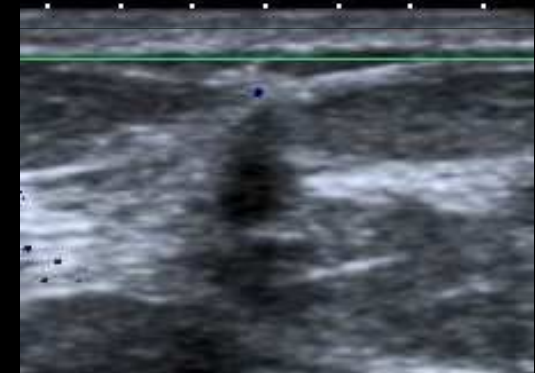
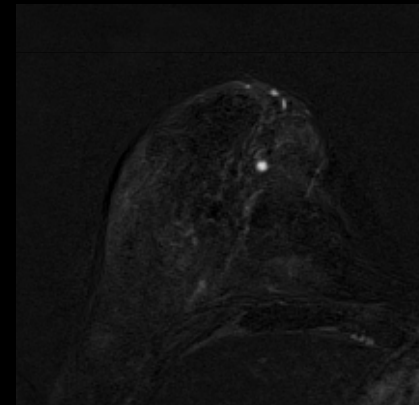
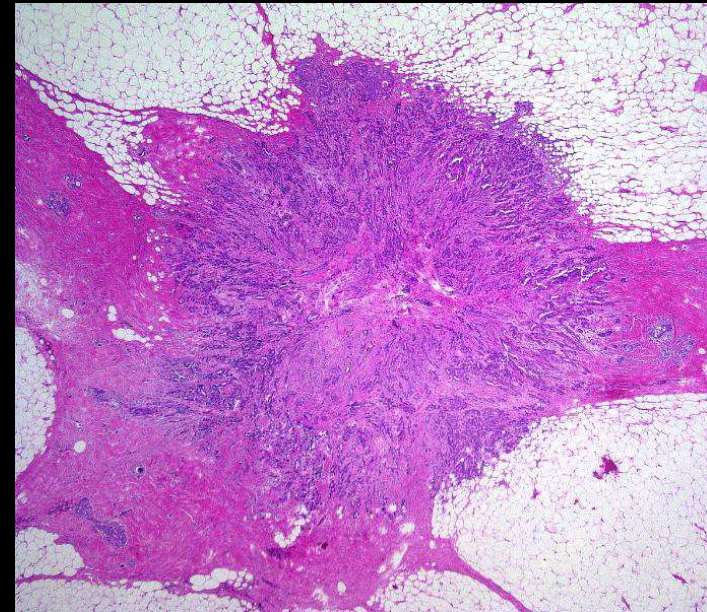
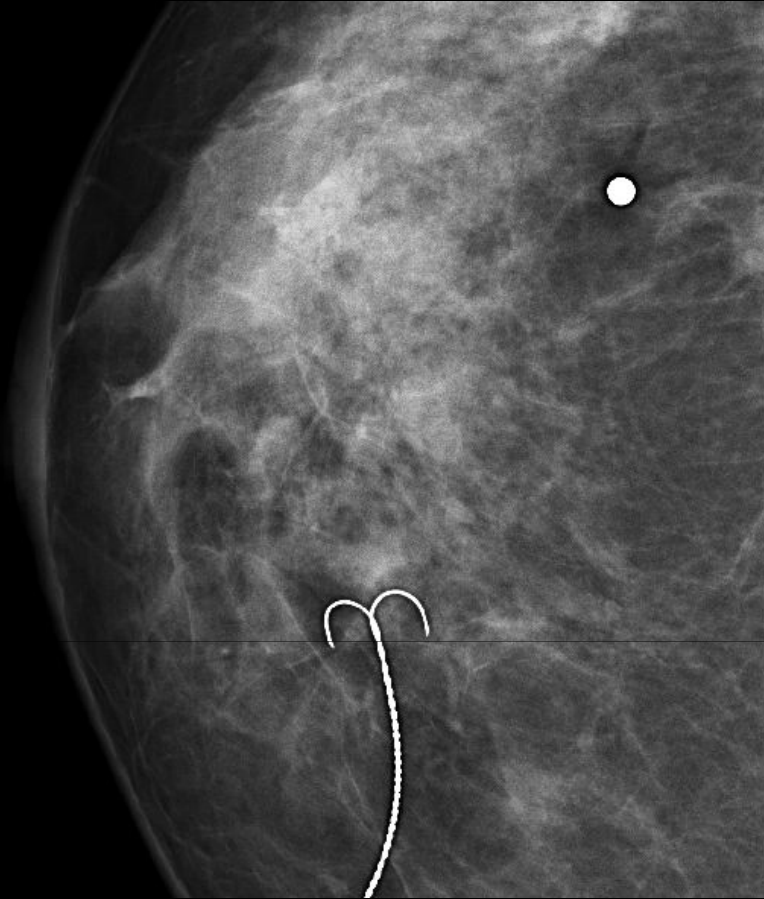
MI: (1.5)
2DG
80
DR
60



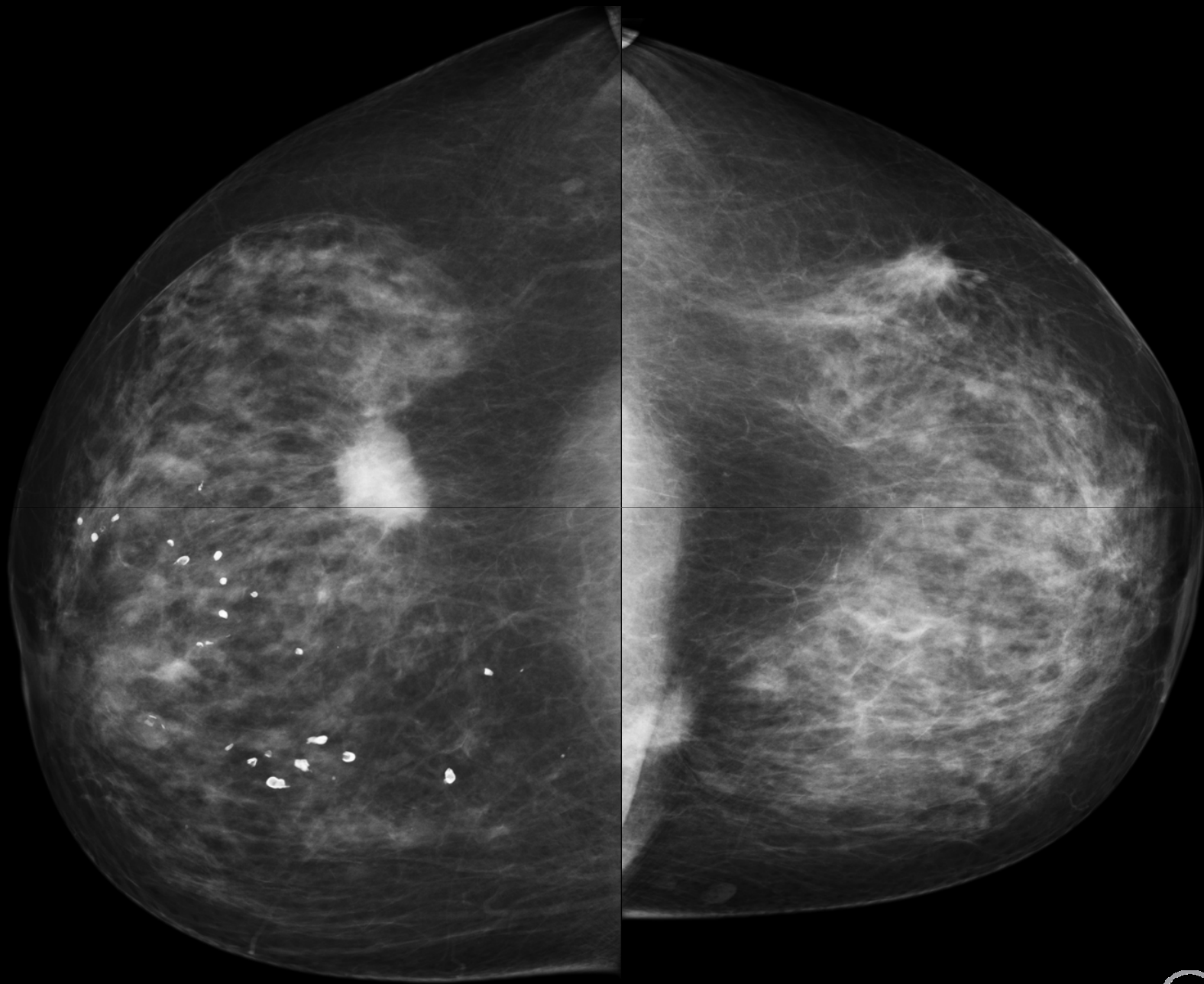
**48-year-old female with palpable
invasive-ductal carcinoma
confirmed by ultrasound-guided
core biopsy**

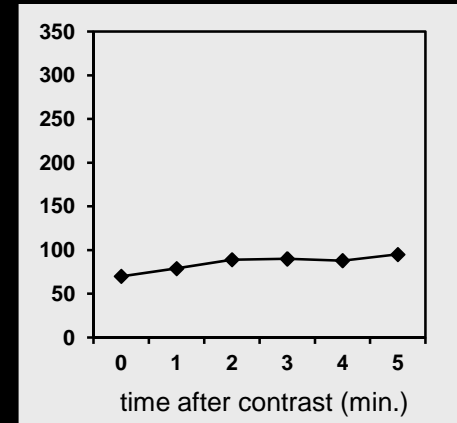
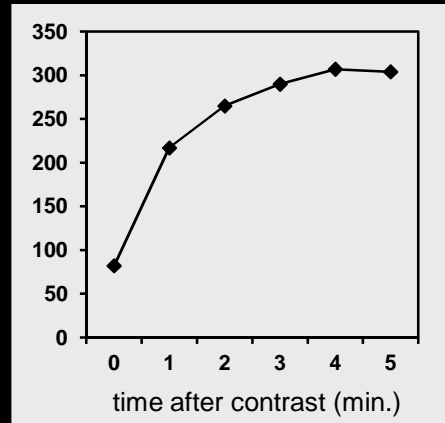
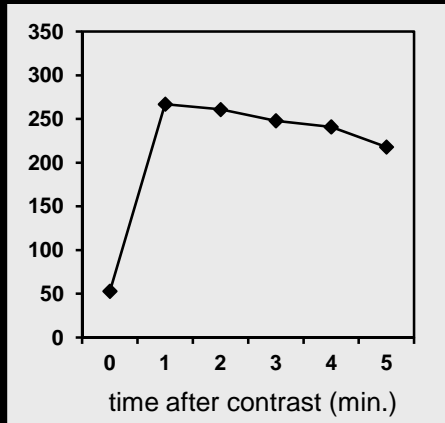
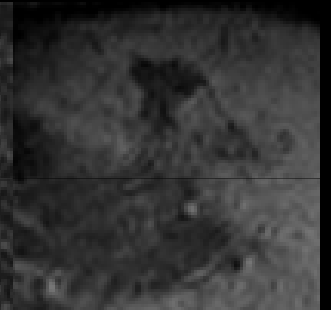
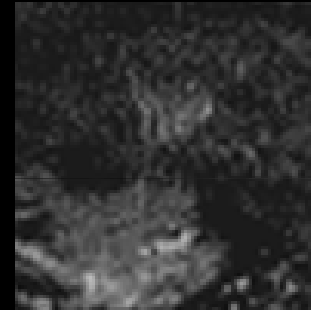
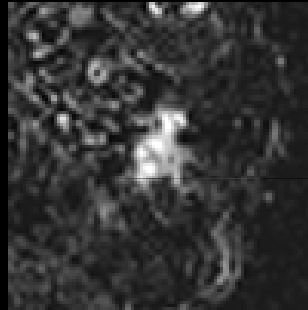
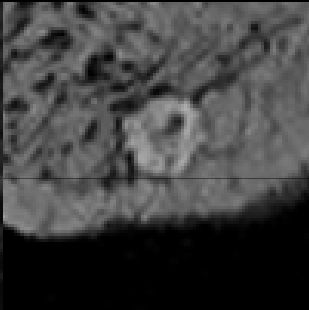
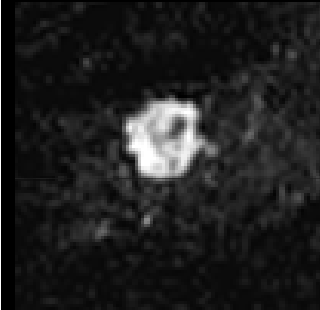
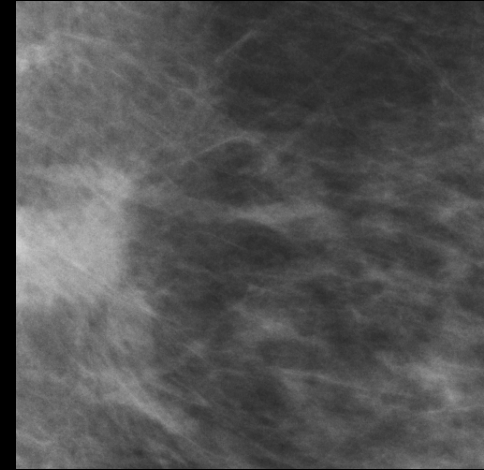
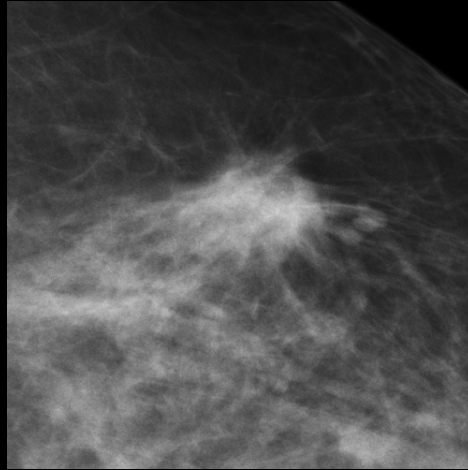






**Final surgical pathology:
*second multicentric 4-mm invasive ductal cancer***



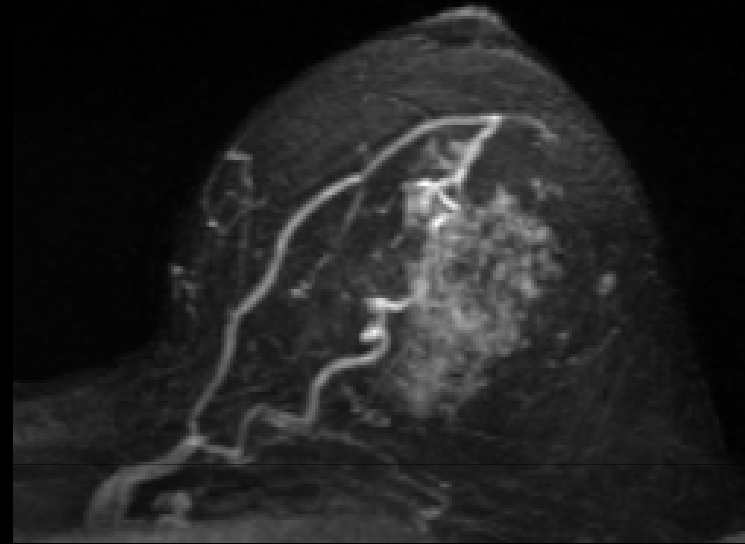
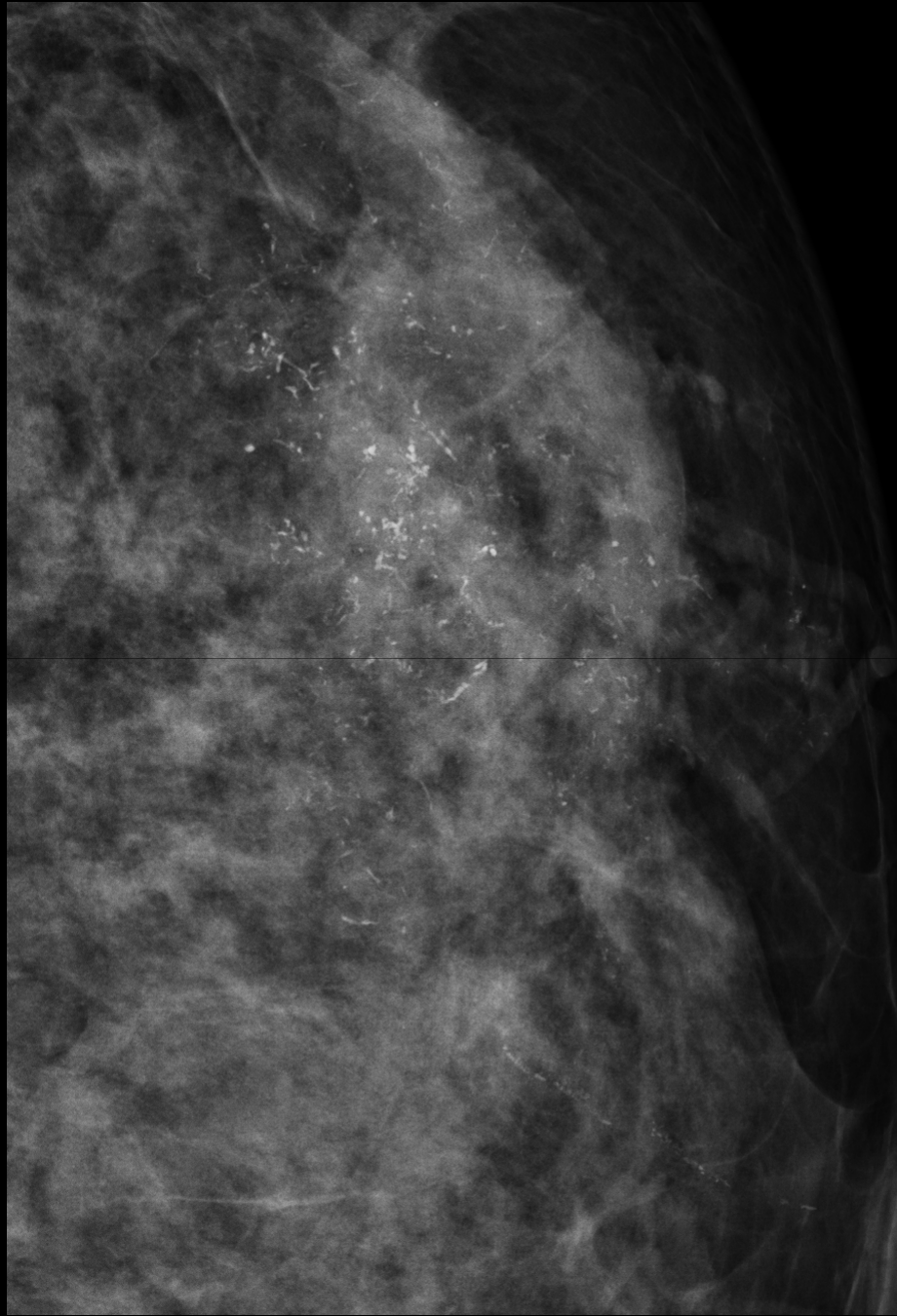


right: *invasive ductal*

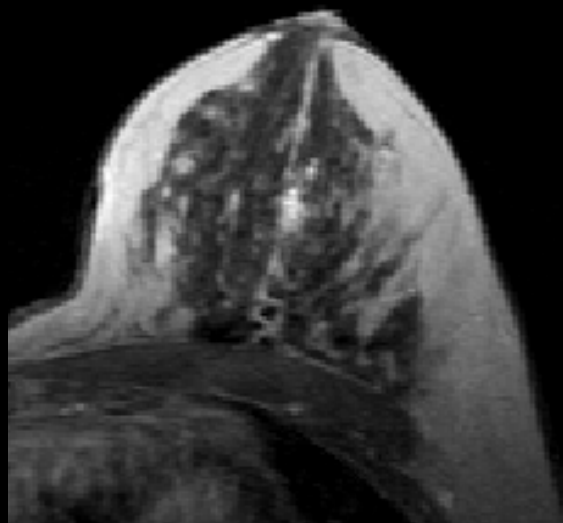
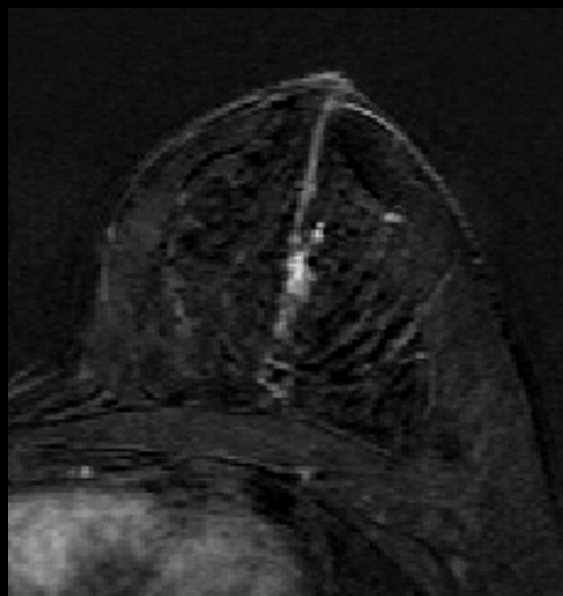
left: *2 x invasive lobular*

Breast MRI and DCIS

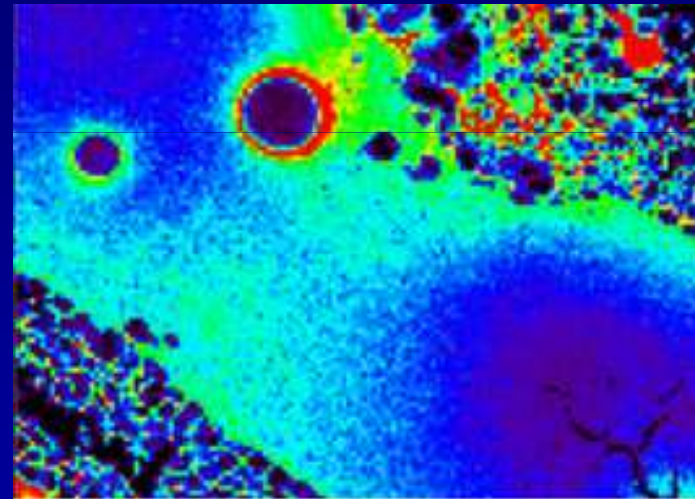
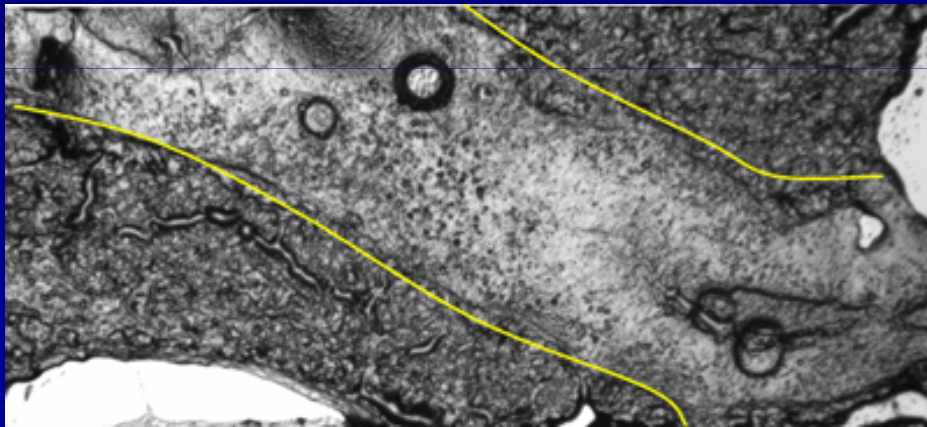
- **Most high-grade DCIS beyond a certain size (10mm?) will be visible on MRI**
- **Early as well as low-grade DCIS difficult to diagnose with any imaging modality**
- **Some lesions may be visible on mammography alone, some only on MRI and some on both**
- **Distribution patterns (unilateral, segmental) of otherwise non-specific enhancement foci on MRI are often key to diagnosis (comparable to distribution patterns of microcalcifications)**



44-year-old patient after right breast-conserving therapy for breast cancer 3 years ago now with 115 mm DCIS high-grade in the left breast

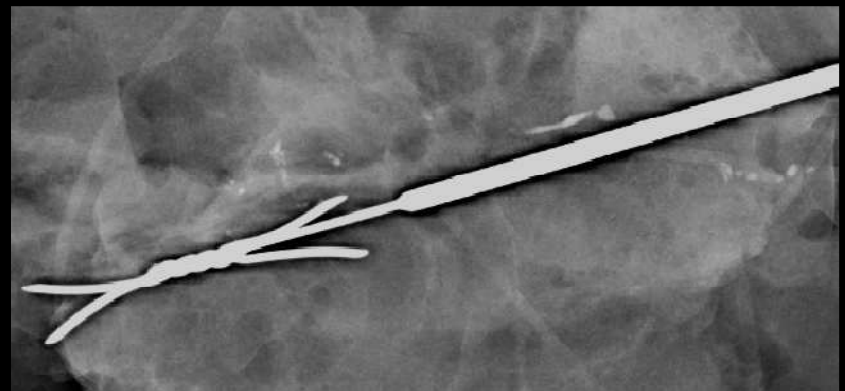
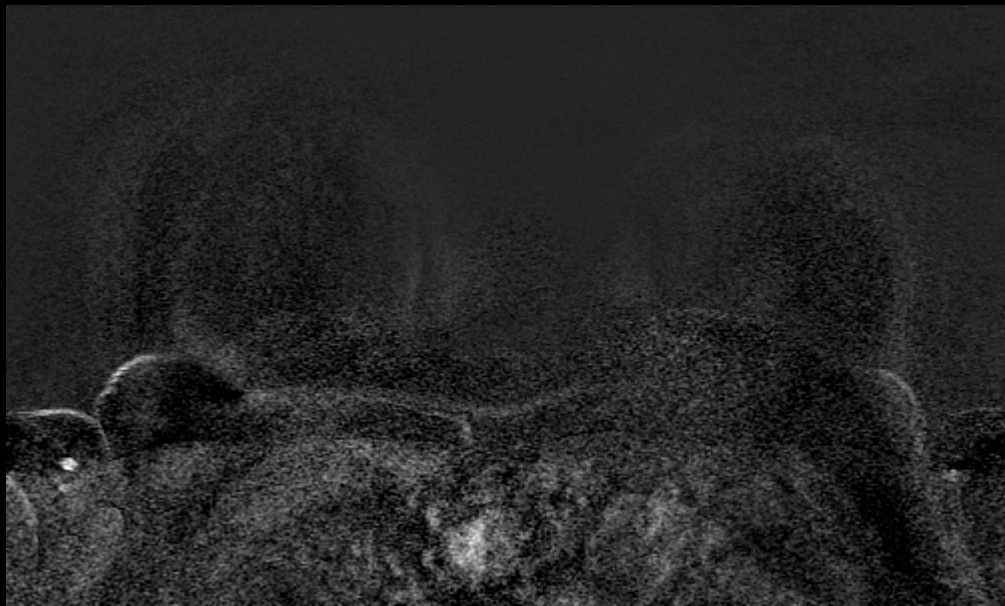
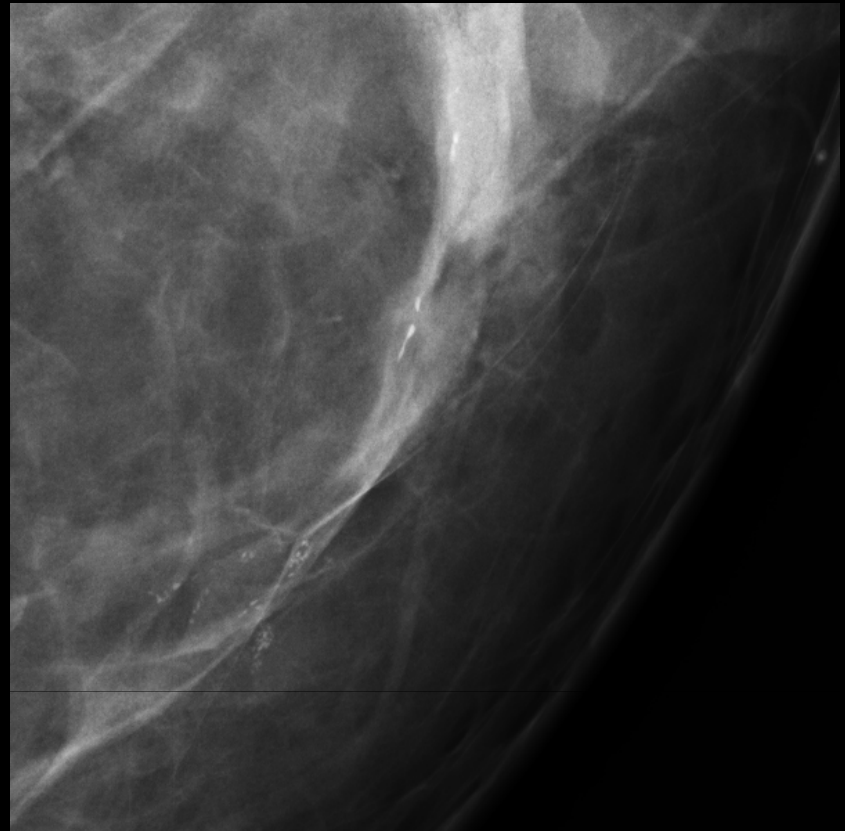
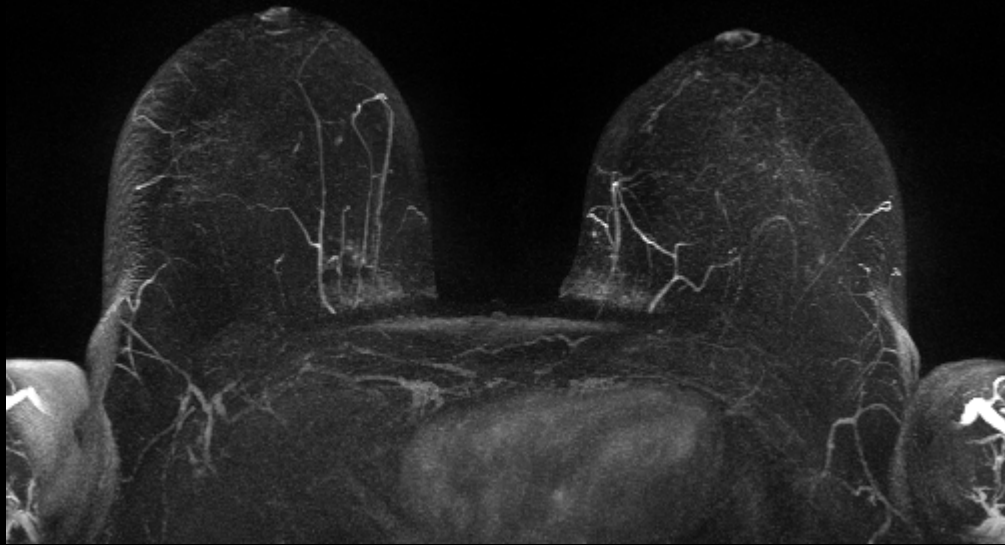


Ductal Carcinoma in Situ: X-ray
Fluorescence Microscopy and
Dynamic Contrast-enhanced MR
Imaging Reveals Gadolinium Uptake
within Neoplastic Mammary Ducts in a
Murine Model¹

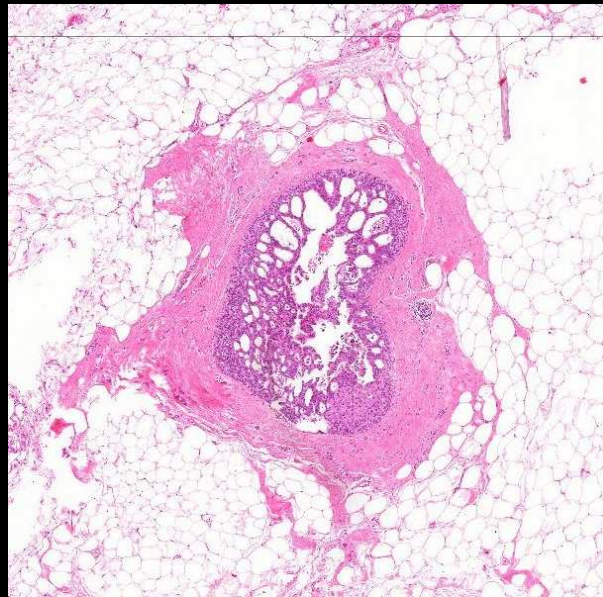
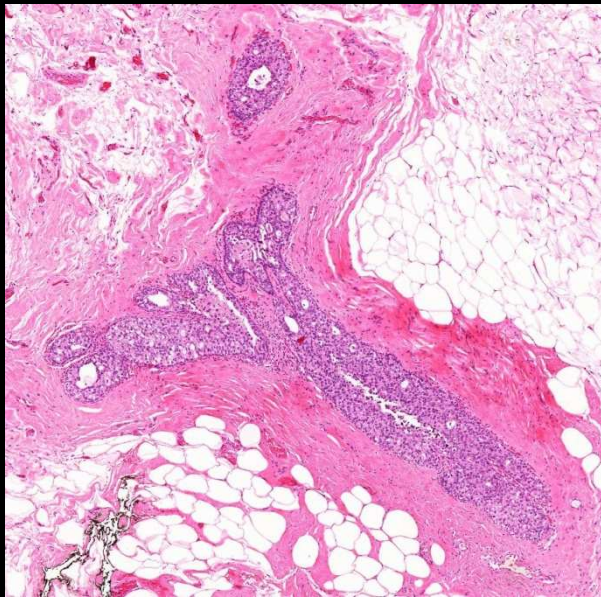
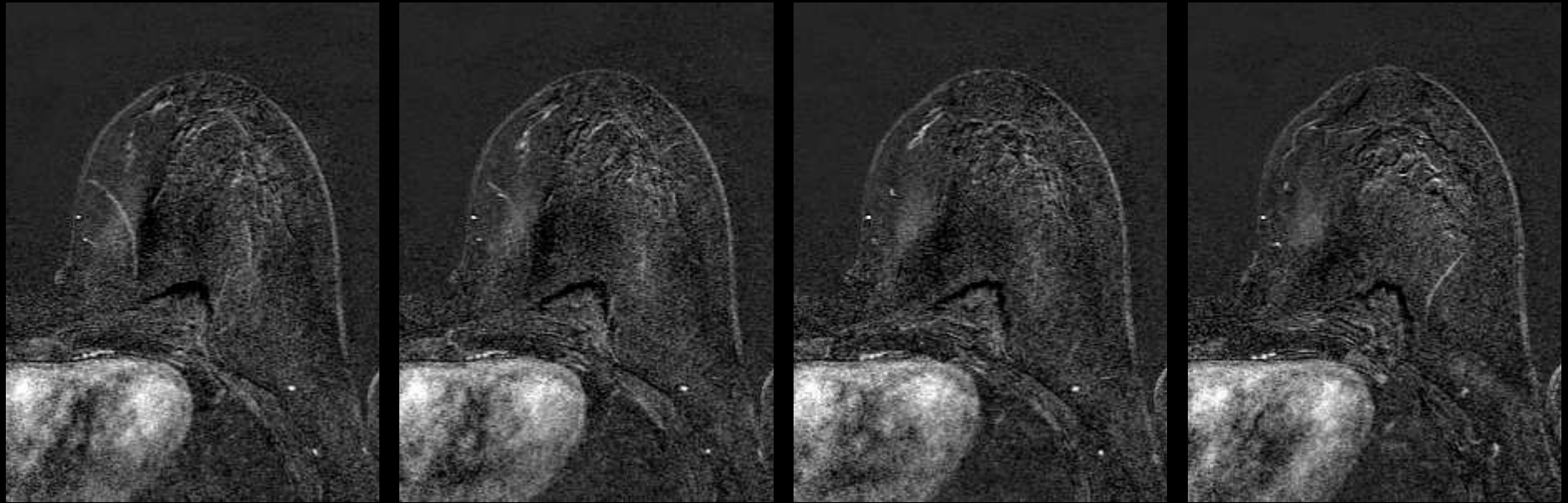


**x-ray fluorescence microscopy
image of ducts with DCIS
showing gadolinium uptake**

Jansen et al. 2009, Radiology 253: 399-406



**12-mm DCIS
intermediate-grade**



MRI of the Breast - *Indications*

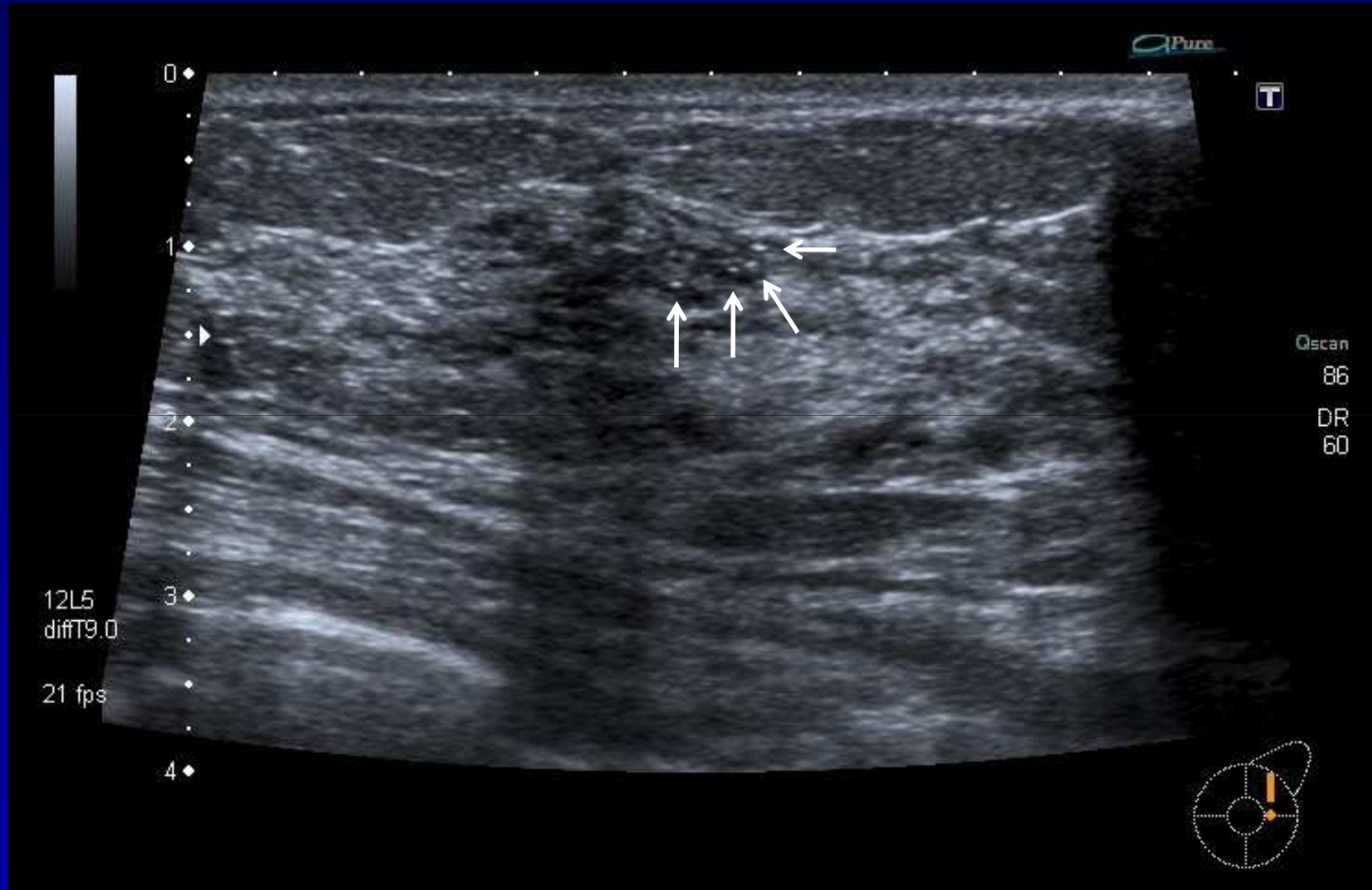
- **Early Detection**
- **Assessment**
- **Therapy**

Breast MRI: *Assessment*

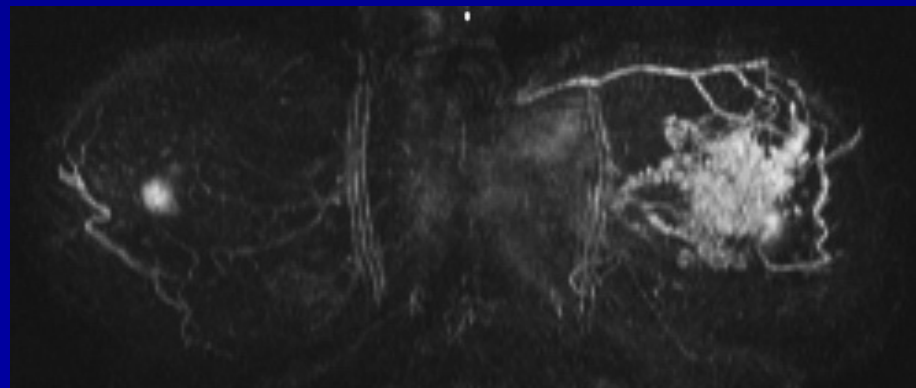
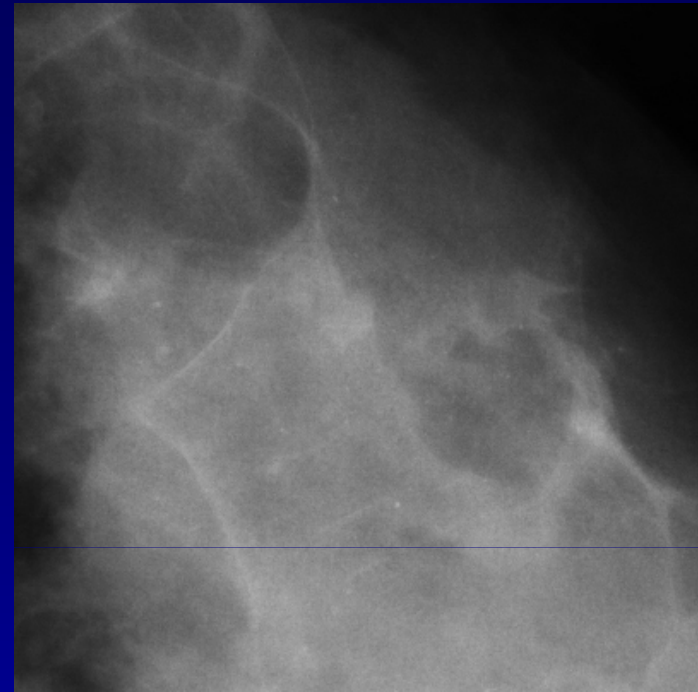
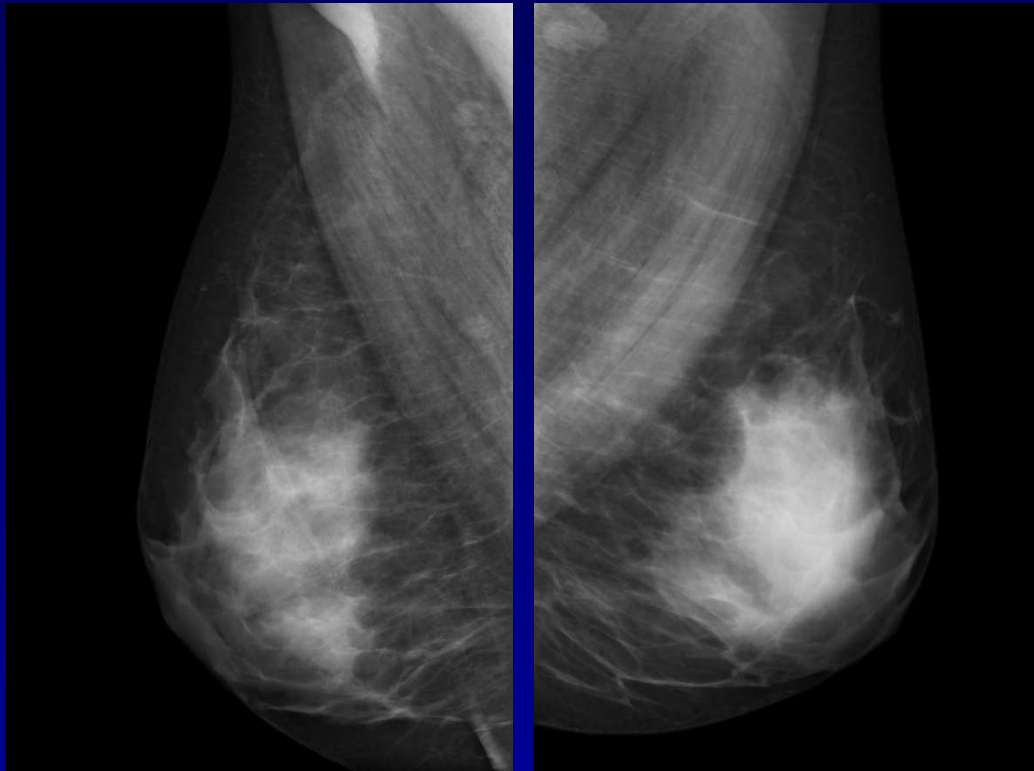
- **Differentiation scar / recurrence***
- **Unknown primary***
- **Palpable abnormality without corresponding imaging finding in mammography and ultrasound**
- **Percutaneous biopsy not possible (Abnormality e.g. visible only in one view)**
- **Poor concordance between imaging findings and biopsy results**

***reimbursed by public payors in Germany**

28-year-old female with asymmetry on palpation



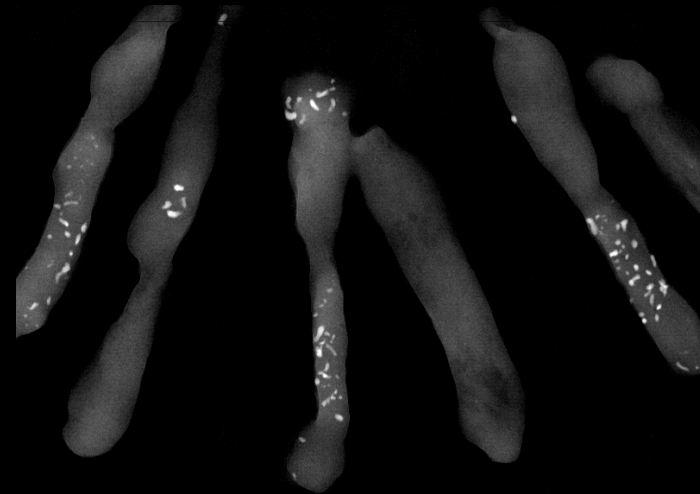
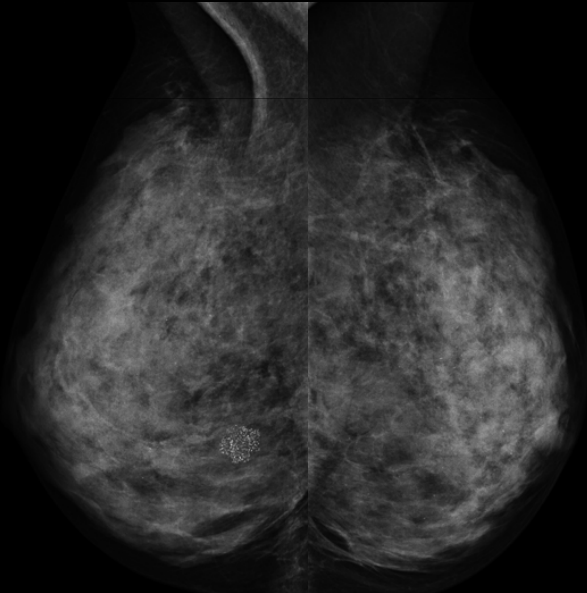
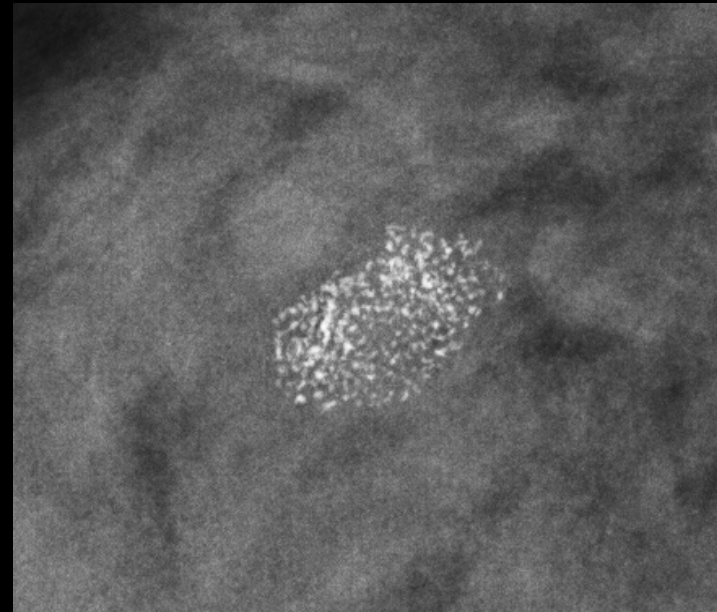
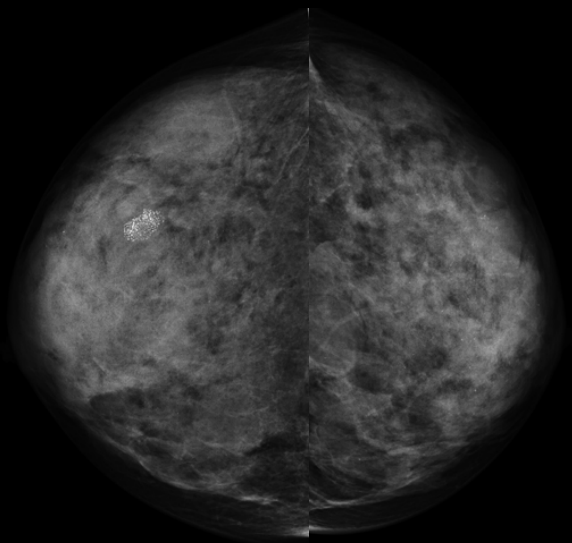
28-year-old female with asymmetry on palpation



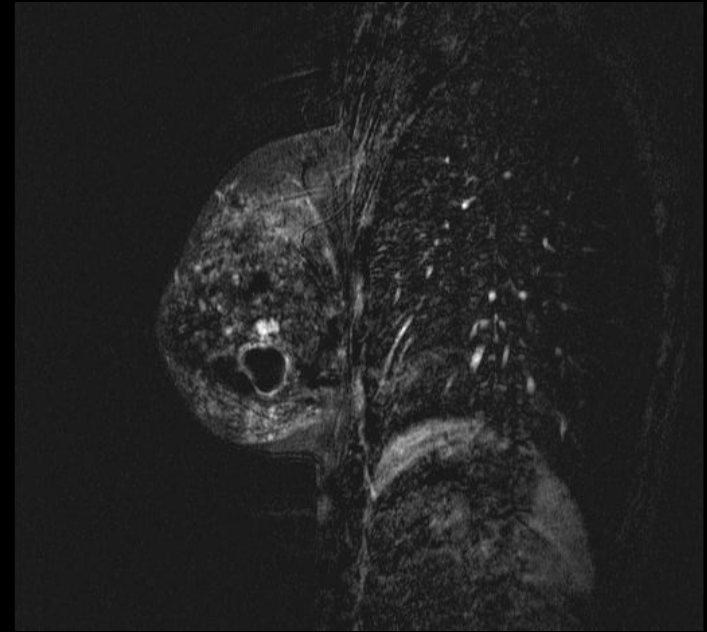
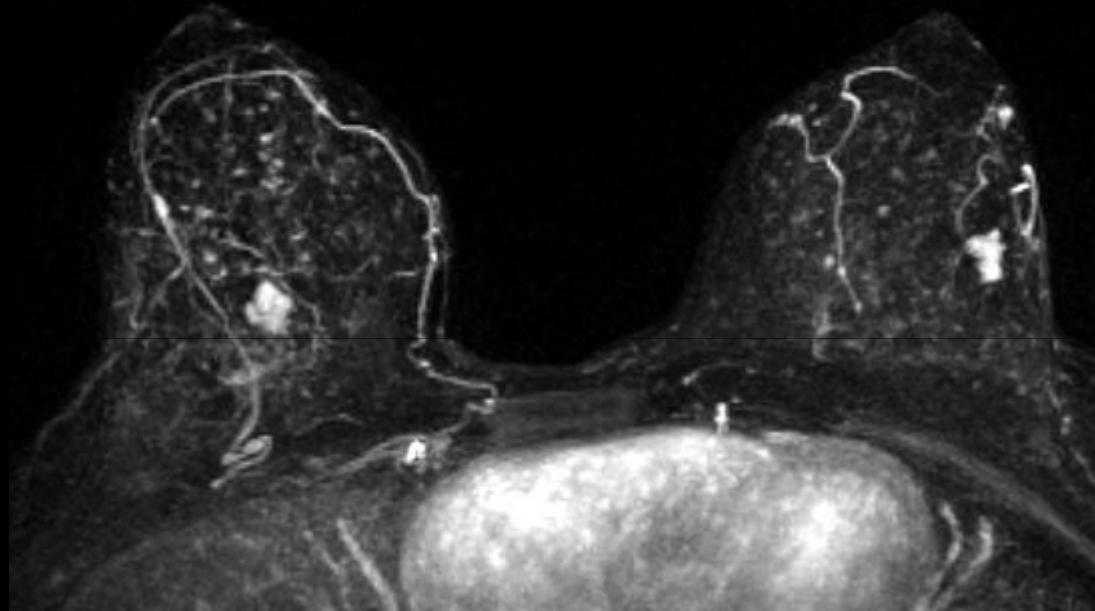
high-grade DCIS

Breast MRI: *Therapy*

- Evaluation of the contralateral breast
- Preoperative tumor staging
- Follow-up during neoadjuvant chemotherapy



49-year-old high-risk patient with DCIS intermediate-grade in the right breast detected on mammography



**Non-calcified DCIS low-grade
in the left breast detected by MRI only**

Local Staging with MRI

- Identification of additional malignant lesions (16%-20%) at acceptable ppv (66%)
[Houssami 2008, Kuhl 2008]

Prospective Studies with > 100 Patients

	Ultrasound	Patients	Additional malignant lesions (ipsilateral)	PPV (additional MRI-Findings)
Deurloo et al. <i>(Eur J Cancer 2005)</i>	yes	116	14.7%	0.50
Schnall et al. <i>(J Surg Oncol 2005)</i>	partially	426	9.6%	0.67
Berg et al. <i>(Radiology 2004)</i>	yes	111	12.5%	0.40
Schelfout et al. <i>(EJSO 2004)</i>	yes	170	19.4%	0,85
Hlawatsch et al. <i>(AJR 2002)</i>	yes	101	5.0%	0.63
Drew et al. <i>(Ann Surg Oncol 1999)</i>	yes	178	23.0%	0.69
Siegmann et al. <i>(Clin Radiol 2009)</i>	yes	119	21.0%	0.74*

**including additional lesions in the contralateral breast*

Local Staging with MRI

- Identification of additional malignant lesions (16%-20%) at acceptable ppv (66%)
[Houssami 2008, Kuhl 2008]
- *Reduced re-operation rates*
Turnbull et al. (2010) Lancet 375: 563 - 571
Prospective randomised COMICE trial (1625 patients)
Re-operation rate of 19% with and without MRI
- *Fewer local recurrences**
[Fischer 2004, Solin 2008]
- *Improved long-term survival**

**up to now no prospective data available*

Influence of preoperative MRI on recurrence rates and long-term survival

	with MRI		without MRI	
	5 years	8 years	5 years	8 years
Patients	215		541	
pTis + PT1	82%		84%	
Local Recurrence	3%	3%	2%	4%
Contralateral Carcinoma	6%	6%	3%	6%

Solin et al. (2008) J Clin Oncol 26: 386 - 391

When should Breast MRI be performed ?

- **To answer a specific question**
 - ➔ **suspicious clinical abnormality**
 - ➔ **benign biopsy results for a highly suspicious imaging finding**
 - ➔ **abnormality visible only in one view**
- **Search for possible malignancy in high-risk situations**
 - ➔ **high-risk screening**
 - ➔ **newly diagnosed breast cancer**
 - ➔ **surveillance after breast cancer treatment**