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ma  
gruppoitaliano screening  
mammografico

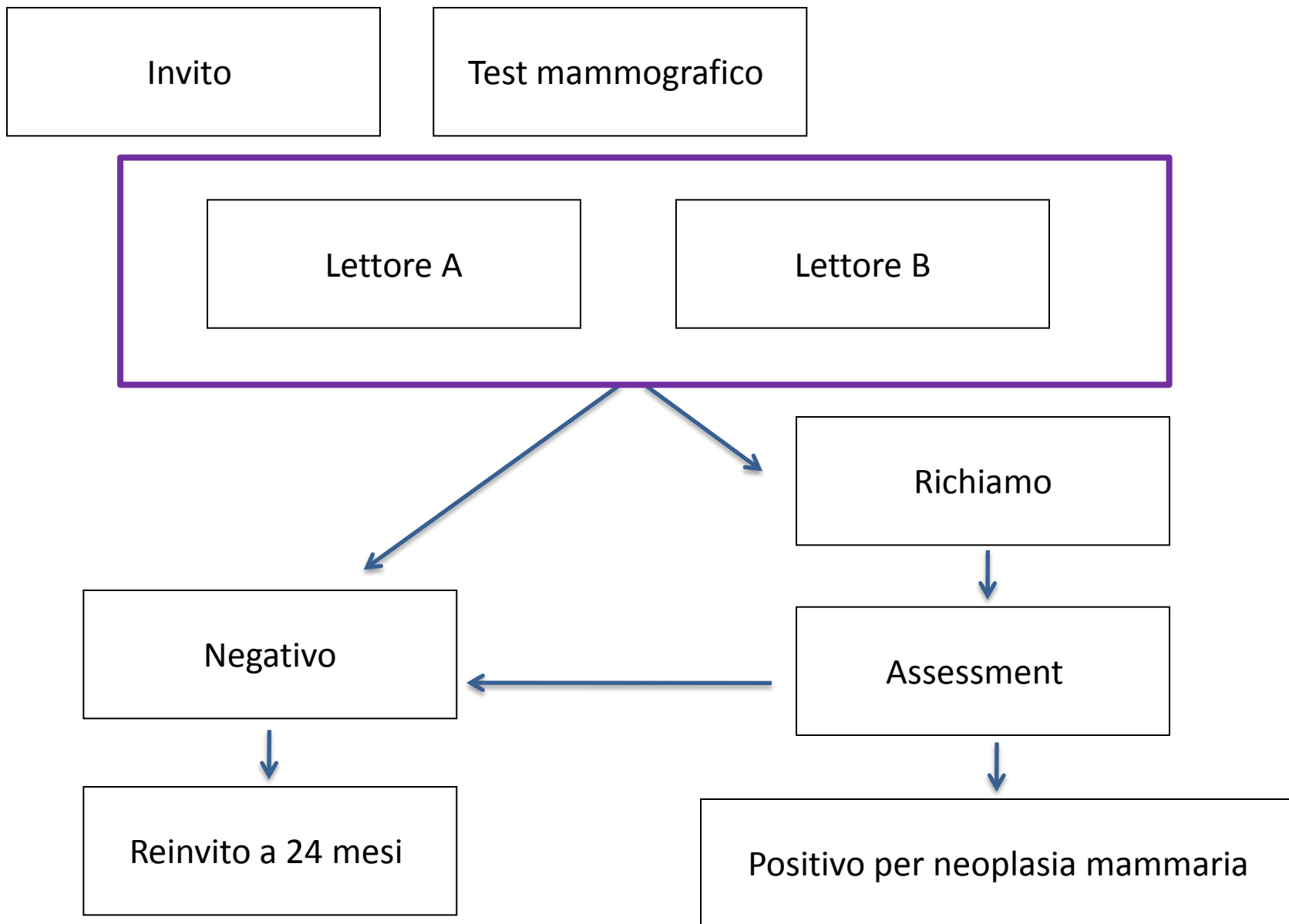
# Lo screening mammografico: scenari, gestione, casistica

L'indagine di primo livello

*F. Caumo, D. Santini*

Torino 2013

# Protocollo di screening nelle donne tra i 50-69 anni



# Come aumentare la sensibilità-specificità del test

Doppia lettura

Doppia lettura ed arbitrato

Doppia lettura con CAD

Tomosintesi

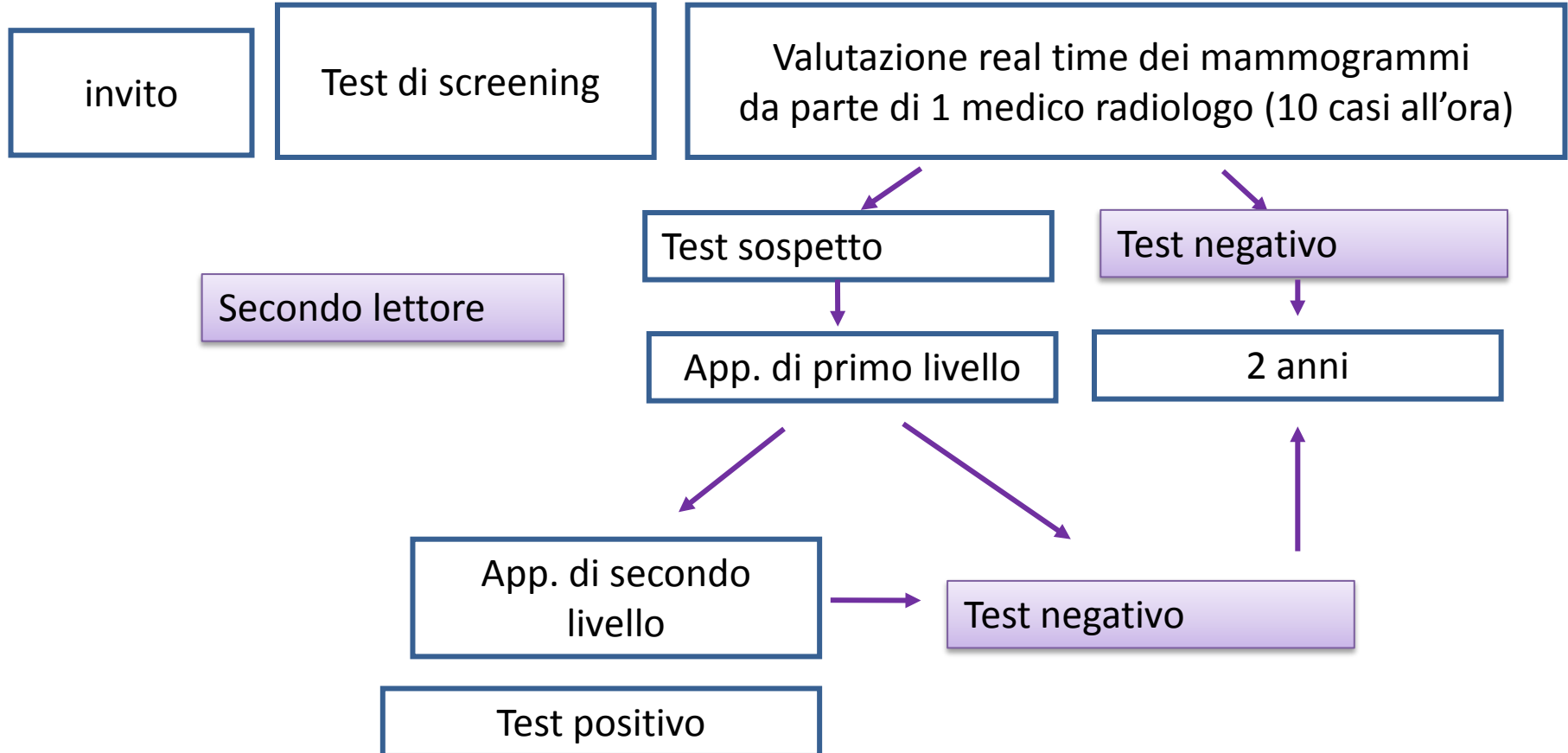
# Doppia lettura

Radiol med (2011) 116:000-000  
DOI 10.1007/s11547-011-0000-0

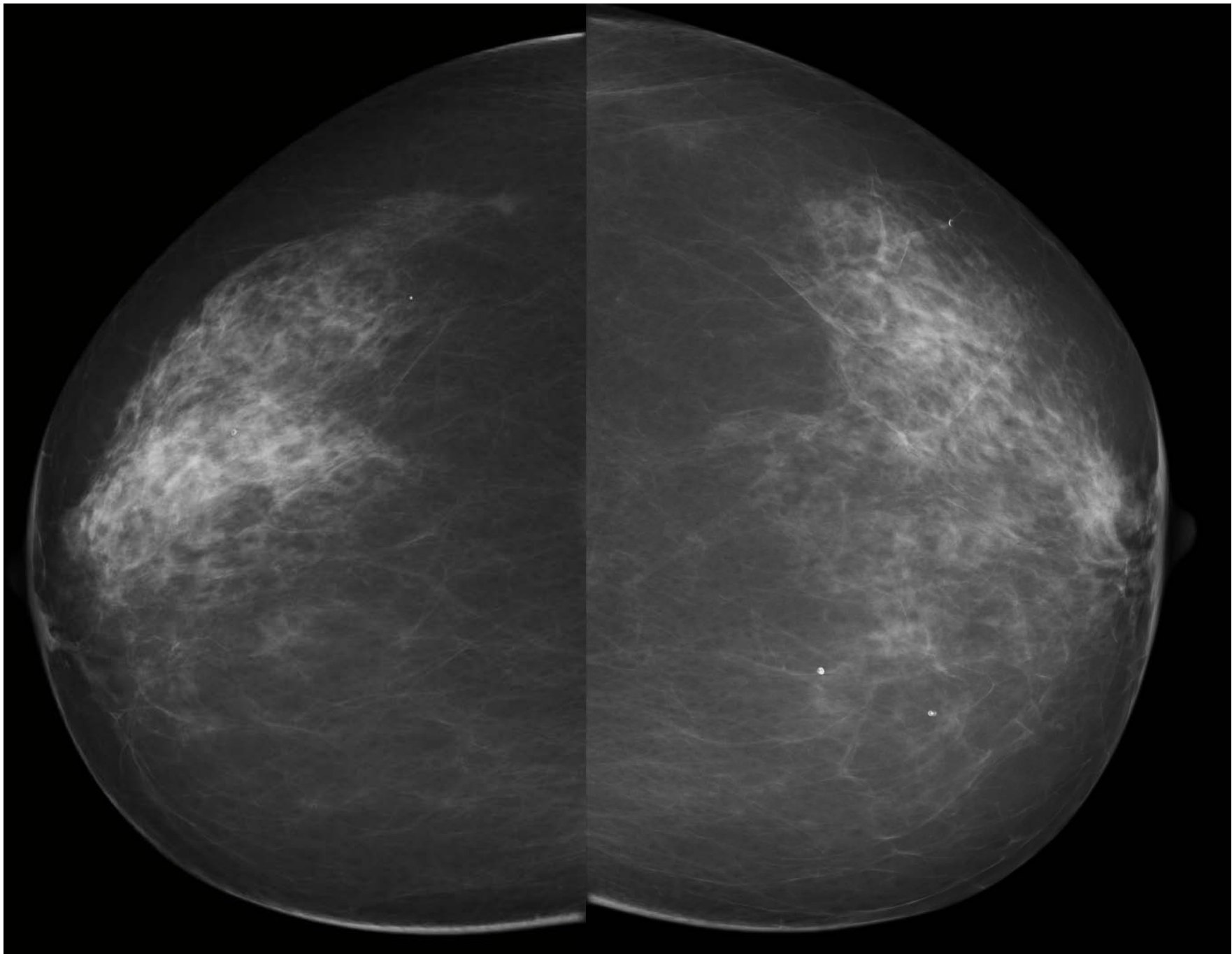
BREAST RADIOLOGY  
SENOLOGIA

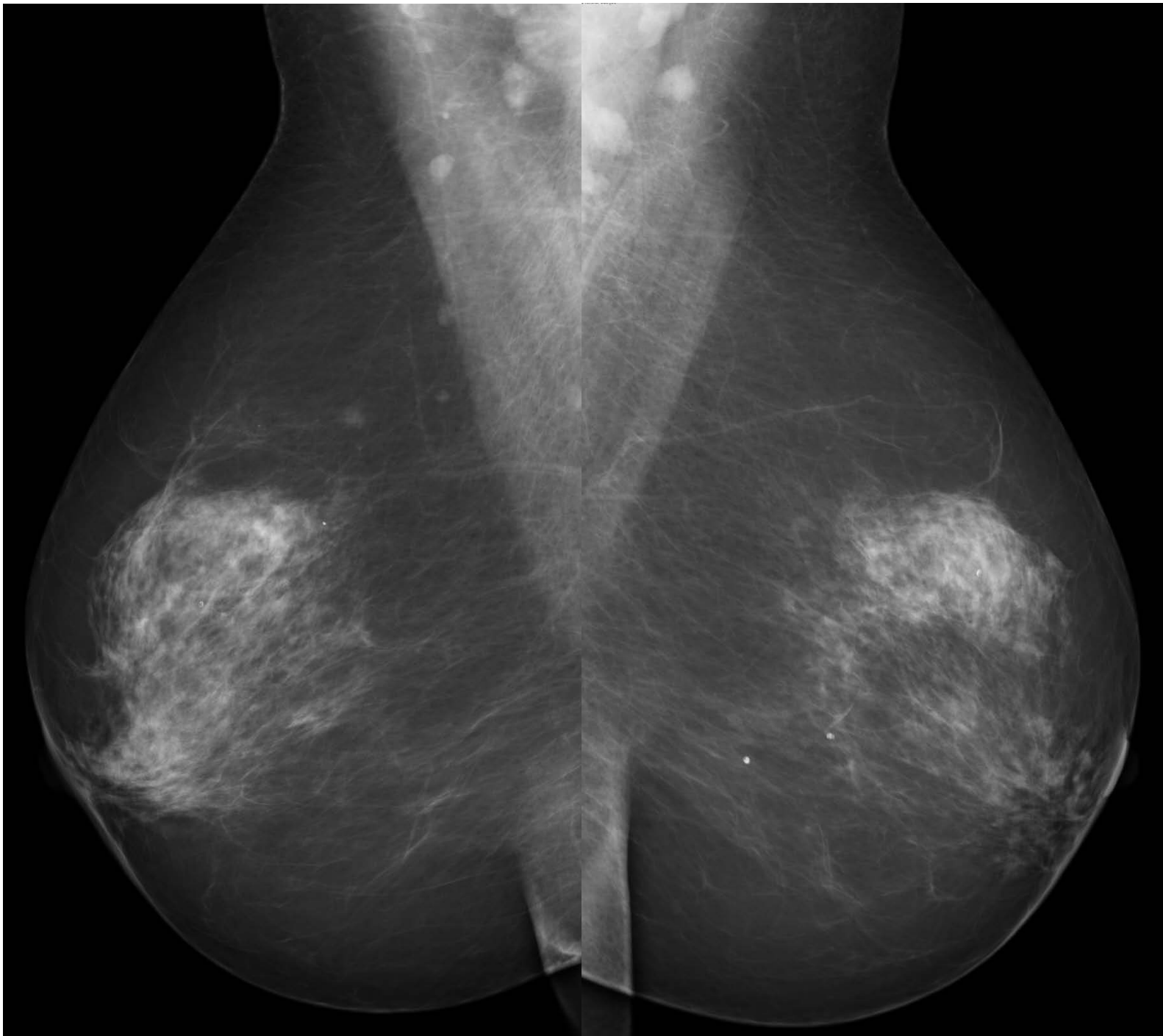
## Benefits of double reading of screening mammograms: retrospective study on a consecutive series

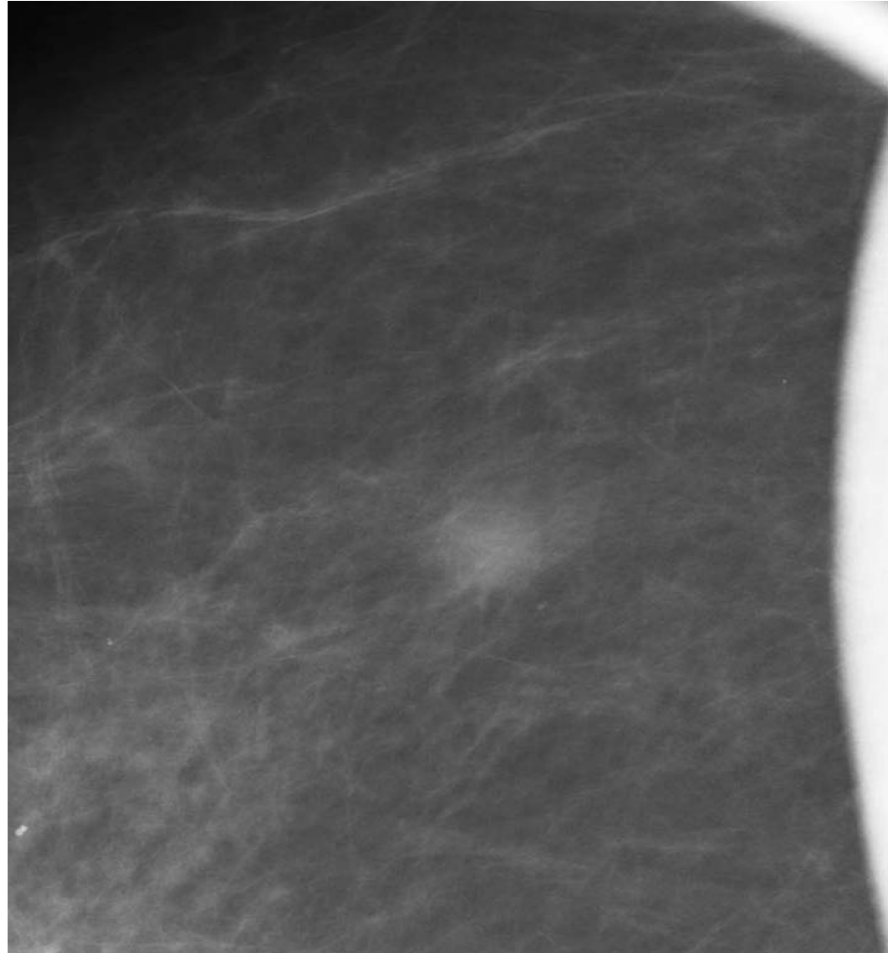
*Vantaggi della doppia lettura delle mammografie di screening. Studio retrospettivo su una casistica consecutiva*



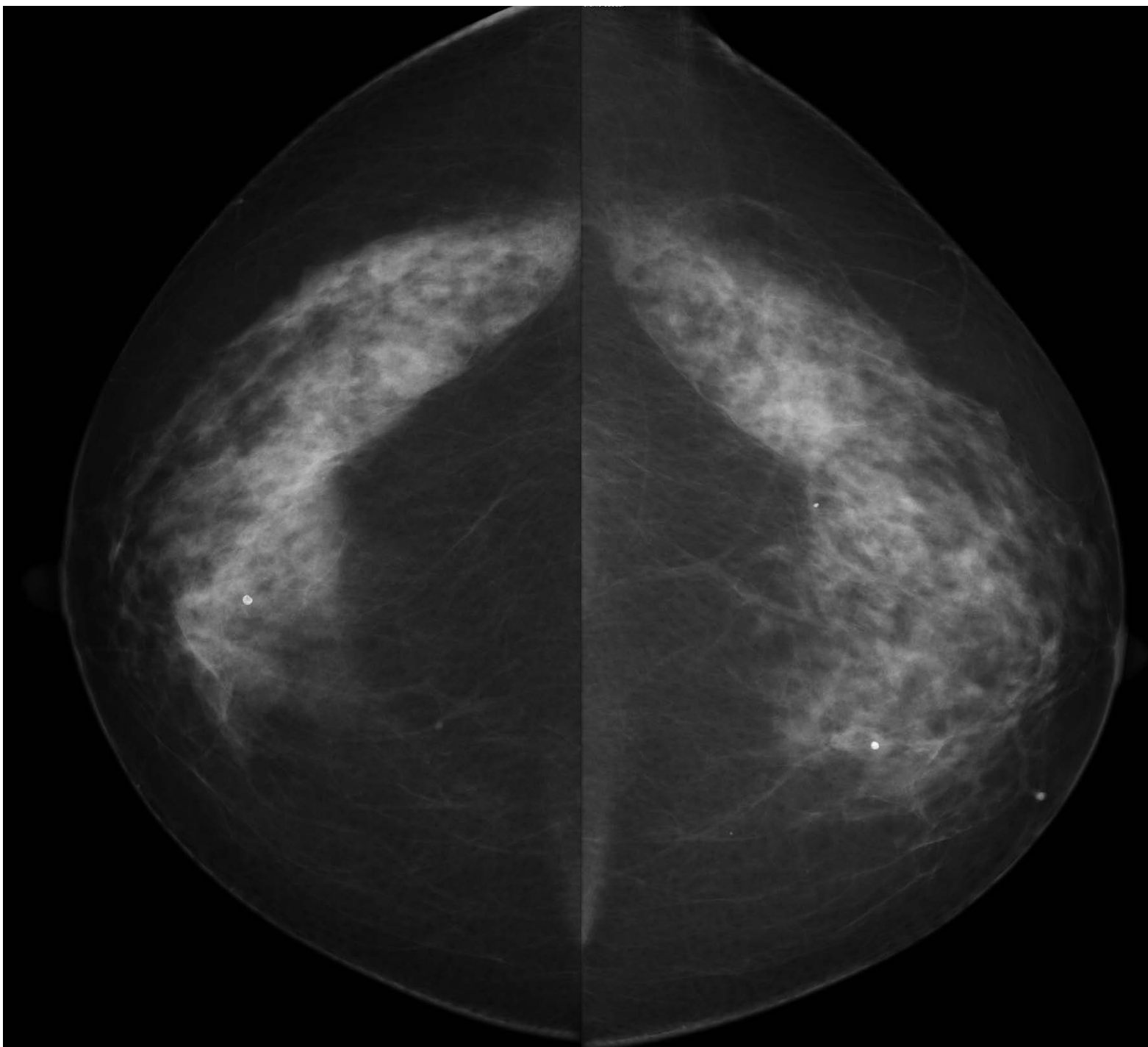




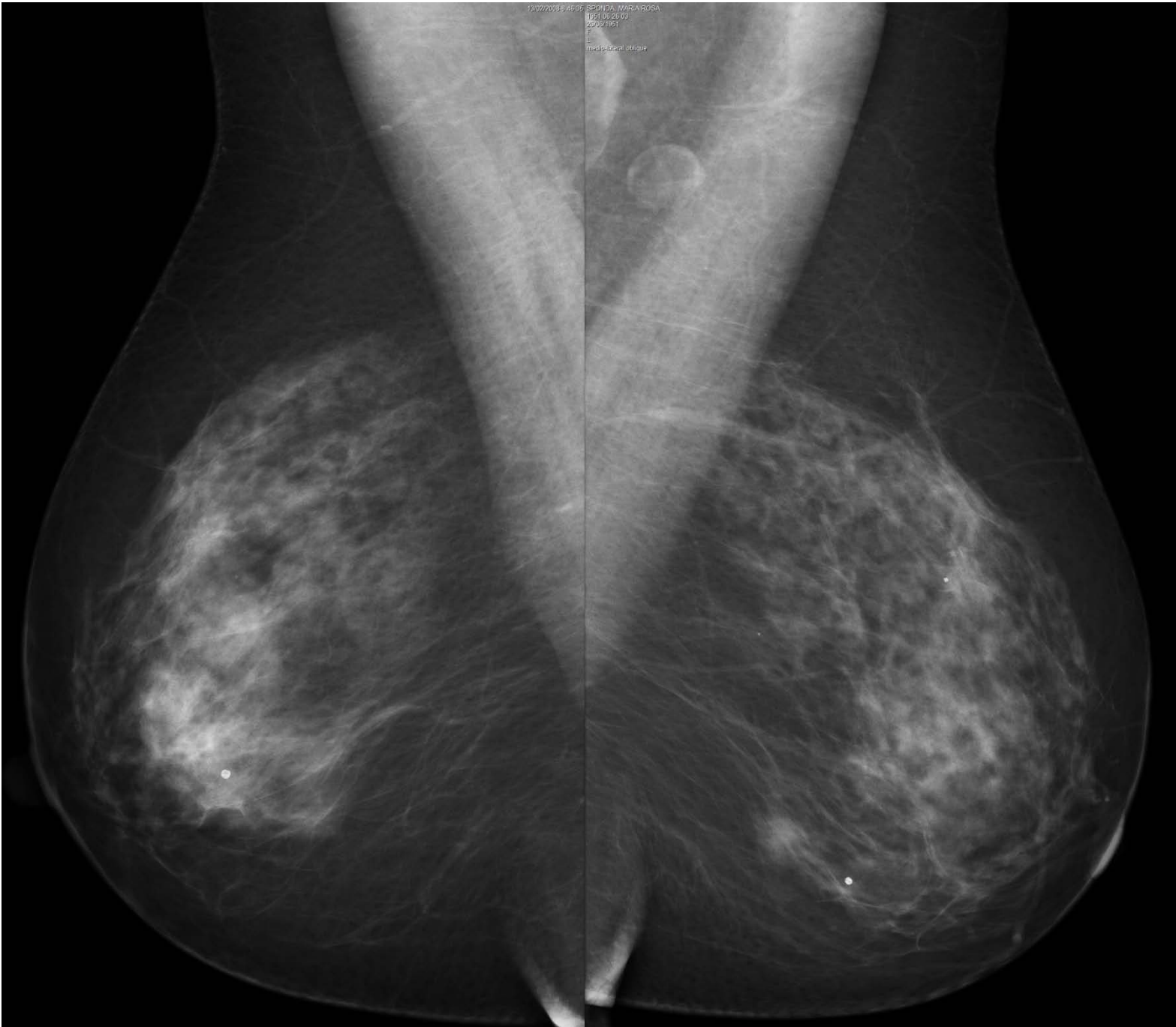


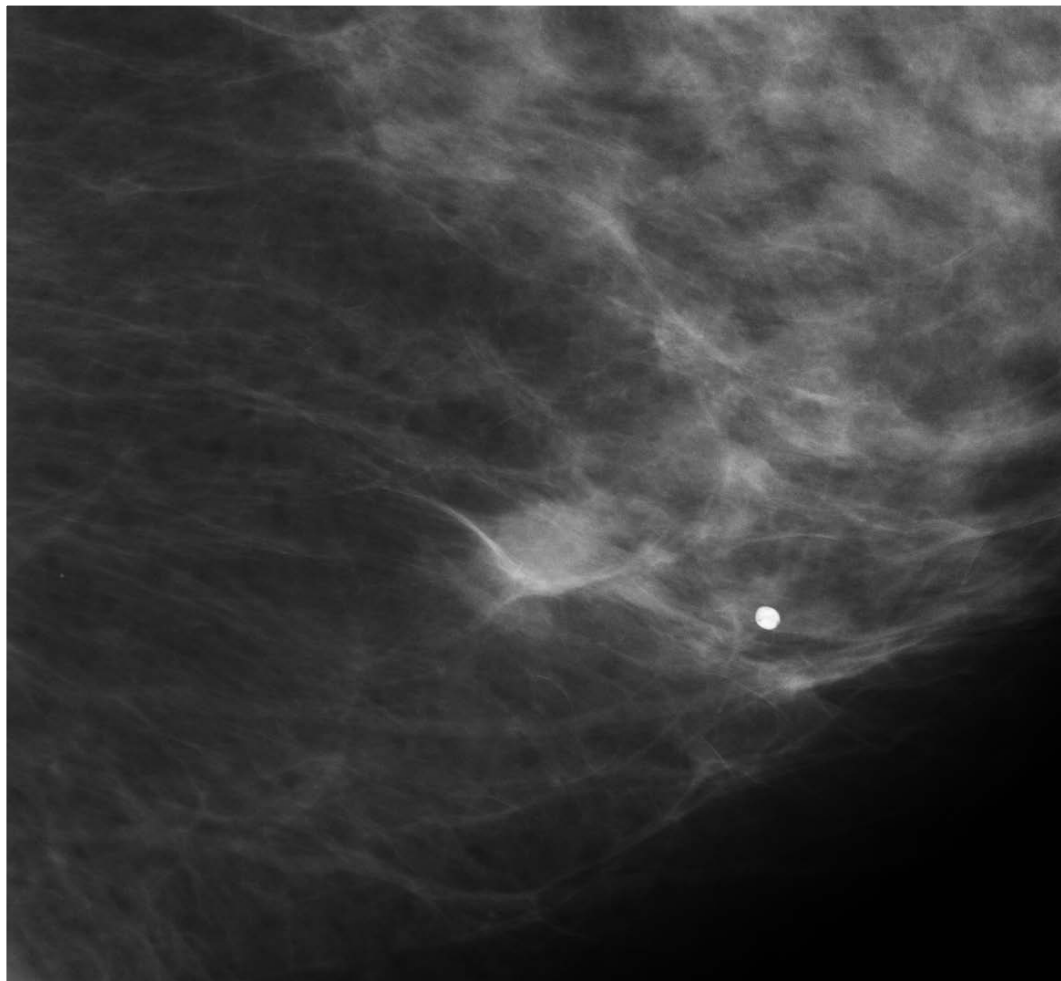


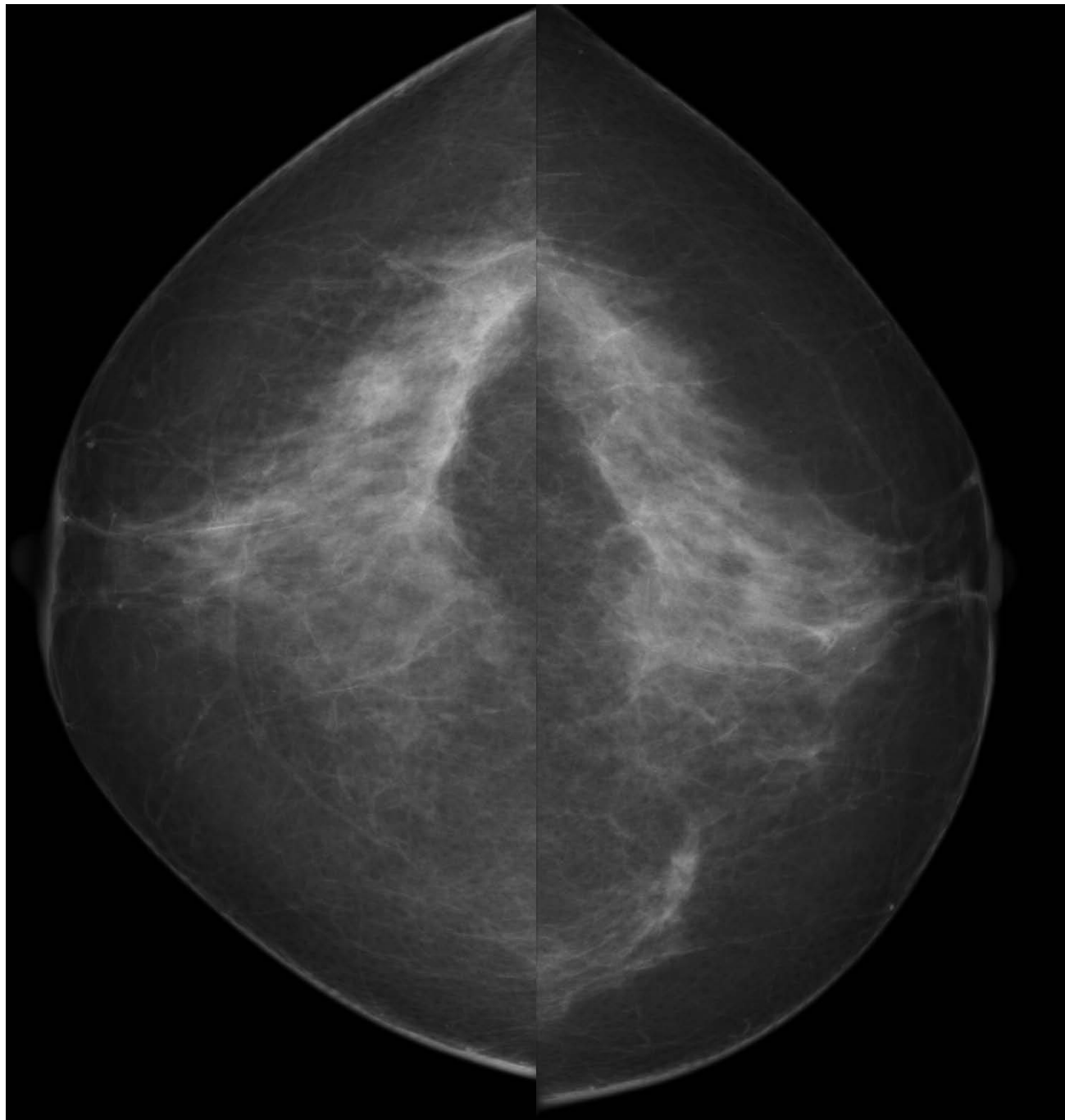


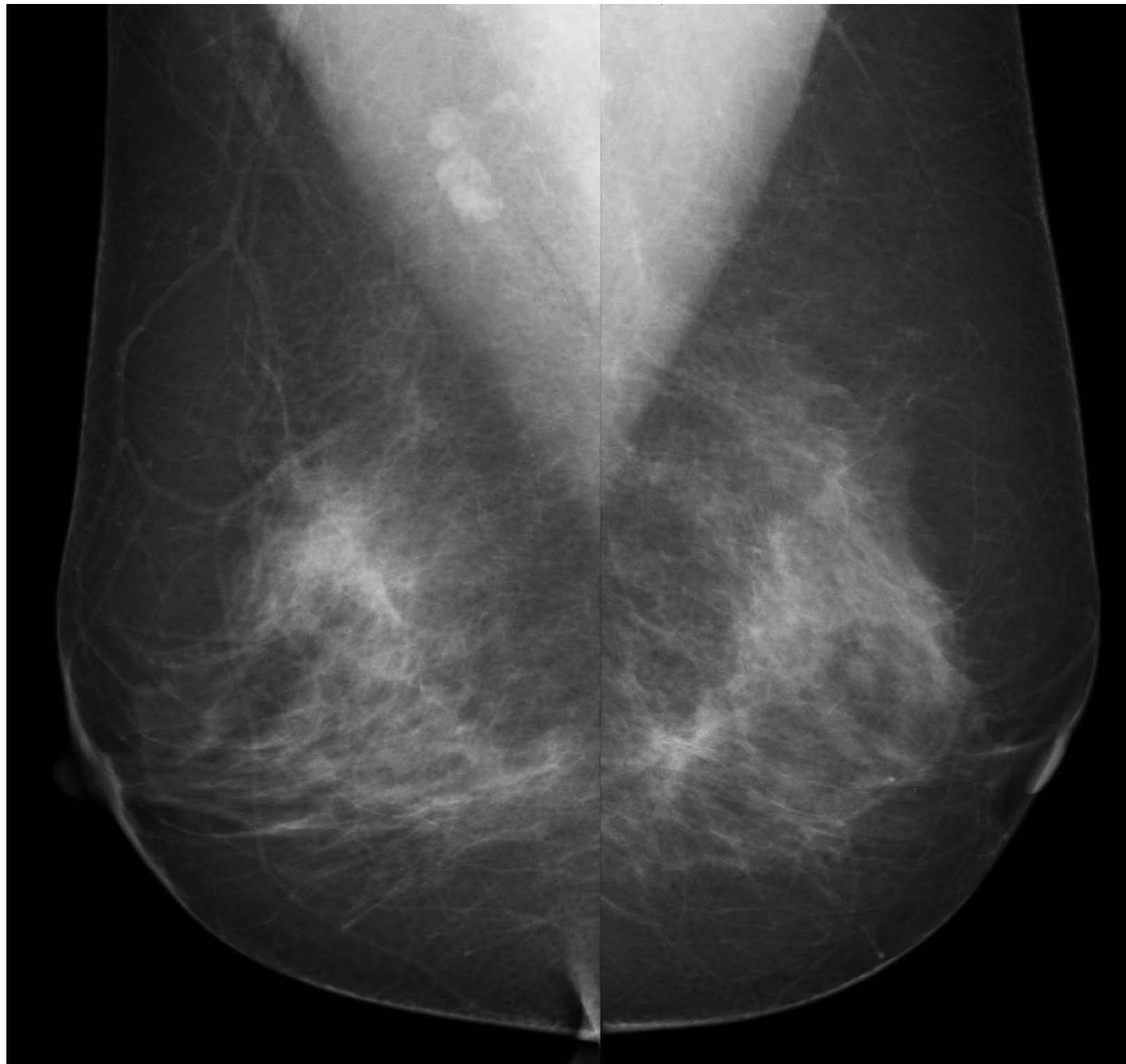


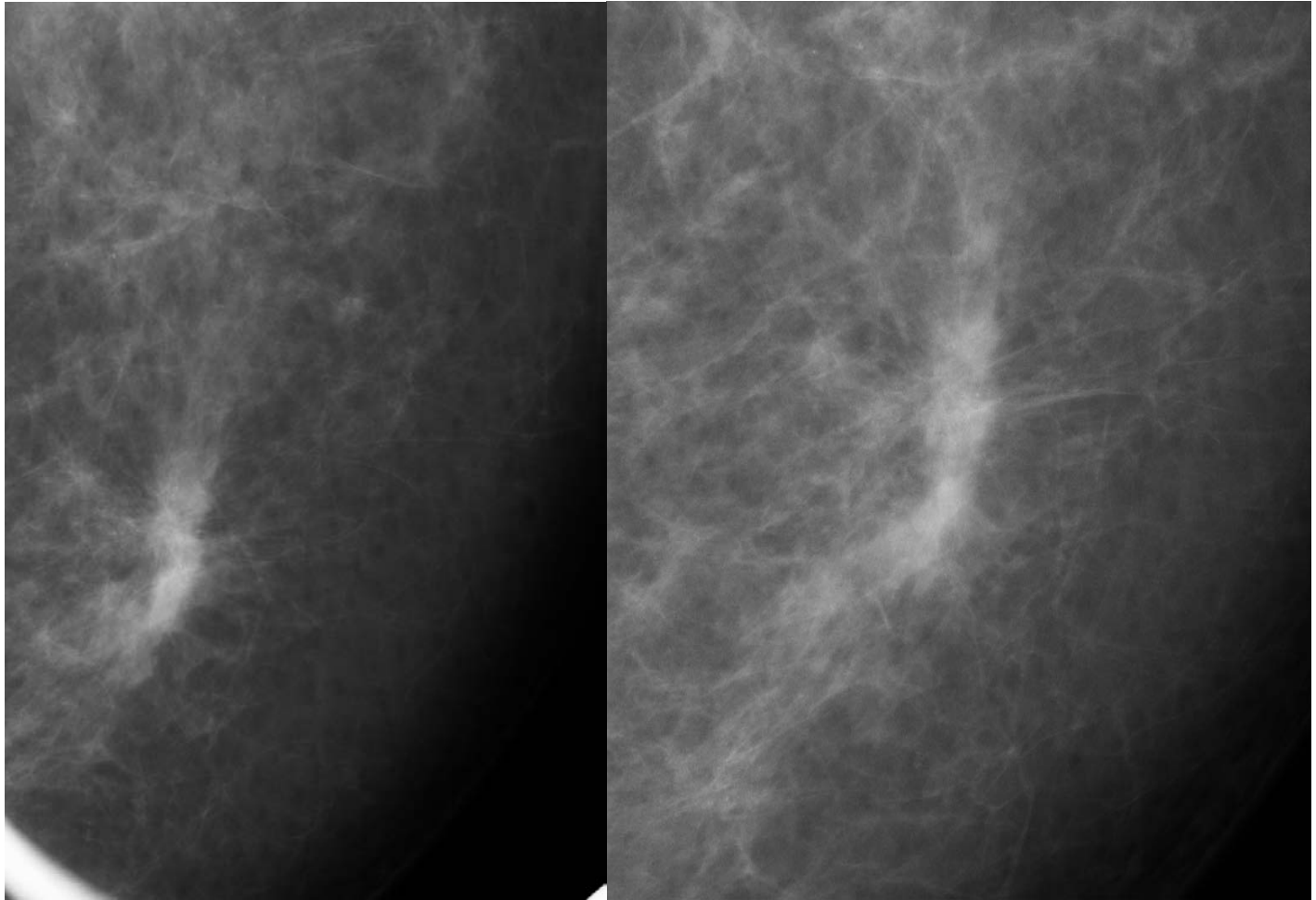
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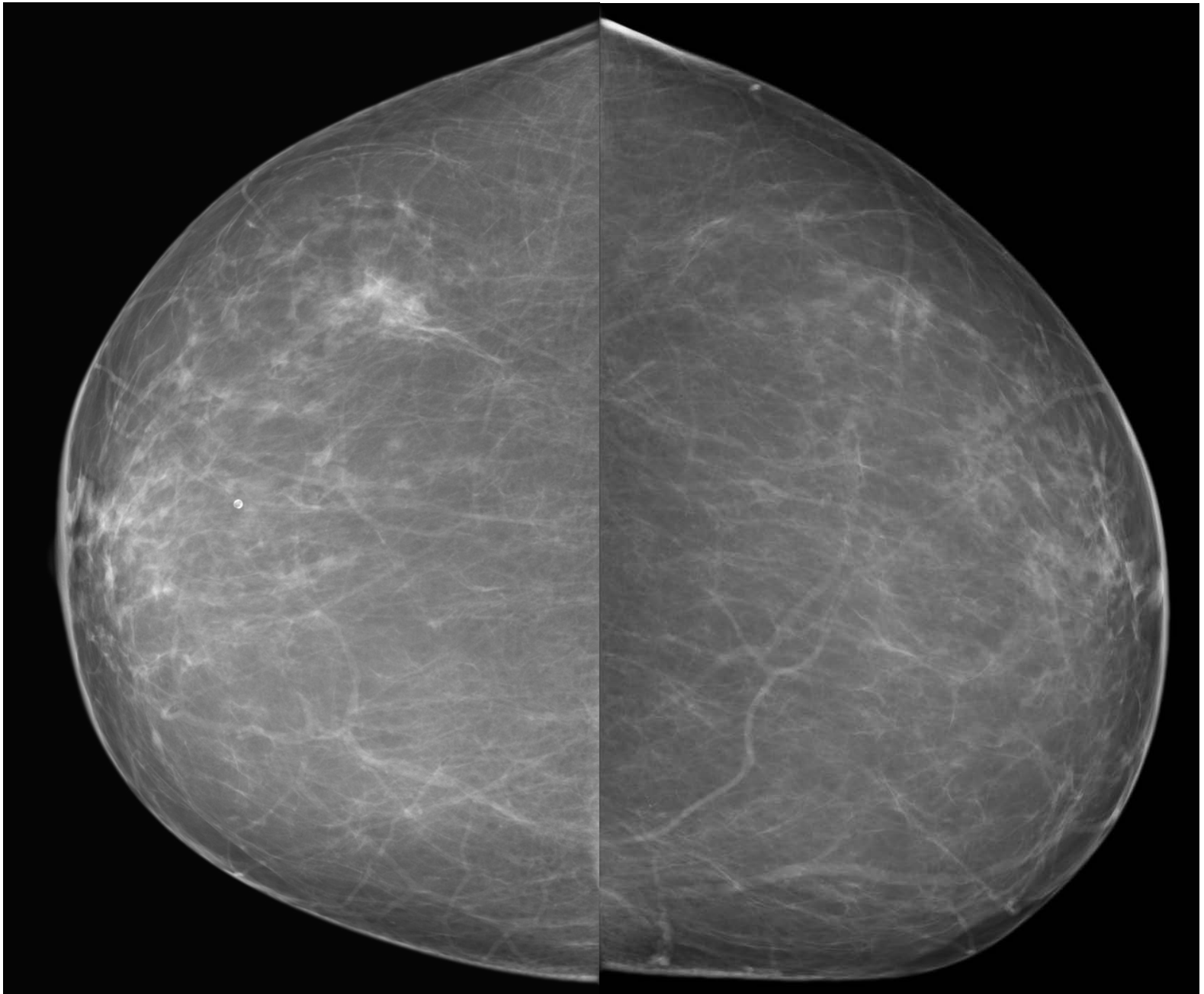






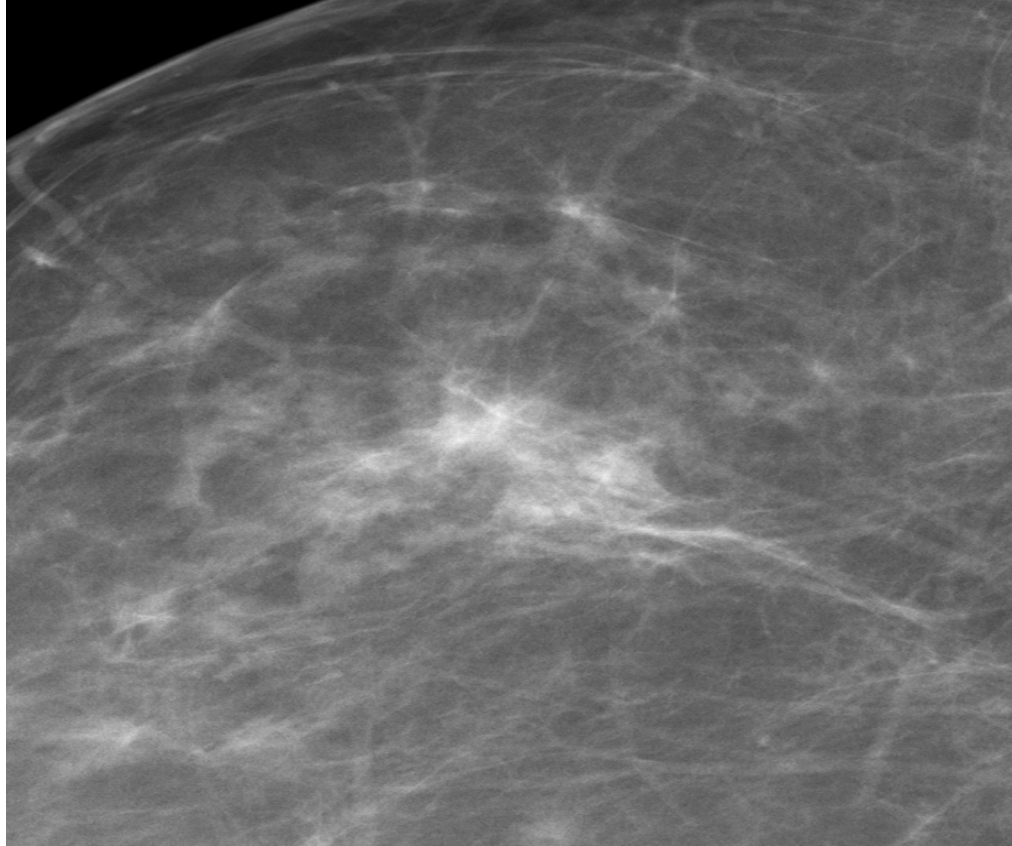












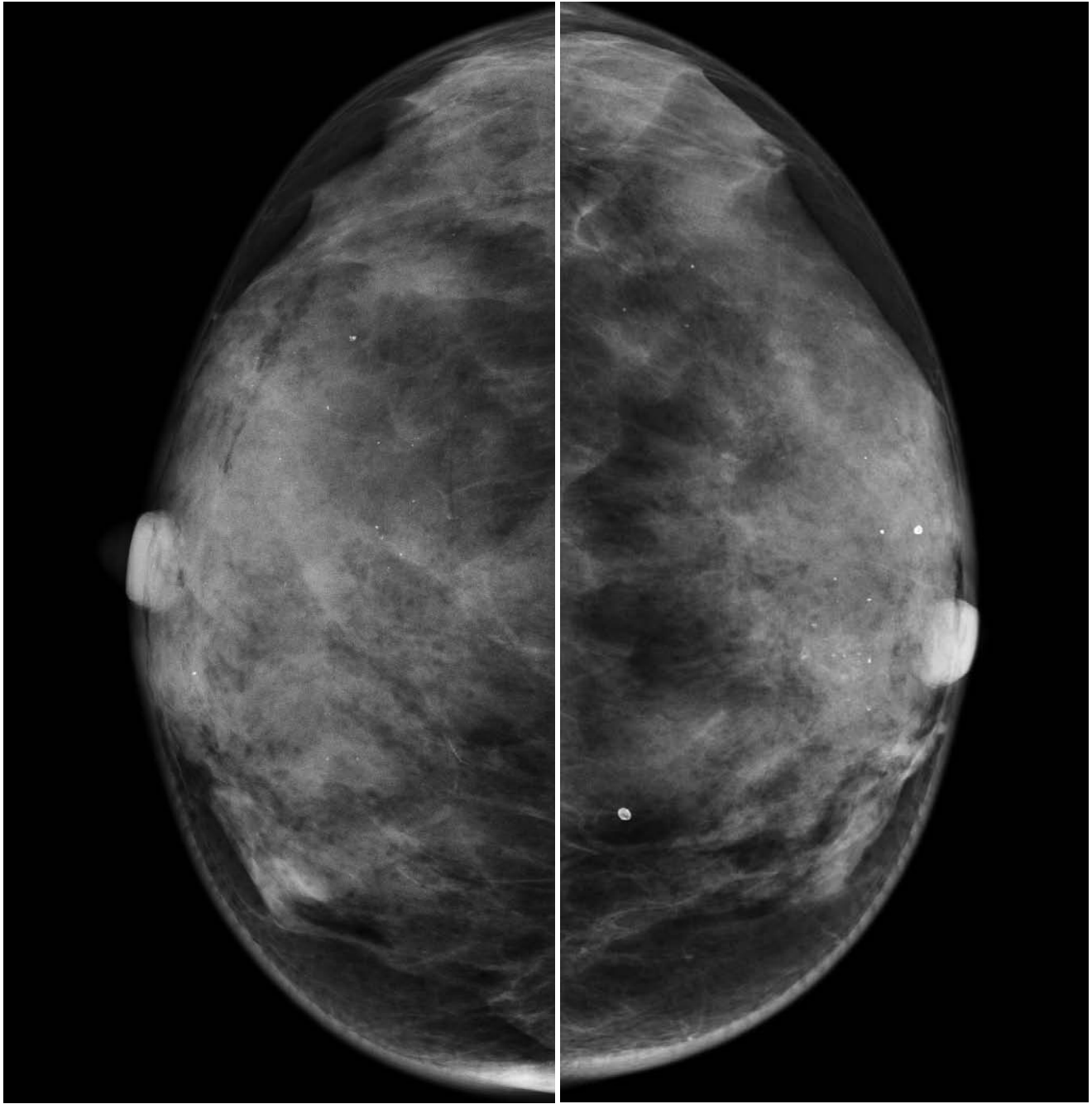


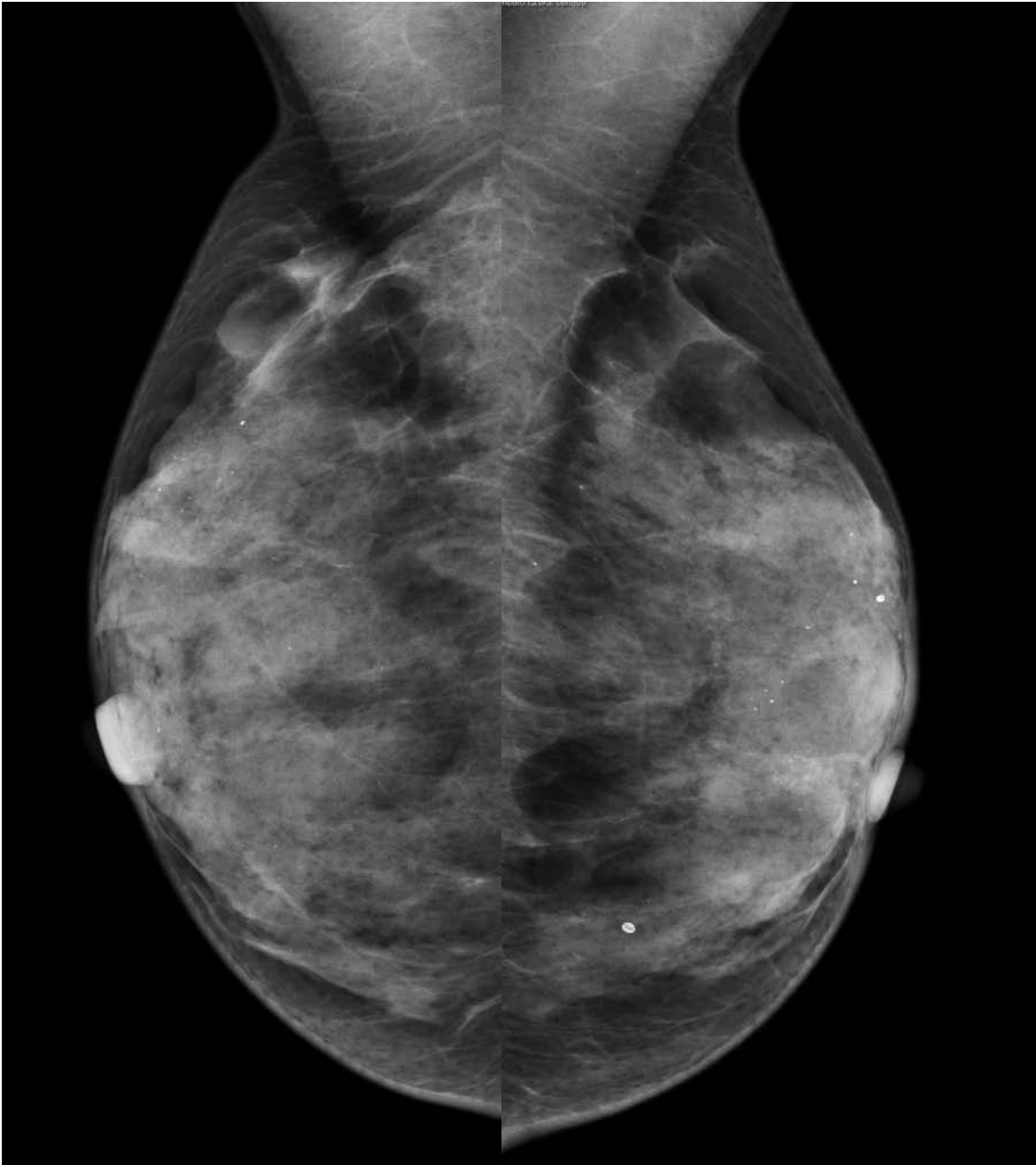
Doppia lettura ed  
ecografia

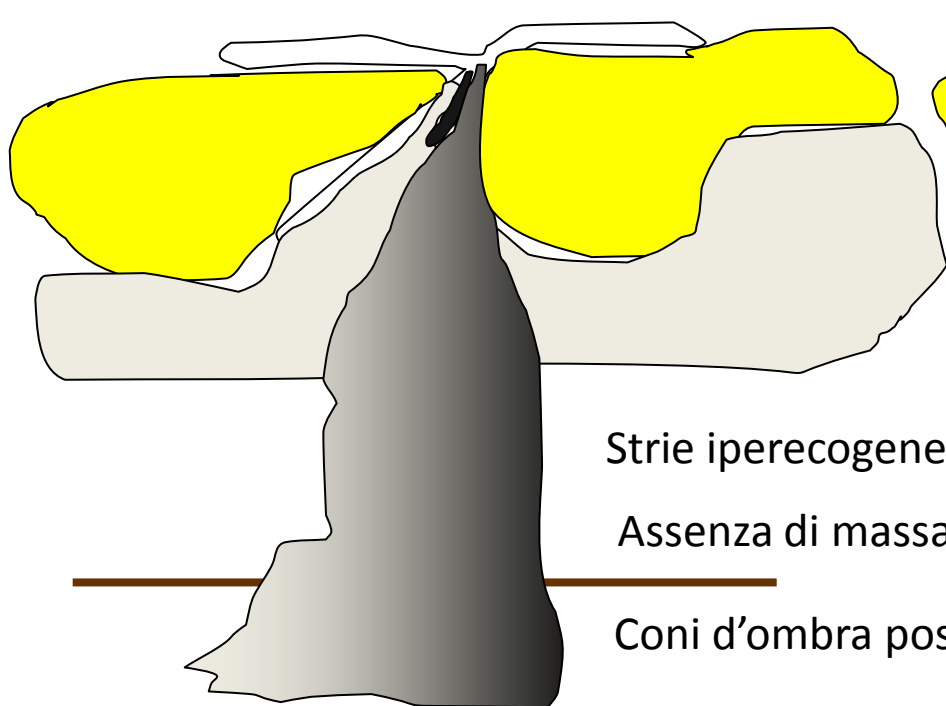
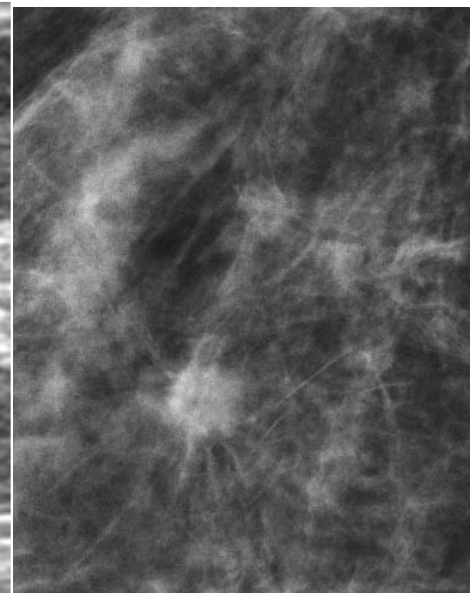
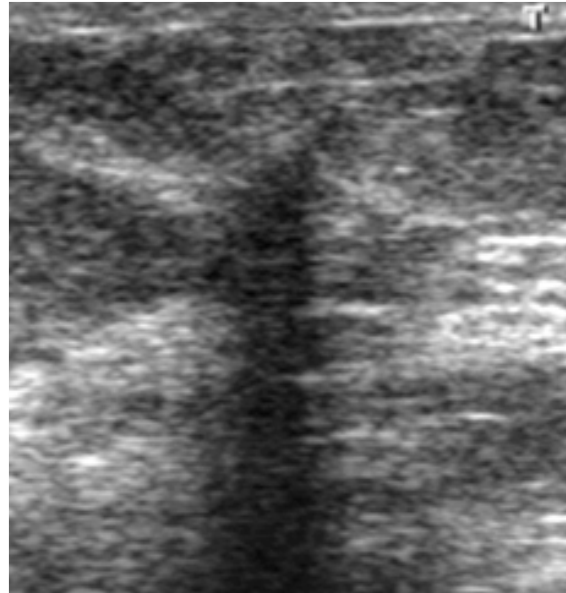
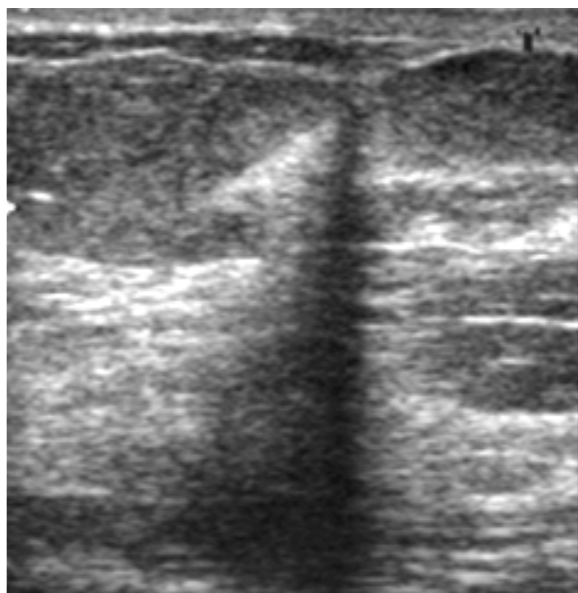
**Breast screening with ultrasound in women with mammography-negative dense breasts: Evidence on incremental cancer detection and false positives, and associated cost**

*Vittorio Corsetti<sup>a</sup>, Nehmat Houssami<sup>b,c</sup>, Aurora Ferrari<sup>a</sup>, Marco Ghirardi<sup>a</sup>, Sergio Bellarosa<sup>a</sup>, Osvaldo Angelini<sup>a</sup>, Claudio Bani<sup>a</sup>, Pasquale Sardo<sup>a</sup>, Giuseppe Remida<sup>a</sup>, Enzo Galligioni<sup>a</sup>, Stefano Ciatto<sup>c,\*</sup>*

	Donne <50 a.	Donne ≥50 a.	Totale
CA A DIAGNOSI MAMMOGRAFICA	52	143	195
CA A DIAGNOSI ECOGRAFICA IN SENI DENSII CON MX NEG IN DONNE ASINTOMATICHE	9	11	20
CA A DIAGNOSI ECOGRAFICA IN SENI DENSII CON MX NEG IN DONNE ASINTOMATICHE	22	20	42
INCREMENTO DIAGNOSTICO ATTRIBUIBILE ALLA SOLA ECOGRAFIA	36.0% (22/61)	12.9% (20/154)	19.5% (42/215)



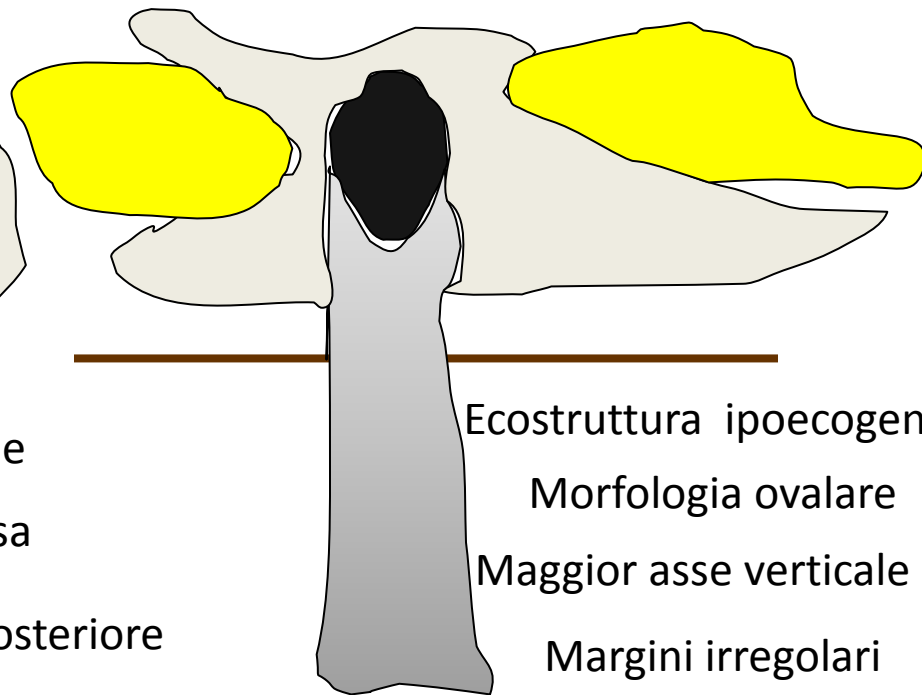




Strie iperecogene

Assenza di massa

Coni d'ombra posteriore

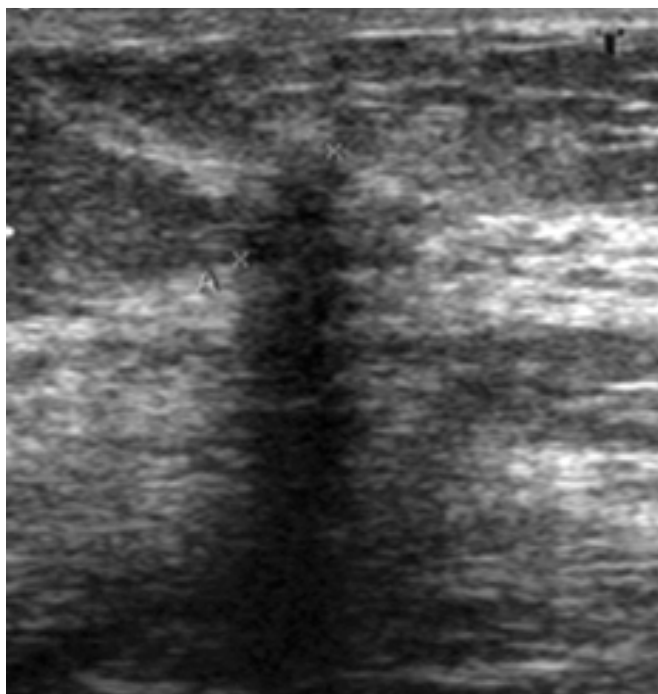
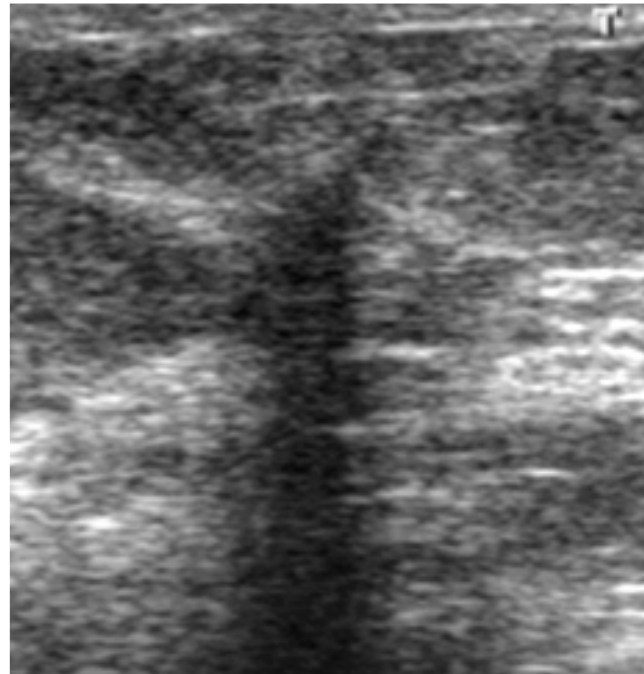
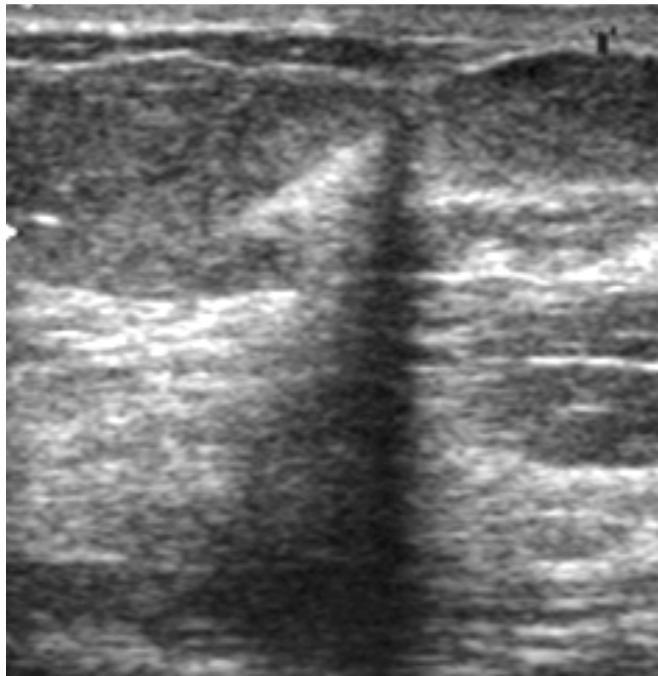


Ecostruttura ipoecogena

Morfologia ovalare

Maggior asse verticale

Margini irregolari



C1

B1

Biopsia  
chirurgica

Tessuto mammario  
normale con fibrosi

# Doppia lettura: doppia lettura con arbitrato

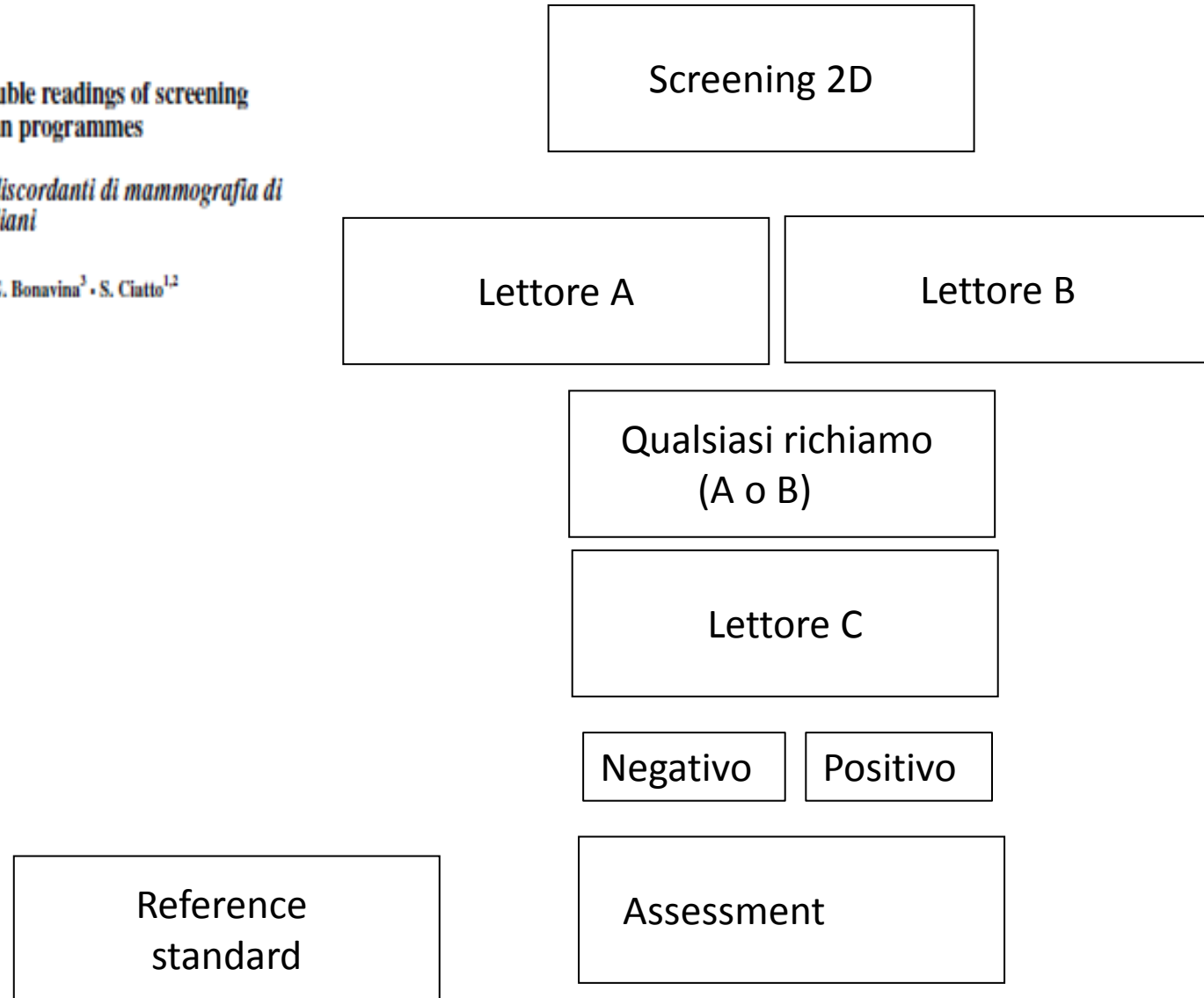
Radiol med  
DOI 10.1007/s11547-010-0606-0

BREAST RADIOLOGY  
SENOLOGIA

**On the role of arbitration of discordant double readings of screening mammography: experience from two Italian programmes**

*Sul ruolo dell'arbitrato delle doppie letture discordanti di mammografia di screening. Esperienza in due programmi italiani*

F. Caumo<sup>1</sup> • S. Brunelli<sup>1</sup> • E. Tosi<sup>2</sup> • S. Teggi<sup>2</sup> • C. Bovo<sup>3</sup> • G. Bonavina<sup>3</sup> • S. Ciatto<sup>1,2</sup>



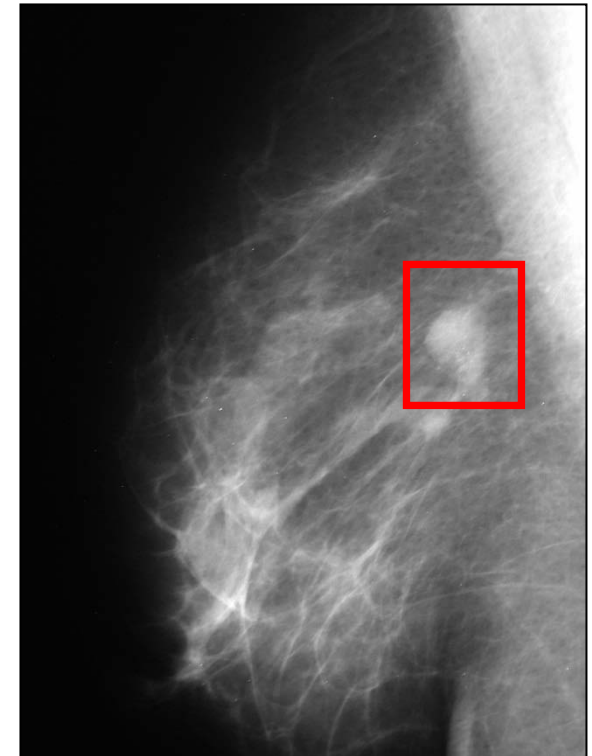
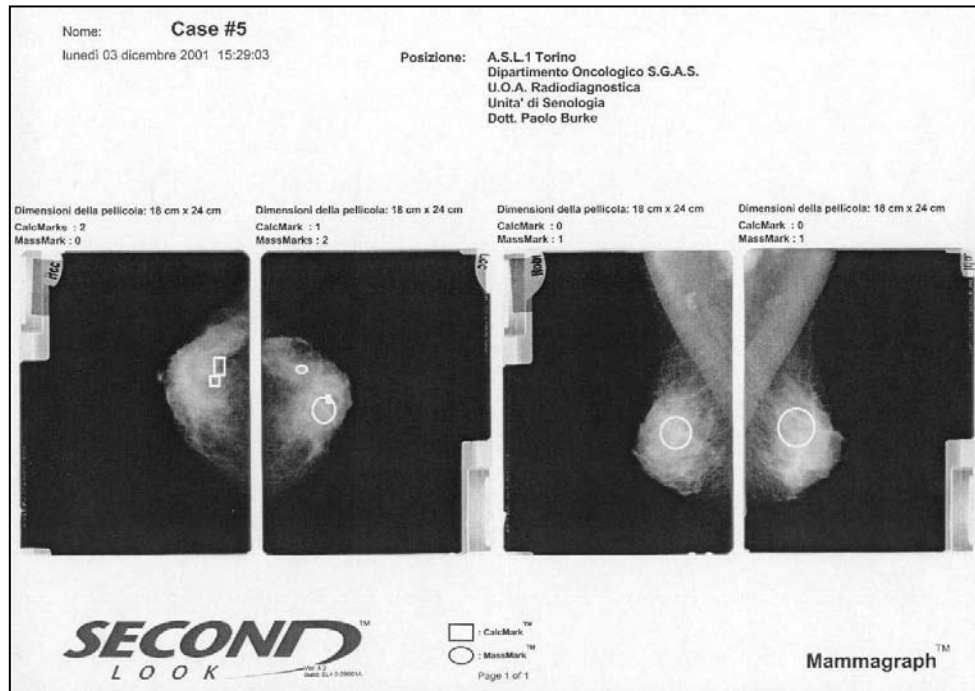
## Doppia lettura: doppia lettura con arbitrato

Impatto dell'arbitrato (simulazione)	VR-PD	FI (2005)
Soggetti esaminati	7.660	96.872
RR	6,8 %	7,7 %
RR concordanti	3.0 %	3.6 %
RR discordanti	3.8 %	3.1 %
Arbitrati negativi	72,5 %	60,9%
DR totale	49 (6,3‰)	903 (9,3‰)
DR in RR concordanti	43 (5,6‰ )	789 (8,1‰)
DR in RR discordanti	6 (0,7‰)	114 (1,2‰)
DR in arbitrati positivi	5 (6,0%)	98 (6,3%)
DR in arbitrati negativi	1 (4,6‰)	16 (6,6‰)
RR risparmiati/ CM persi	216/1	151/1
Riduzione relativa RR	- 40,9%	- 32,1%
Riduzione relativa DR	- 2,0%	- 1,7%

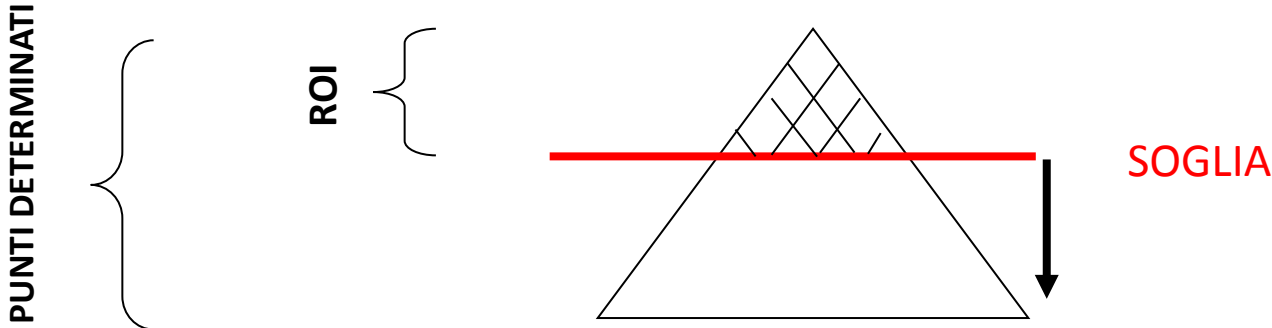


# Doppia lettura: doppia lettura con CAD (Computer Aided Detection)

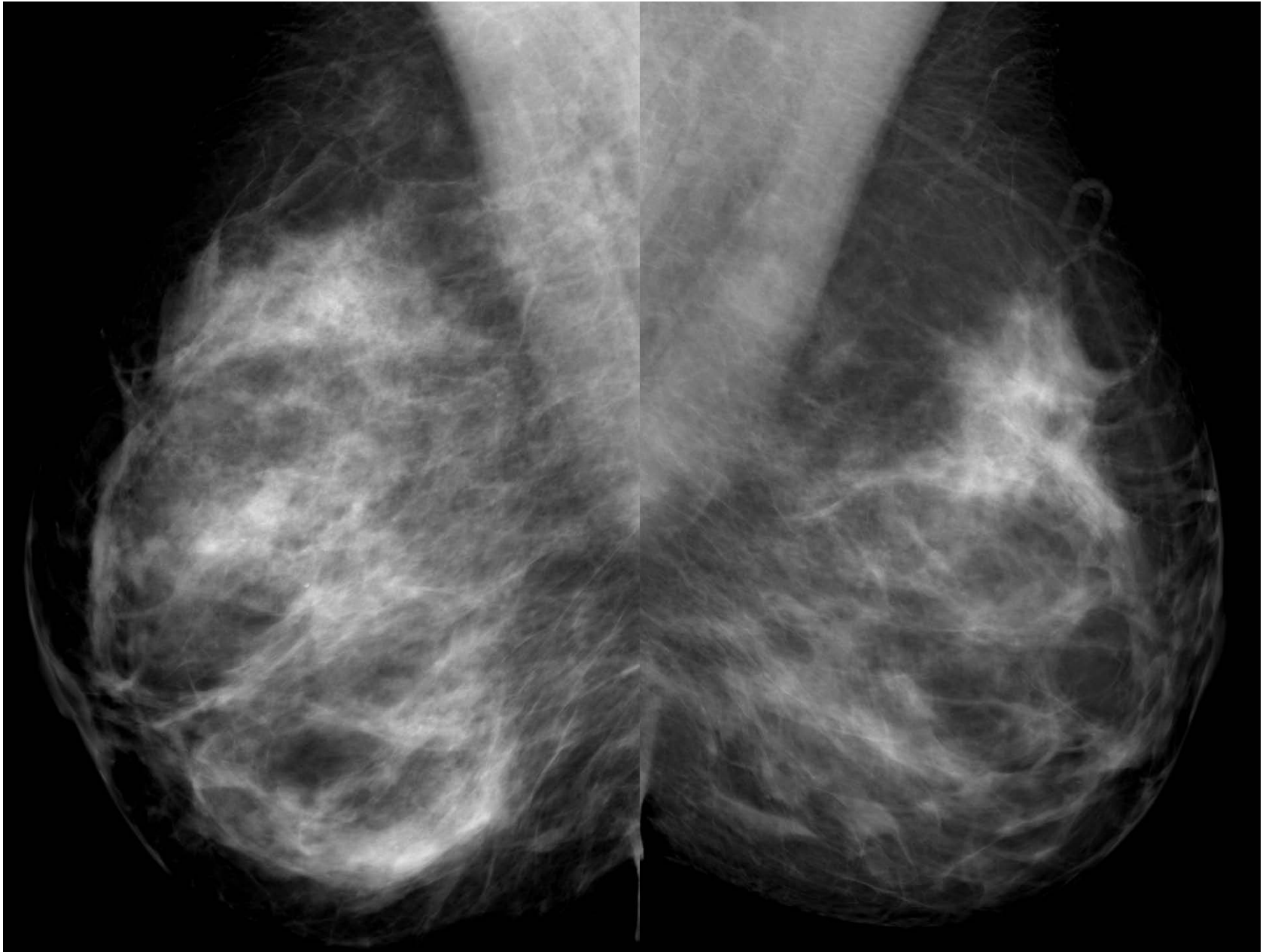
Letture aiutata dal computer CAD: il sistema si basa sulla mammografia digitale (o convenzionale digitalizzata) che viene processata dal computer, "educato" in base ad un algoritmo a riconoscere densità di massa e calcificazioni "sospette"

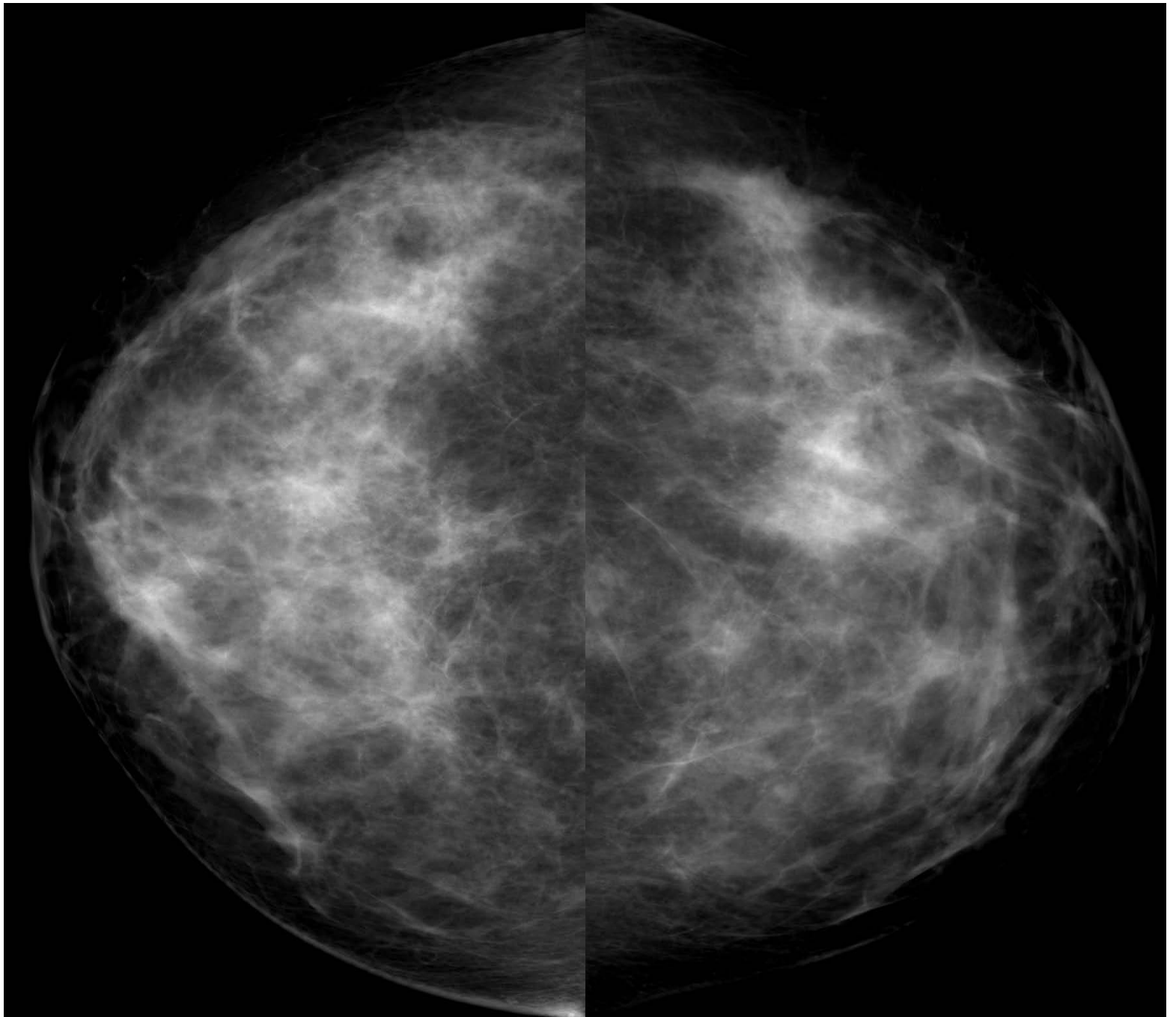


# Doppia lettura: doppia lettura con CAD

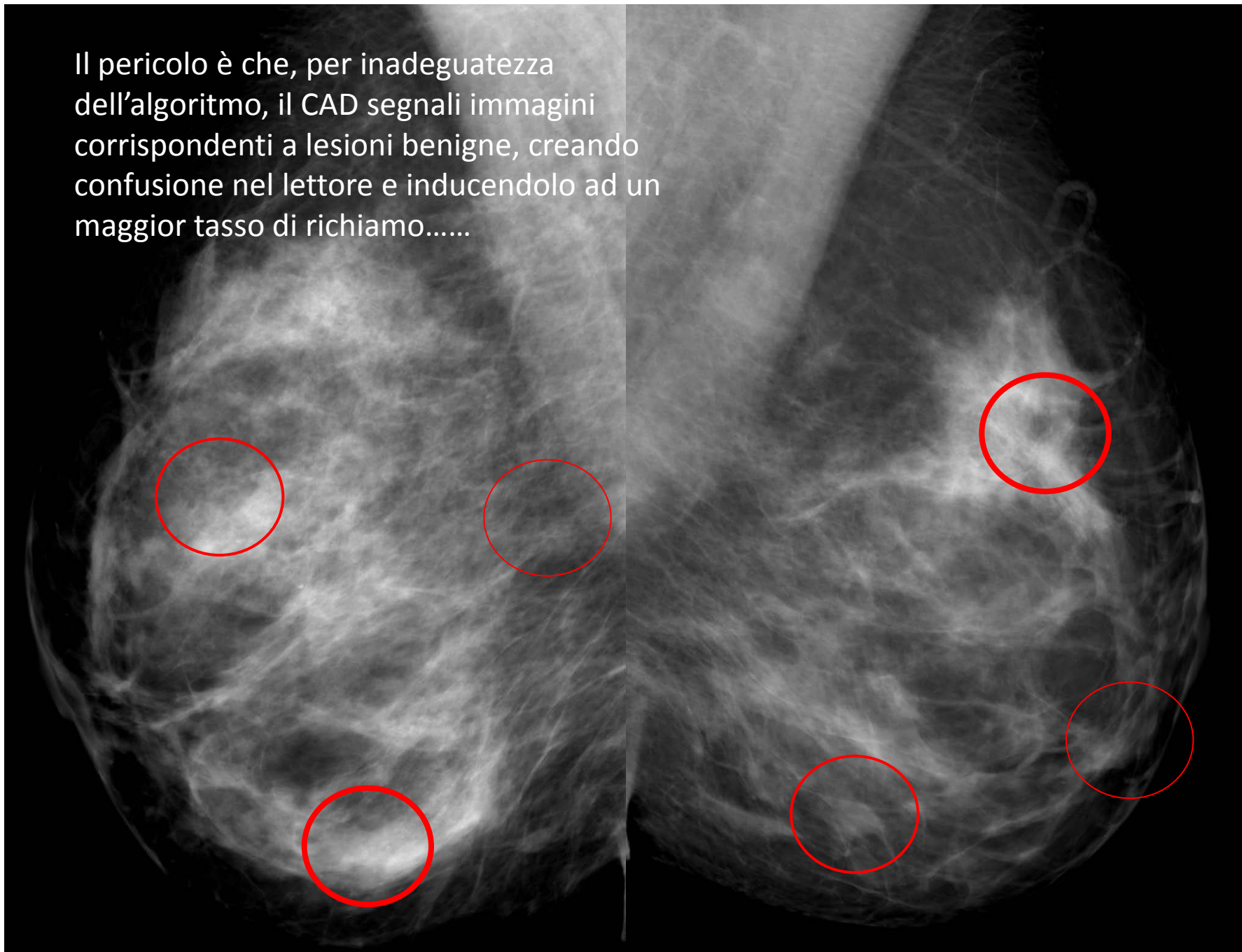


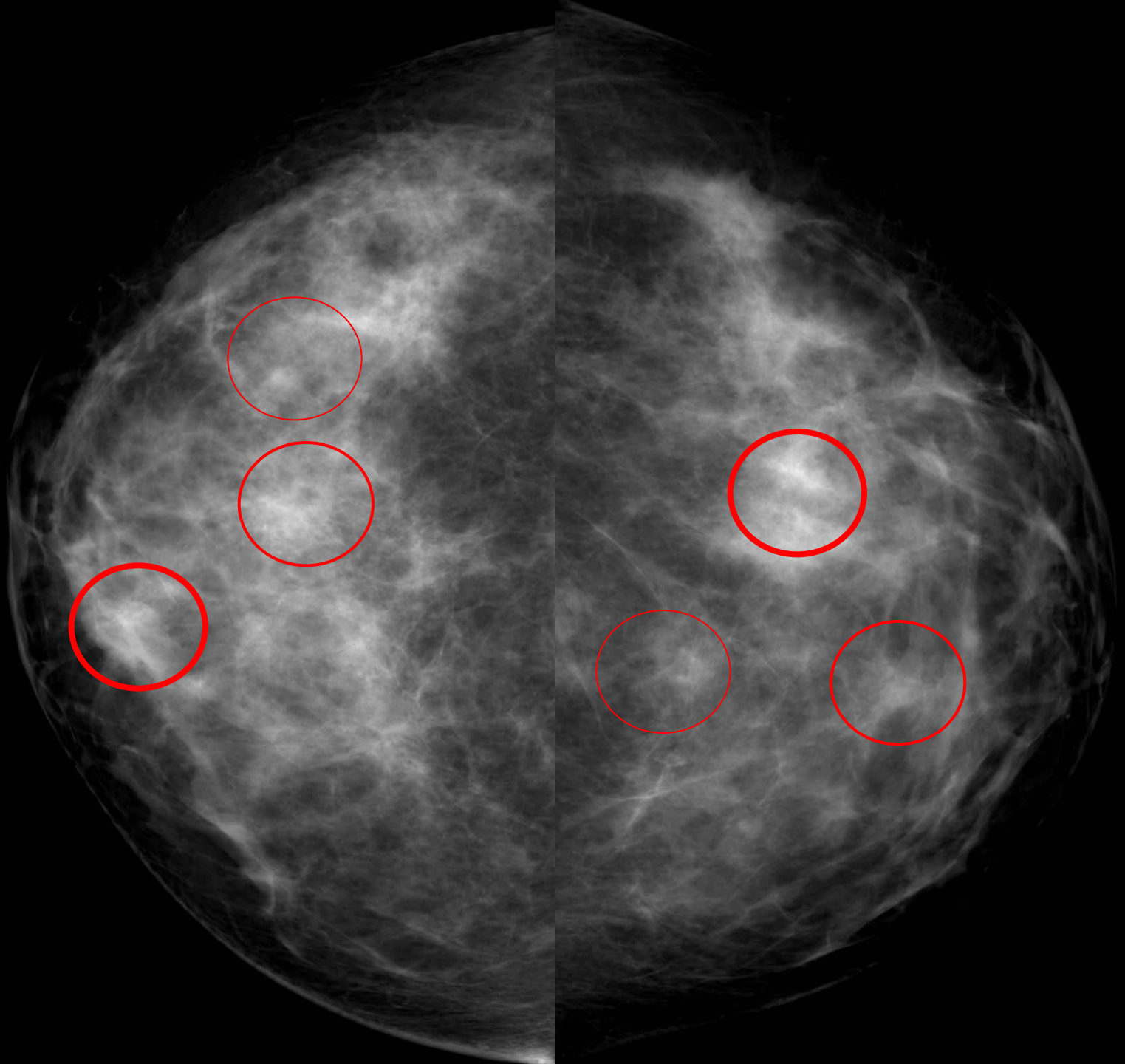
- ↑ Alzando la soglia minore saranno le ROI, minori i falsi positivi ( sistema meno sensibile)
- ↓ Abbassando la soglia maggiori saranno le ROI, maggiori i falsi positivi ( sistema meno specifico)



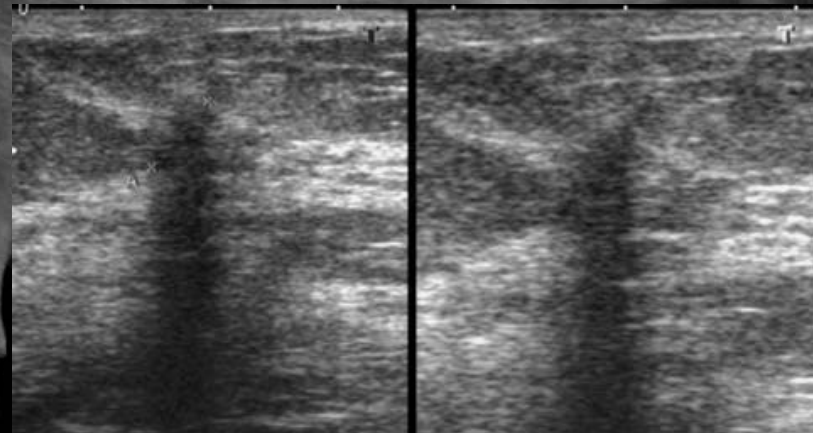
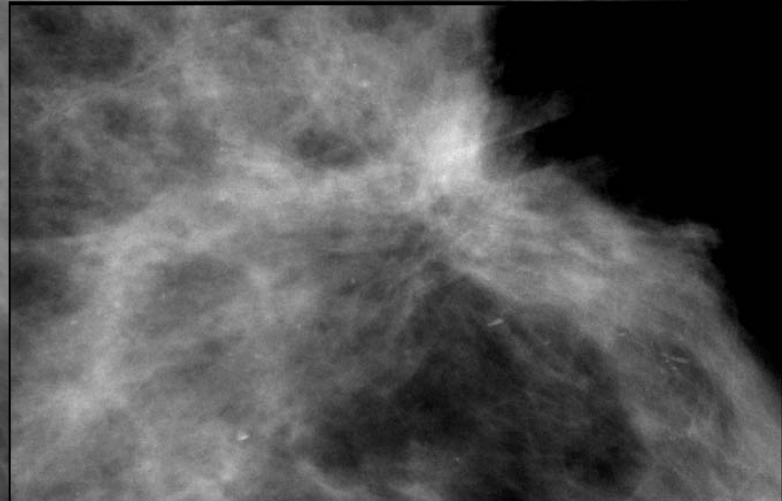
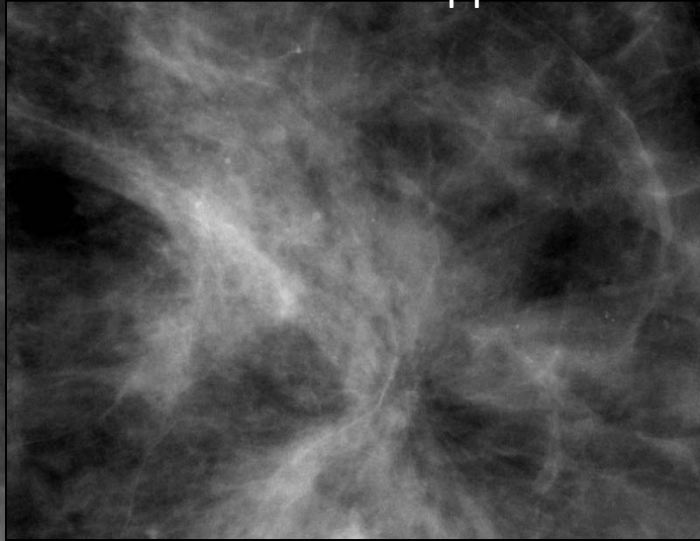


Il pericolo è che, per inadeguatezza dell'algoritmo, il CAD segnali immagini corrispondenti a lesioni benigne, creando confusione nel lettore e inducendolo ad un maggior tasso di richiamo.....





o che, sempre per inadeguatezza dell'algoritmo, non riconosca immagini riferibili a neoplasie, inducendo una falsa rassicurazione nel lettore che, pur avendo "scorto" l'anomalia, potrebbe non ritenerla meritevole di approfondimento proprio perché il CAD non l'ha segnalata



## Confronto tra lettura singola e lettura singola con CAD

TASSO DIAGNOSTICO AGGIUNTIVO (IDR) DI CARCINOMI CON CAD	
STUDIO	IDR
CSPO (4 STUDI) <sup>°</sup>	85/617 (+13.7%)
FREER 2001*	8/41 (+19.5%)
BIRDWELL 2003*	2/17 (+11.7%)
HELVIE 2004*	1/10 (+10.0%)
GUR, 2004*	4/206 (+1.9%)
KHOO, 2005	2/61 (+1.3%)
BIRDWELL, 2005*	2/27 (+ 7.4%)
CUPPLES, 2005*	17/101 (+16.8%)
KO 2006*	2/45 (4.4%)
MORTON, 2006*	8/105 (+ 7.6%)
TOTAL	131/1230 (+10.6%)
FENTON, 2007 <sup>*A</sup>	(+ 3.6%)

<sup>°</sup> studio retrospettivo, \* studio prospettico, <sup>A</sup> confronto di coorti

TASSO AGGIUNTIVO DI RICHIAMI AD APPROFONDIMENTO CON CAD	
STUDIO	IRR
CSPO (4 STUDI) <sup>°</sup>	245/703 (+35.5%)
HELVIE 2004*	34/344 (+9.8%)
FREER 2001*	156/830 (+18.7%)
BIRDWELL 2003*	57/487 (+11.7%)
MORTON 2002*	214/1163 (+18.4%)
KHOO, 2005*	18/372 (+5.8%)
BIRDWELL, 2005*	73/887 (+8.2%)
CUPPLES, 2005*	164/2100 (+7.8%)
KO, 2006*	100/602 (+16.6%)
MORTON, 2006*	191/1996 (+9.5%)
TOTAL	1252/9484 (+13.2%)
FENTON, 2007	(+ 3.0%)

<sup>°</sup> studio retrospettivo, \* studio prospettico, <sup>A</sup> confronto di coorti



## Confronto tra doppia lettura e doppia lettura con CAD

MAMMOGRAPHY SCREENING USING INDEPENDENT DOUBLE READING WITH CONSENSUS: IS THERE A POTENTIAL BENEFIT FOR CAD.

Skaane P et al Acta radiol 2012 April 1;53(3):241-8

Cancer detection :+ 16%

Riduce of interval cancers del 20%

Azavedo et al. BMC Medical Imaging 2012, 12:22  
<http://www.biomedcentral.com/1471-2342/12/22>



RESEARCH ARTICLE

Open Access

### Is single reading with computer-aided detection (CAD) as good as double reading in mammography screening? A systematic review

Edward Azavedo<sup>1,4</sup>, Sophia Zackrisson<sup>2\*</sup>, Ingegerd Mejåre<sup>3</sup> and Marianne Heibert Arnlind<sup>3,4</sup>

2328 (+44.0%)

320 (+11.45%)

1560 (+40.0%)

5138 (+24.3%)

3332 (+28.8%)

**Conclusions:** The scientific evidence is insufficient to determine whether the accuracy of single reading + CAD is at least equivalent to that obtained in standard practice, i.e. double reading where two breast radiologists independently read the mammographic images.

## Integration of 3D digital mammography with tomosynthesis for population breast-cancer screening (STORM): a prospective comparison study

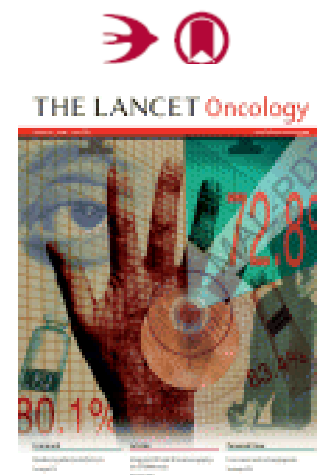
*Stefano Ciattot, Nehmat Houssami, Daniela Bernardi, Francesca Caumo, Marco Pellegrini, Silvia Brunelli, Paola Tuttobene, Paola Bricolo, Carmine Fantò, Marvi Valentini, Stefania Montemezzi, Petra Macaskill*

Eur Radiol (2013) 23:2061–2071  
DOI 10.1007/s00330-013-2820-3

BREAST

## Prospective trial comparing full-field digital mammography (FFDM) versus combined FFDM and tomosynthesis in a population-based screening programme using independent double reading with arbitration

**Per Skaane • Andriy I. Bandos • Randi Gullien • Ellen B. Eben • Ulrika Ekseth • Unni Haakenaasen • Mina Izadi • Ingvild N. Jebsen • Gunnar Jahr • Mona Krager • Solveig Hofvind**



# Risultati



	Breast cancer			No breast cancer (including false recalls)		
	Integrated 2D and 3D positive	Integrated 2D and 3D negative	Total	Integrated 2D and 3D positive	Integrated 2D and 3D negative	Total
2D positive	39			141		322
2D negative	20			6840		6913
Total	59			6981		7235
p value	<0.0001					

39 cancro sono stati visti sia con la 2D che con la 3D; 20 cancro solo con la 3D (P<0.0001) !

p values are exact for McNemar's test for paired binary data. \*Does not include follow-up data on interval cancers.

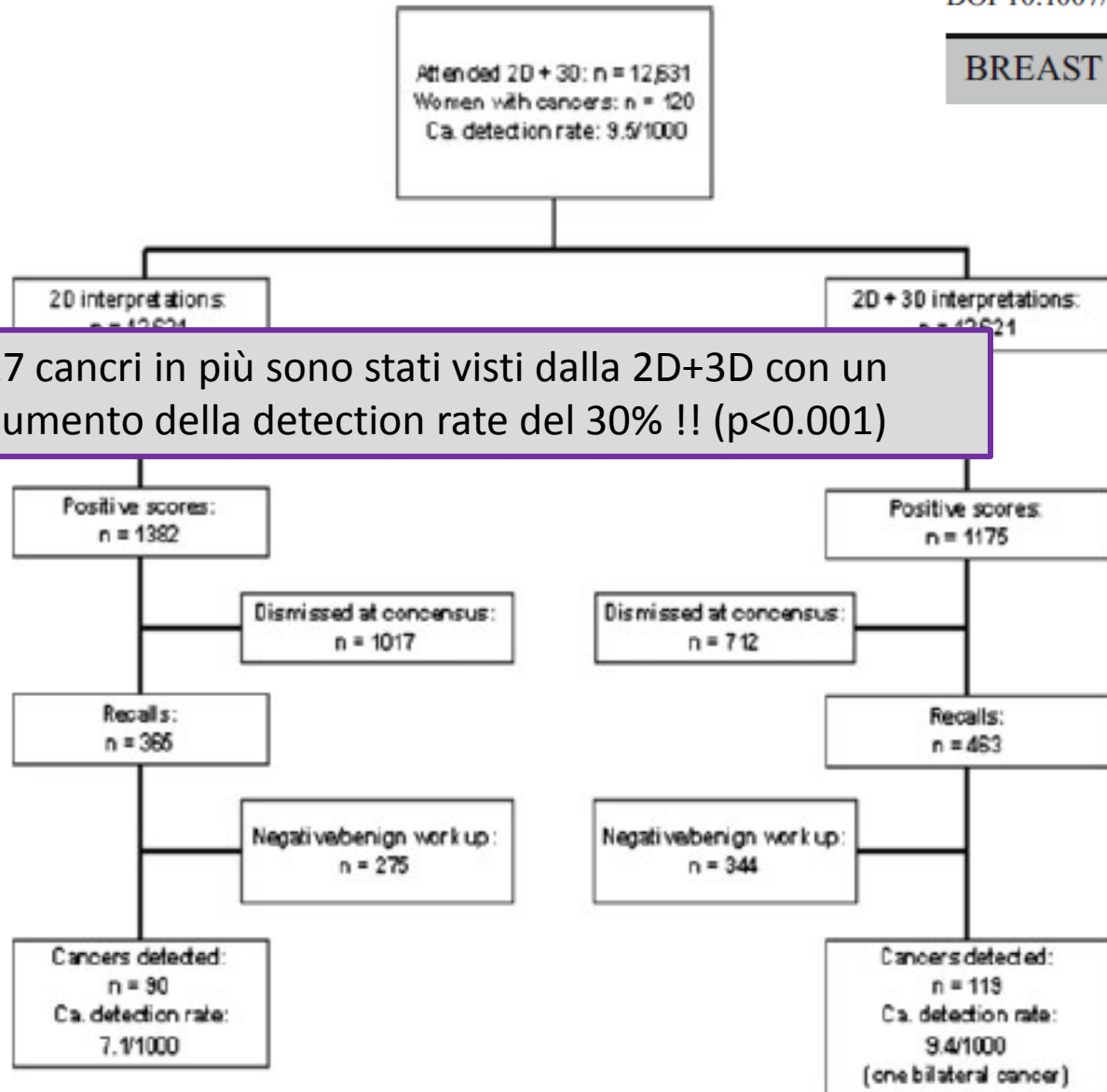
**Table 2: Outcomes of screening**

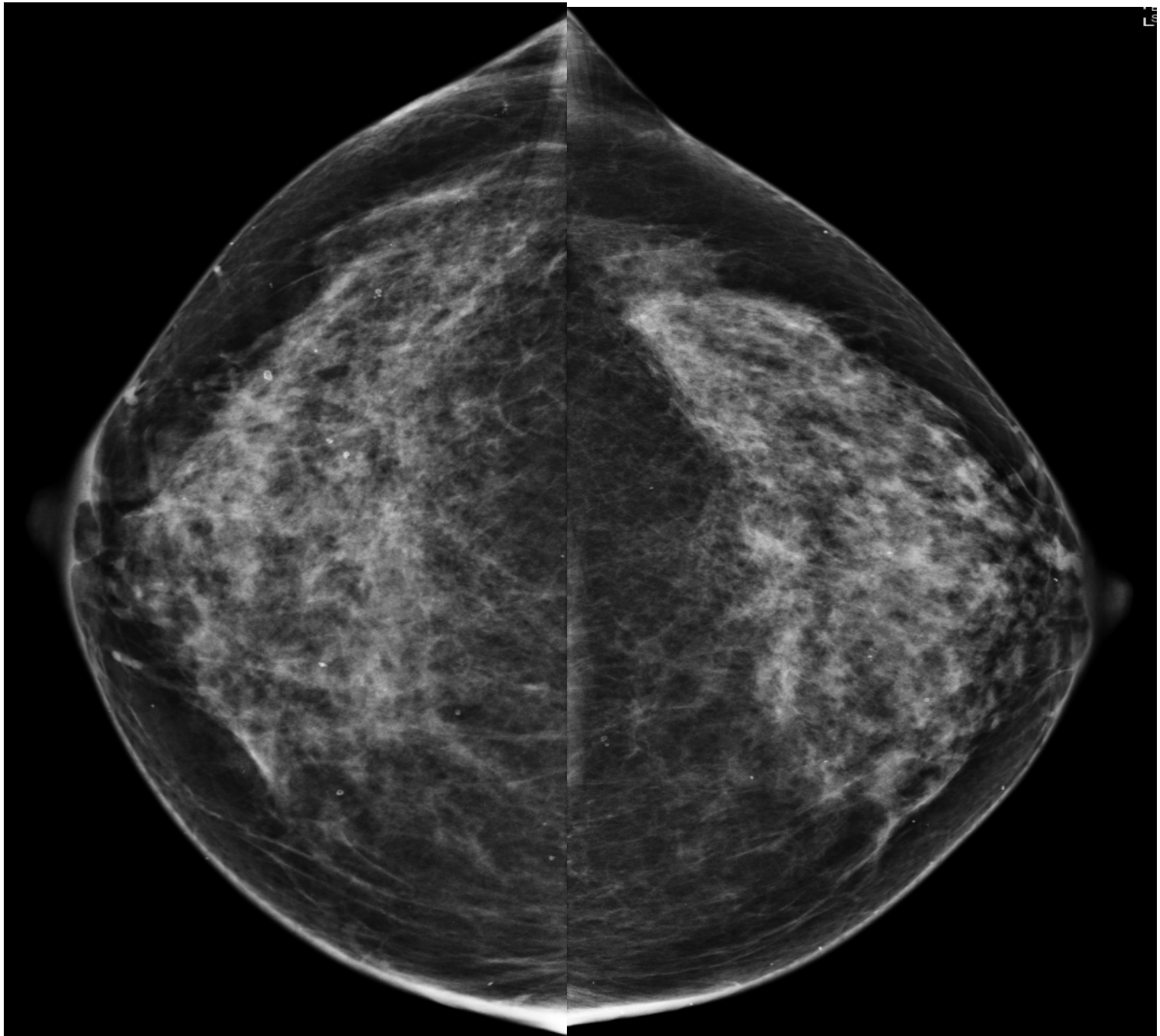
	n	% (95% CI)
<b>Overall (72 35 screens*)</b>		
Recalled at either 2D or integrated 2D and 3D mammography		0-6.0)
Recalled at both 2D and integrated 2D and 3D mammography		2-2.9)
Recalled at 2D mammography only		6-2.3)
Recalled at integrated 2D and 3D mammography only	73	1.0% (0.8-1.3)
Conditional false positive recalls†	254	3.5% (3.1-4.0)

Potenzialmente la 3D ha ridotto di 68 casi i 395 falsi positivi  
Cioè circa 17.2%

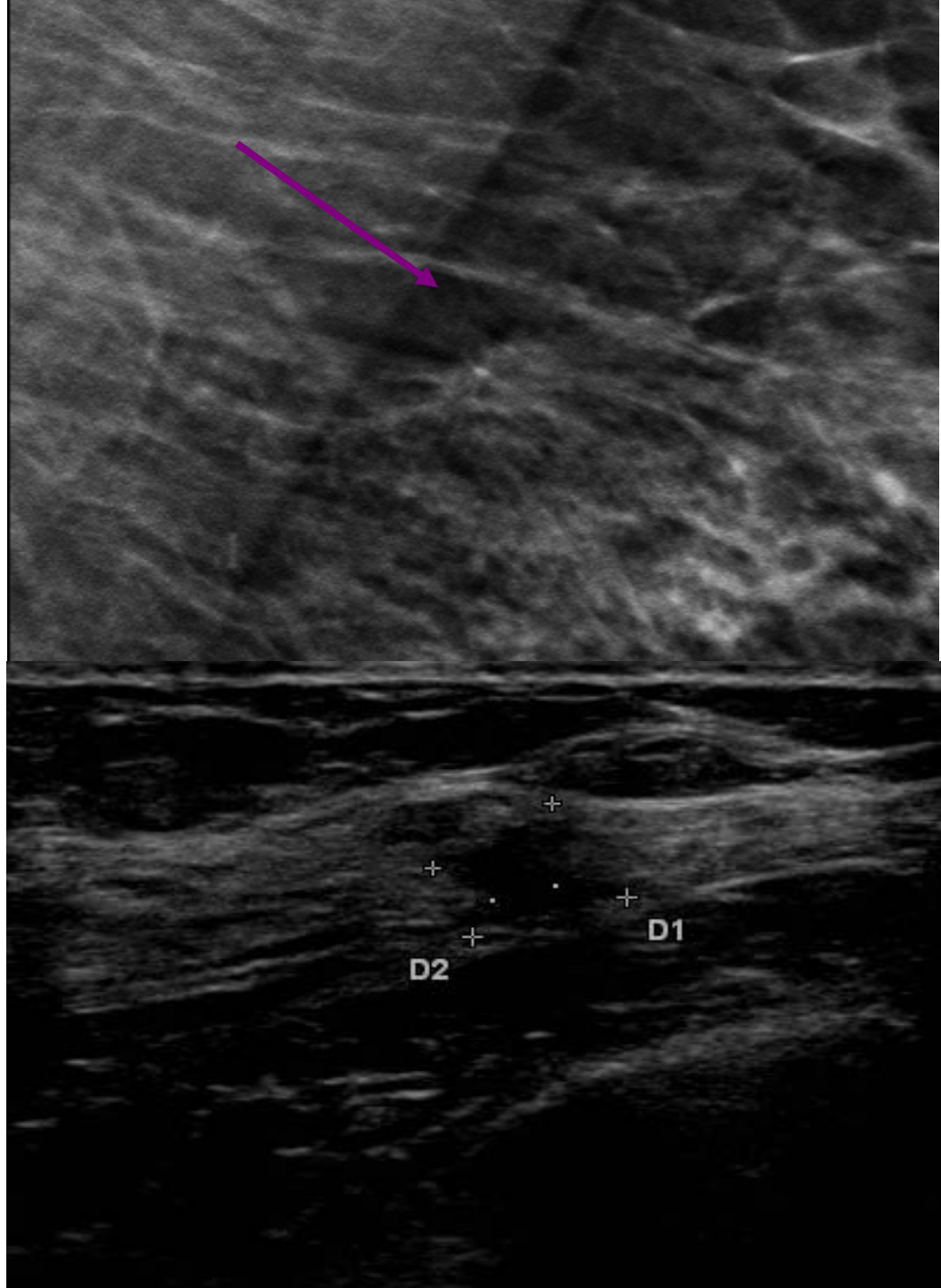
BREAST

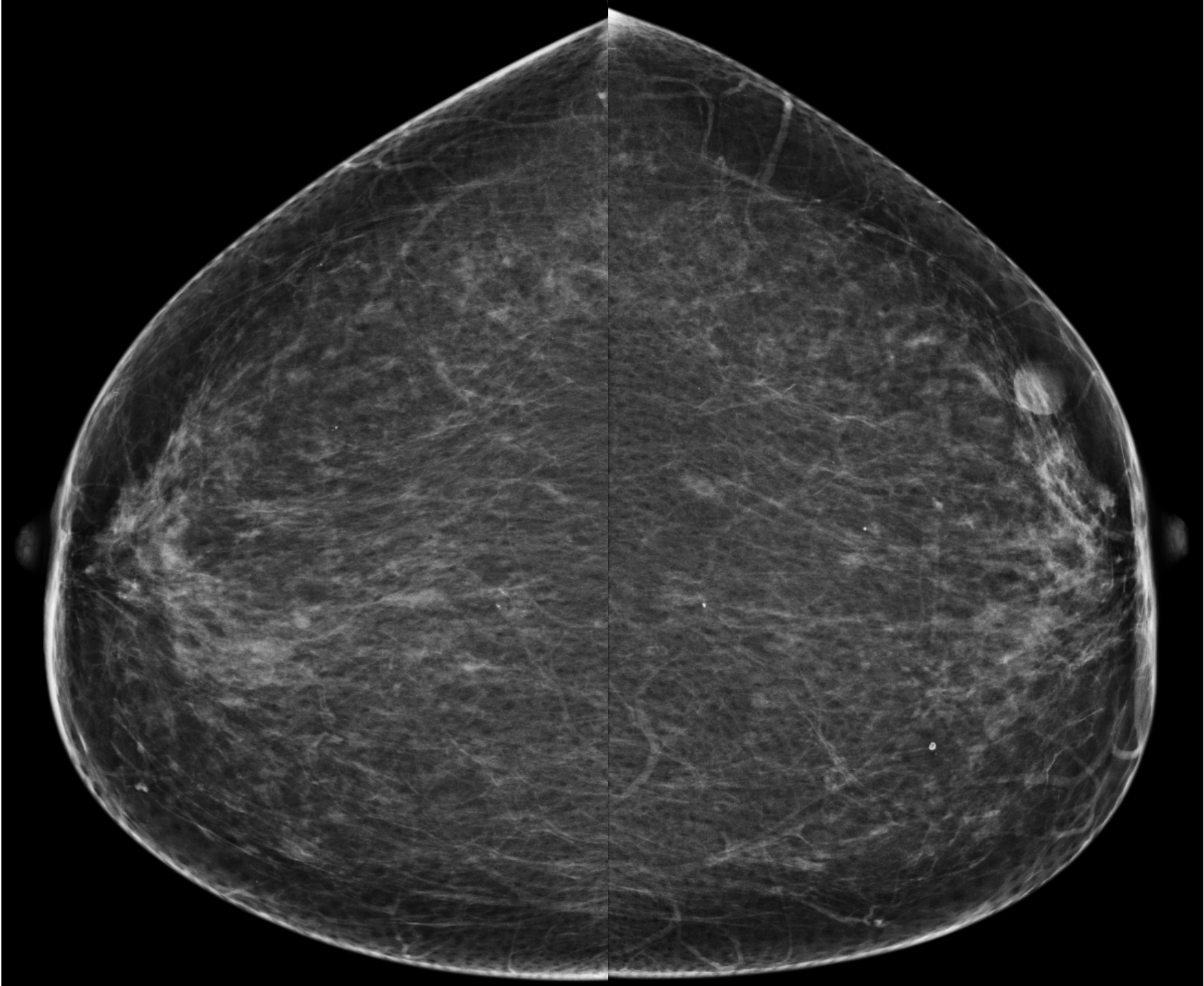
27 cancro in più sono stati visti dalla 2D+3D con un aumento della detection rate del 30% !! ( $p < 0.001$ )





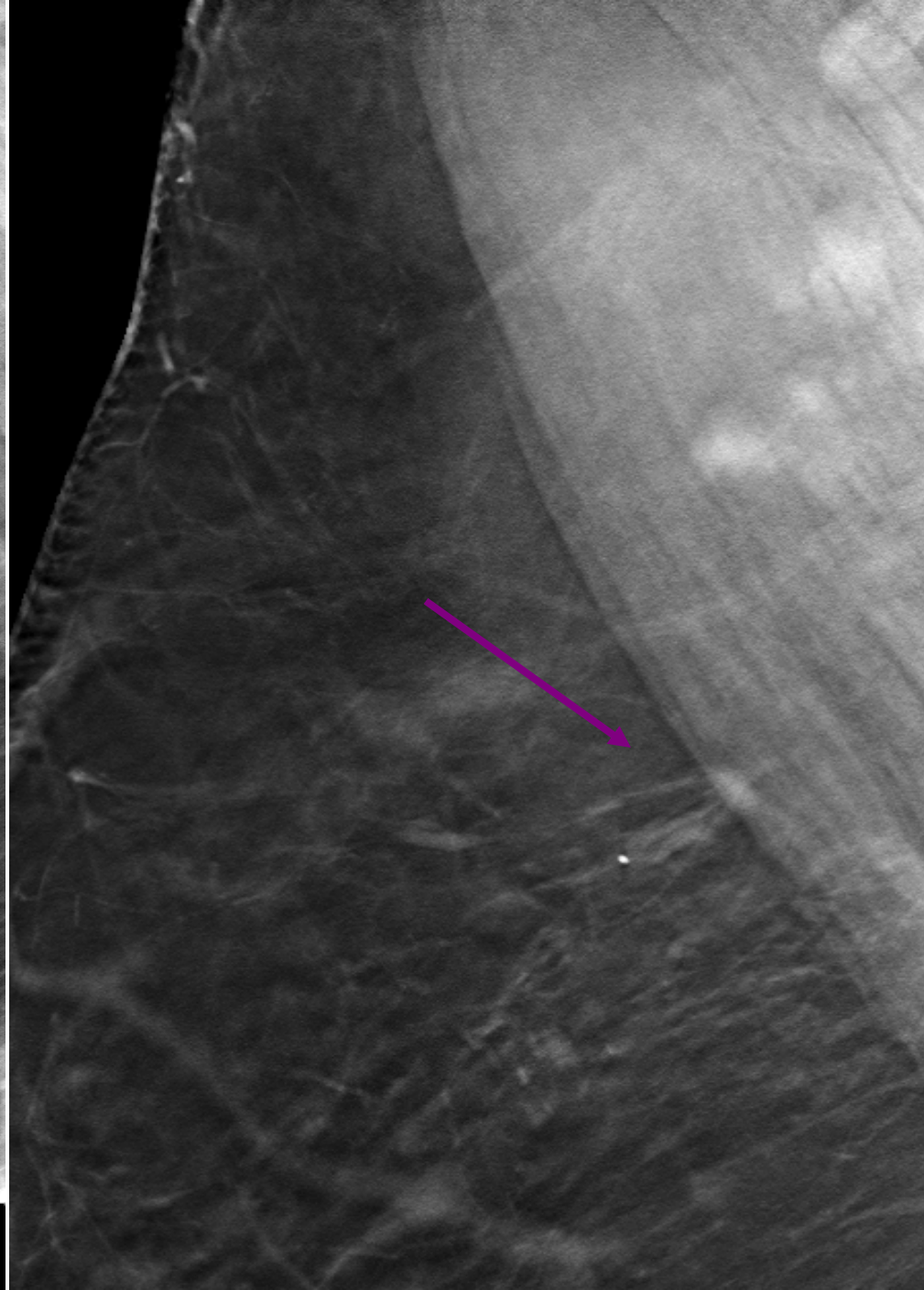


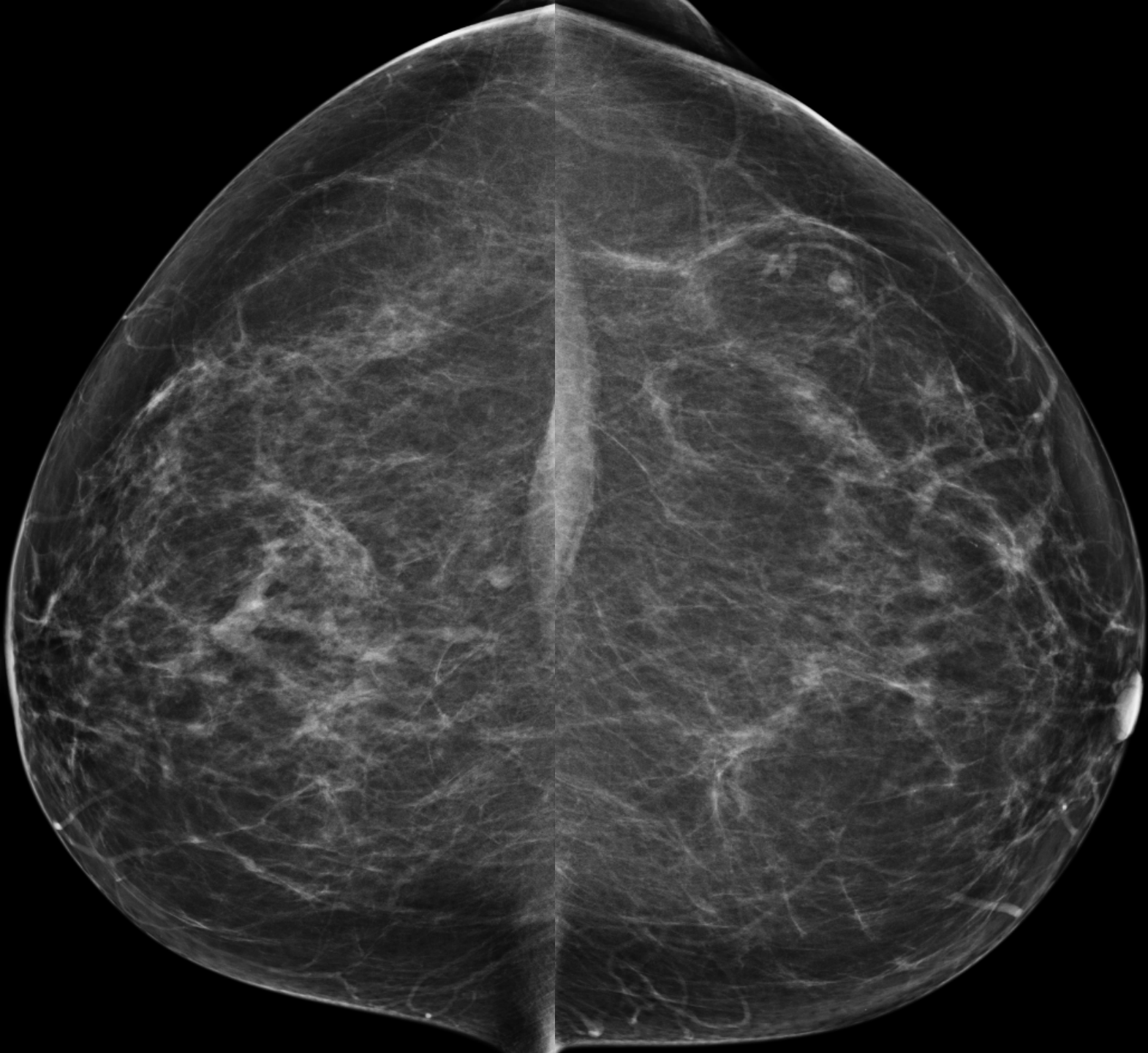




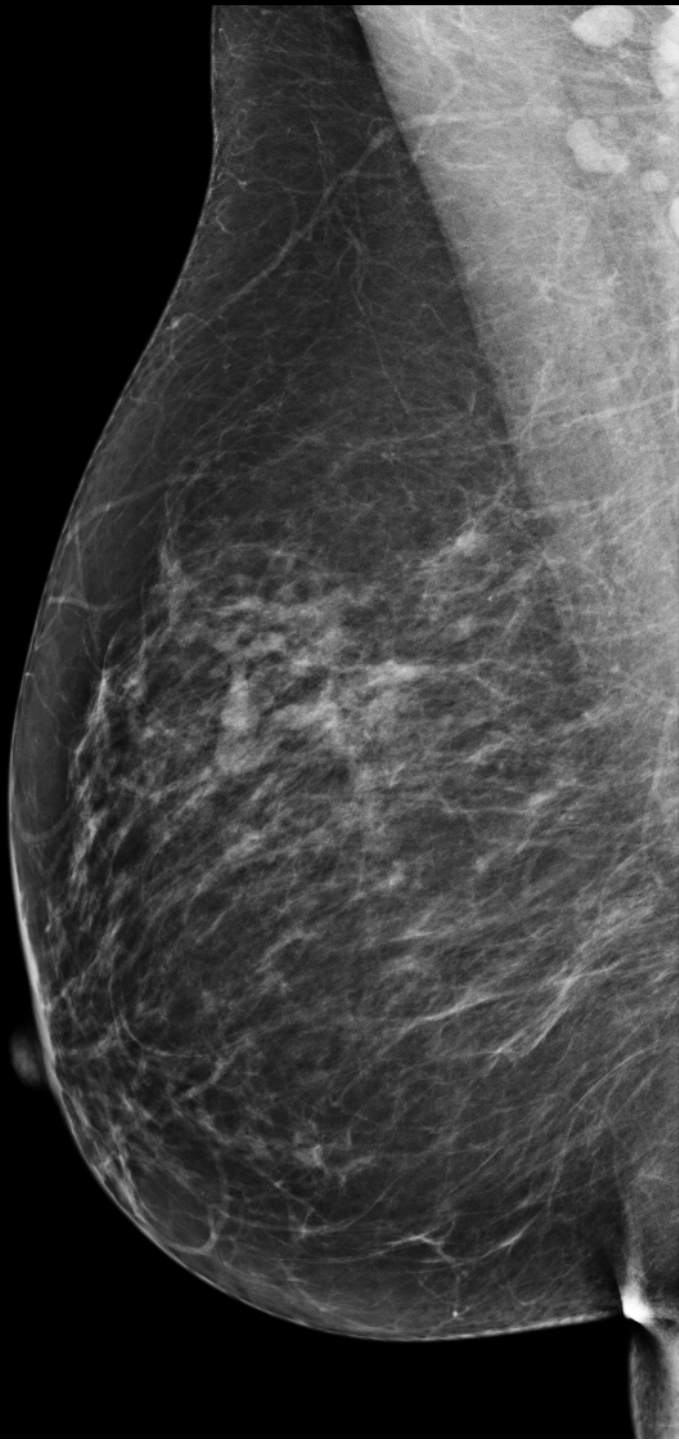




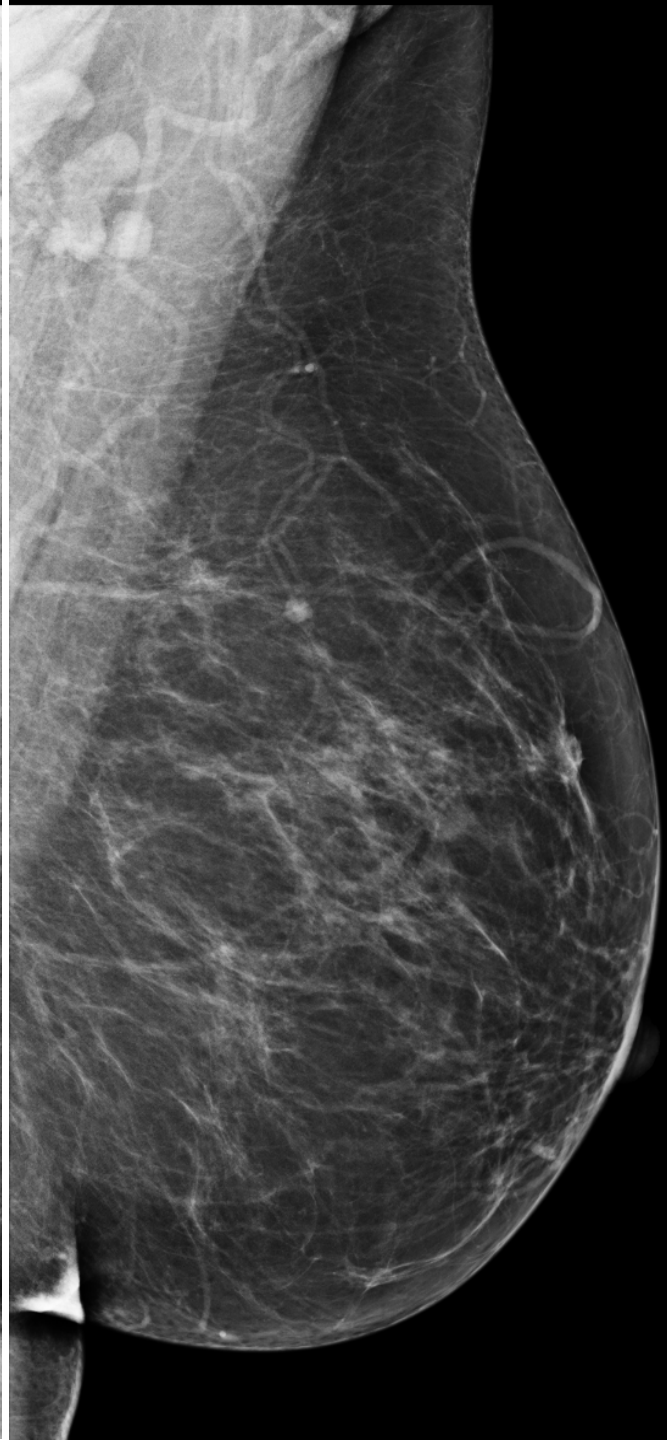


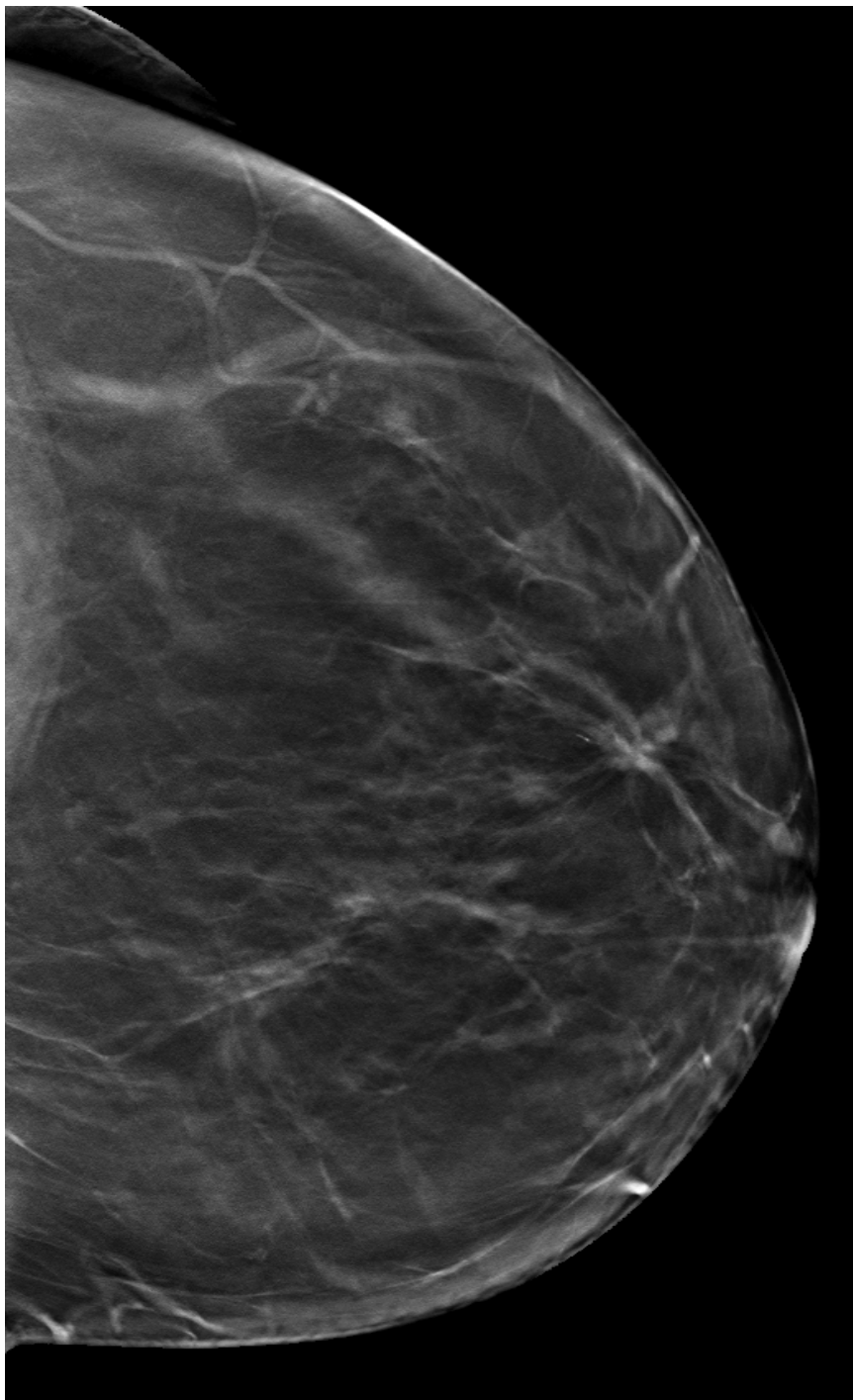


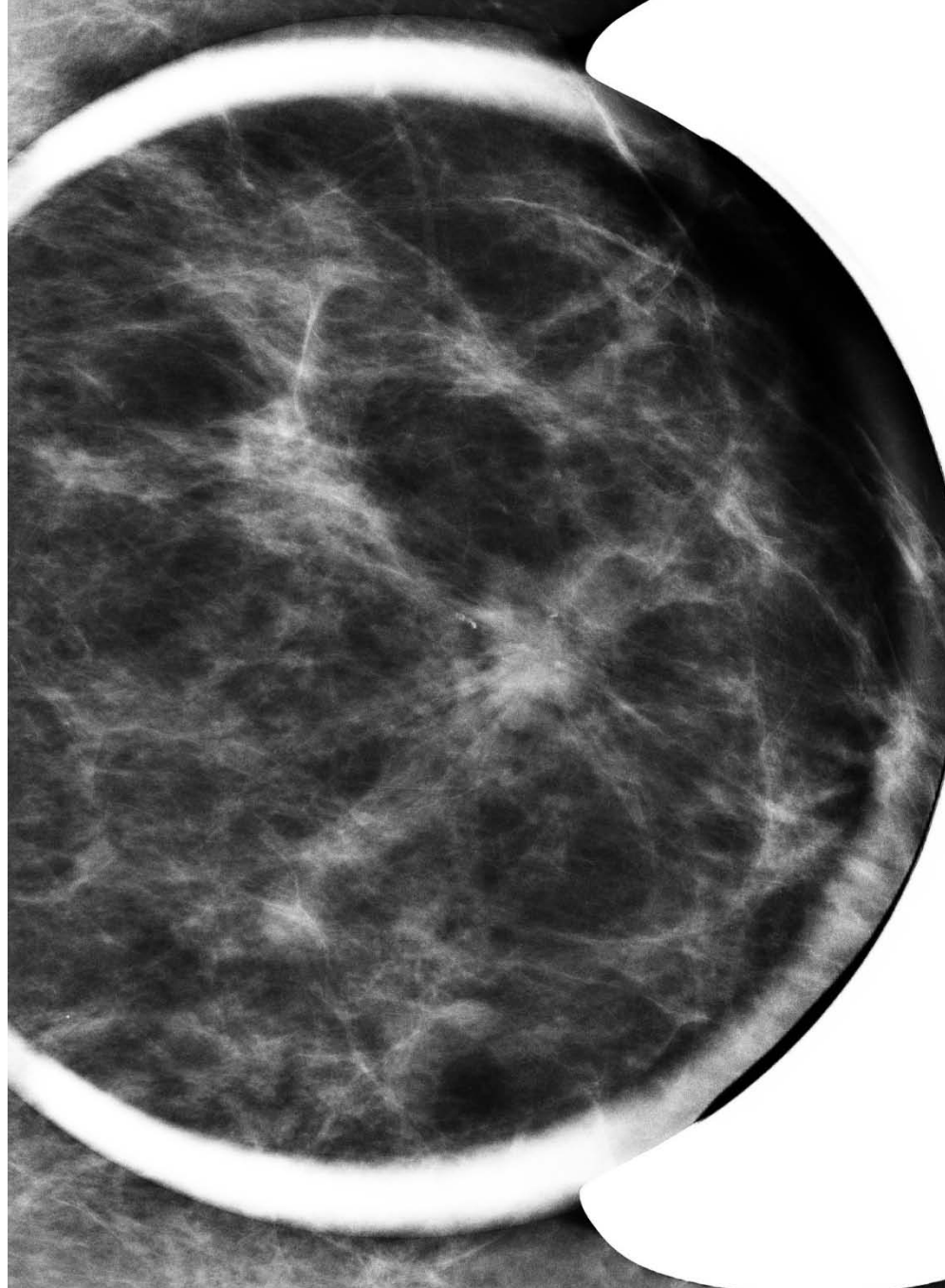
RMLO



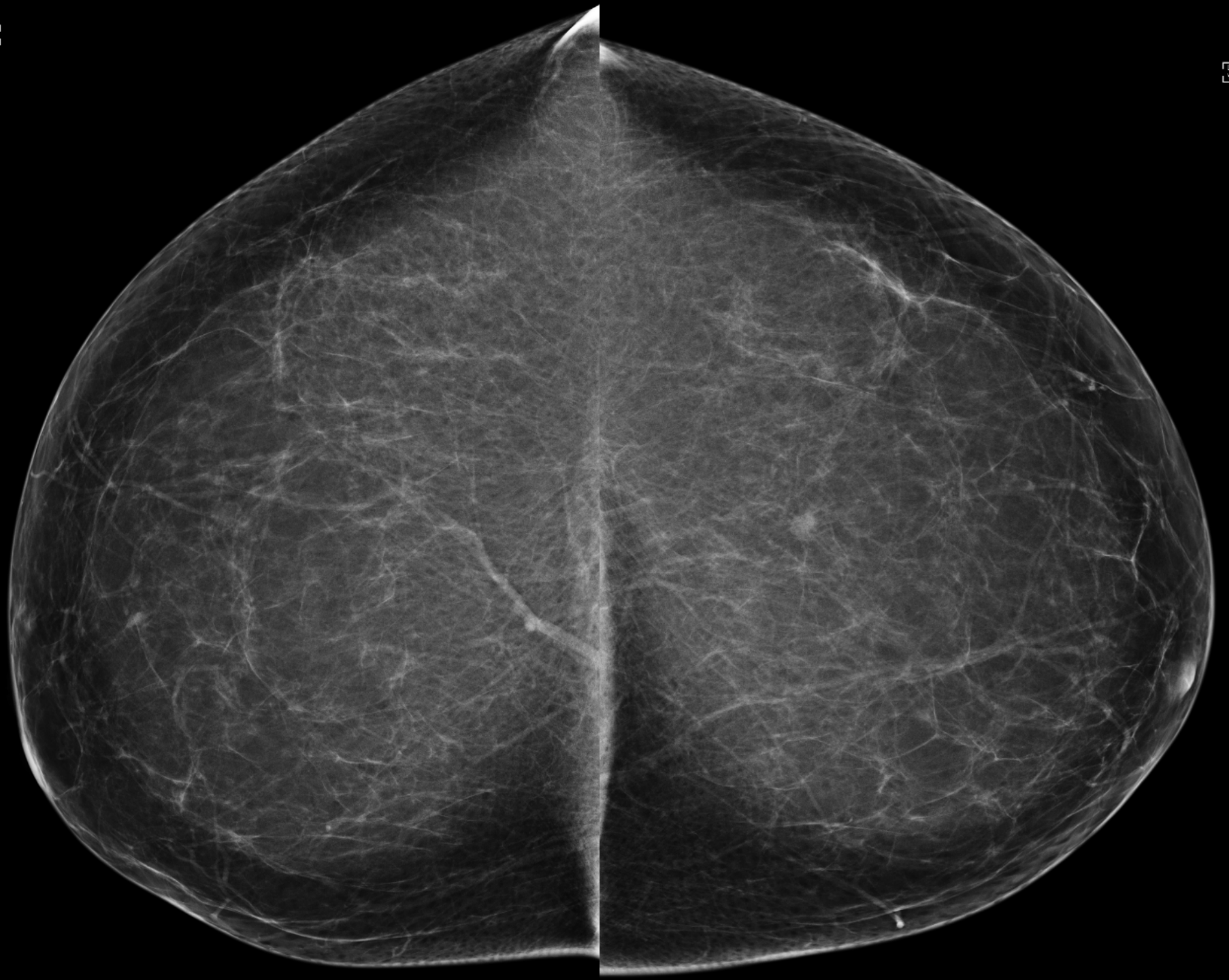
LMLO





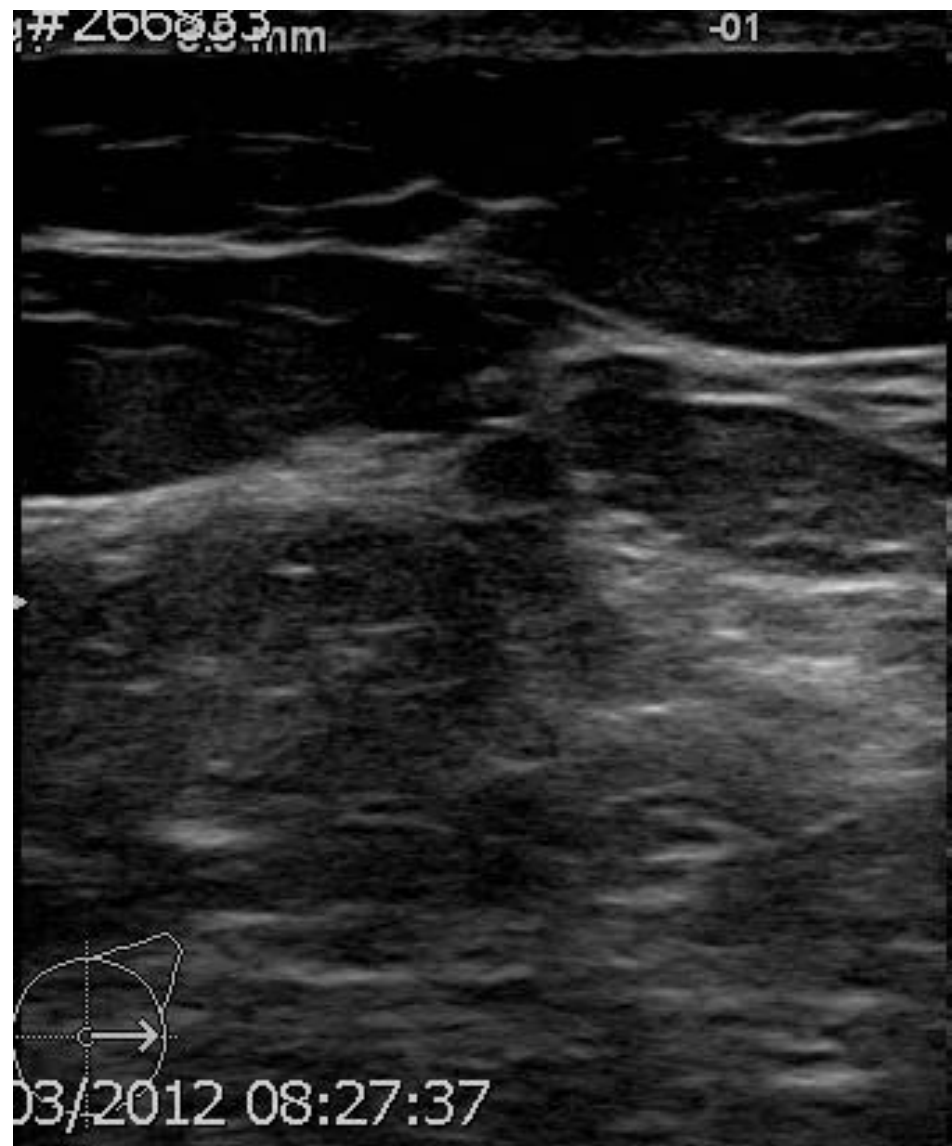
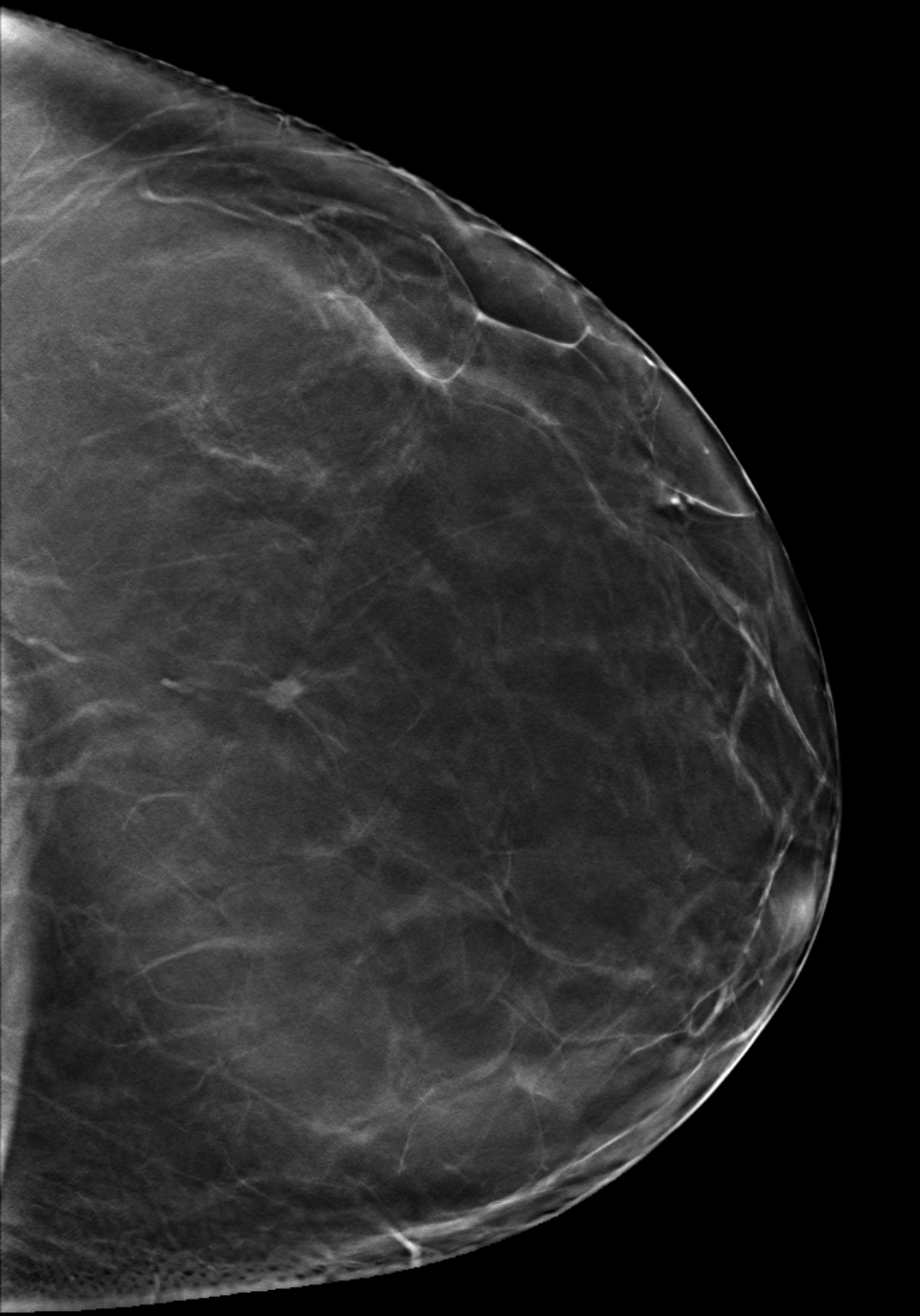


04/08/1955 <sup>Calip</sup> <sup>Dr. Paz.:</sup> <sup>84431</sup> <sup>8443</sup>  
Cod. Paz.: 84431 -01  
Cod. Esame: 268847  
ESE: mGy  
ADG: dGy  
FS:   
F:  
A:  
mm - N  
mAs - msec  
kV: mA  
ULSS 20 - Veneto  
Centro Prevenzione Senologica No.38/38  
BG:12 70/+/3/6/2/-/-  
L65 HdTHLE BREAST HD55 40mm

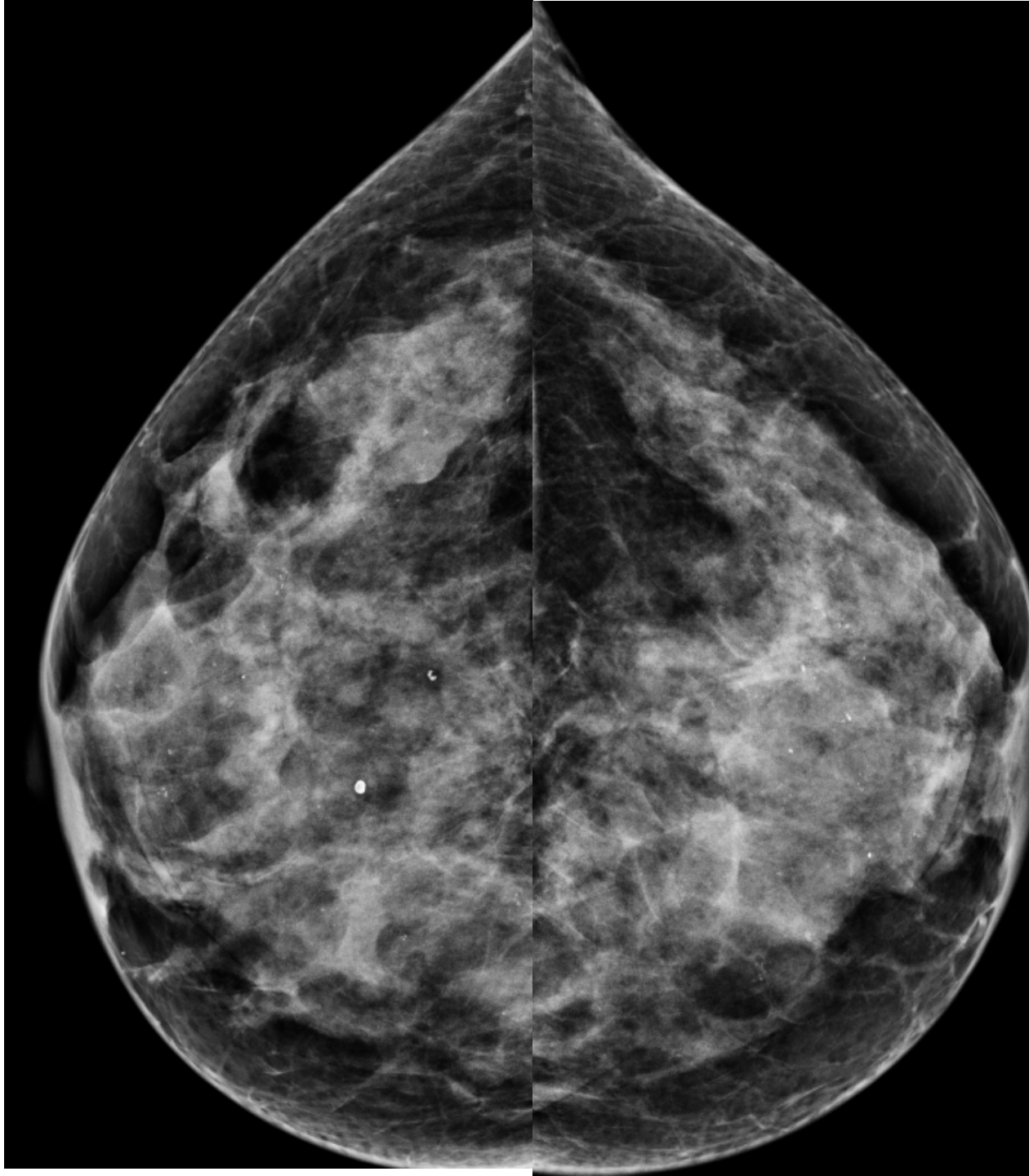


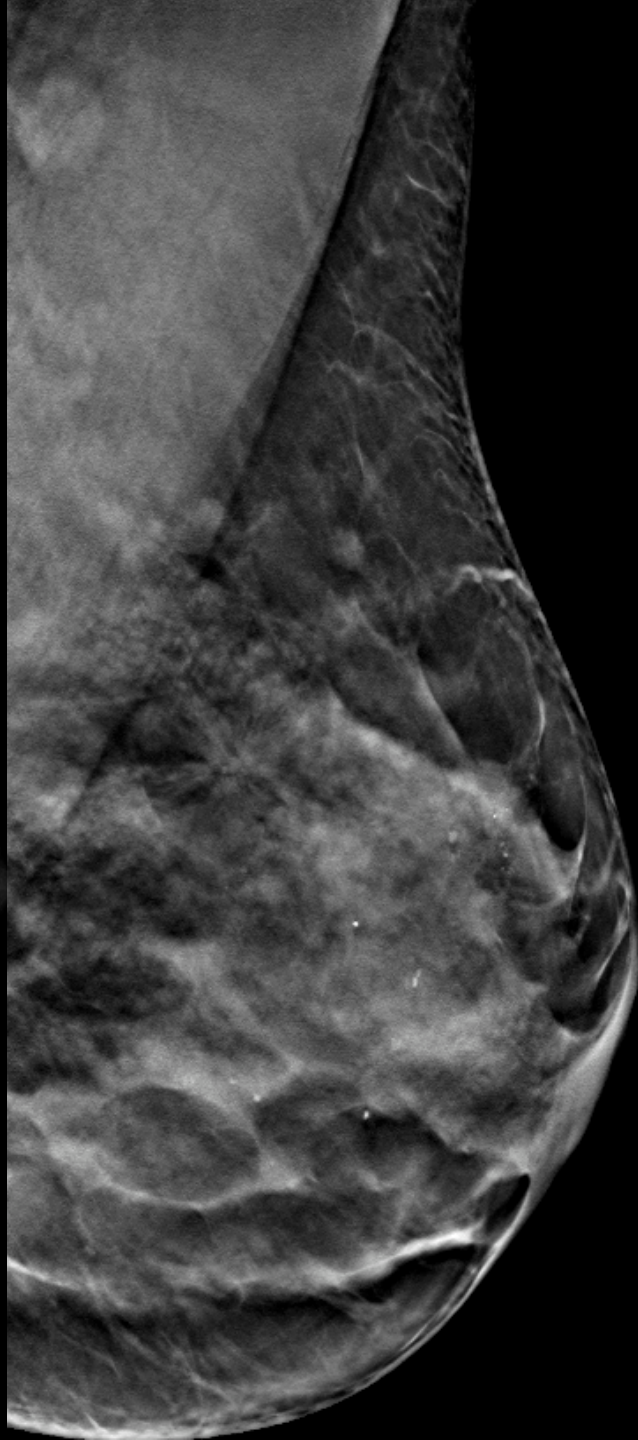
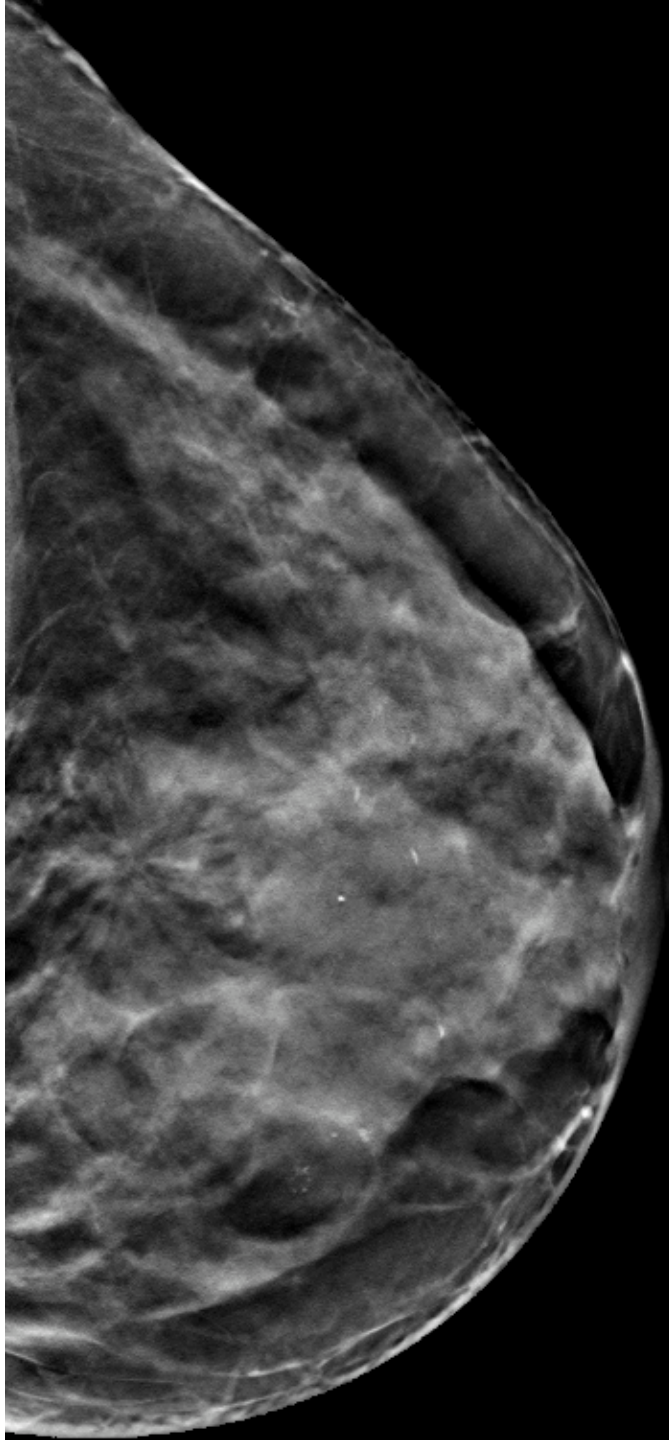


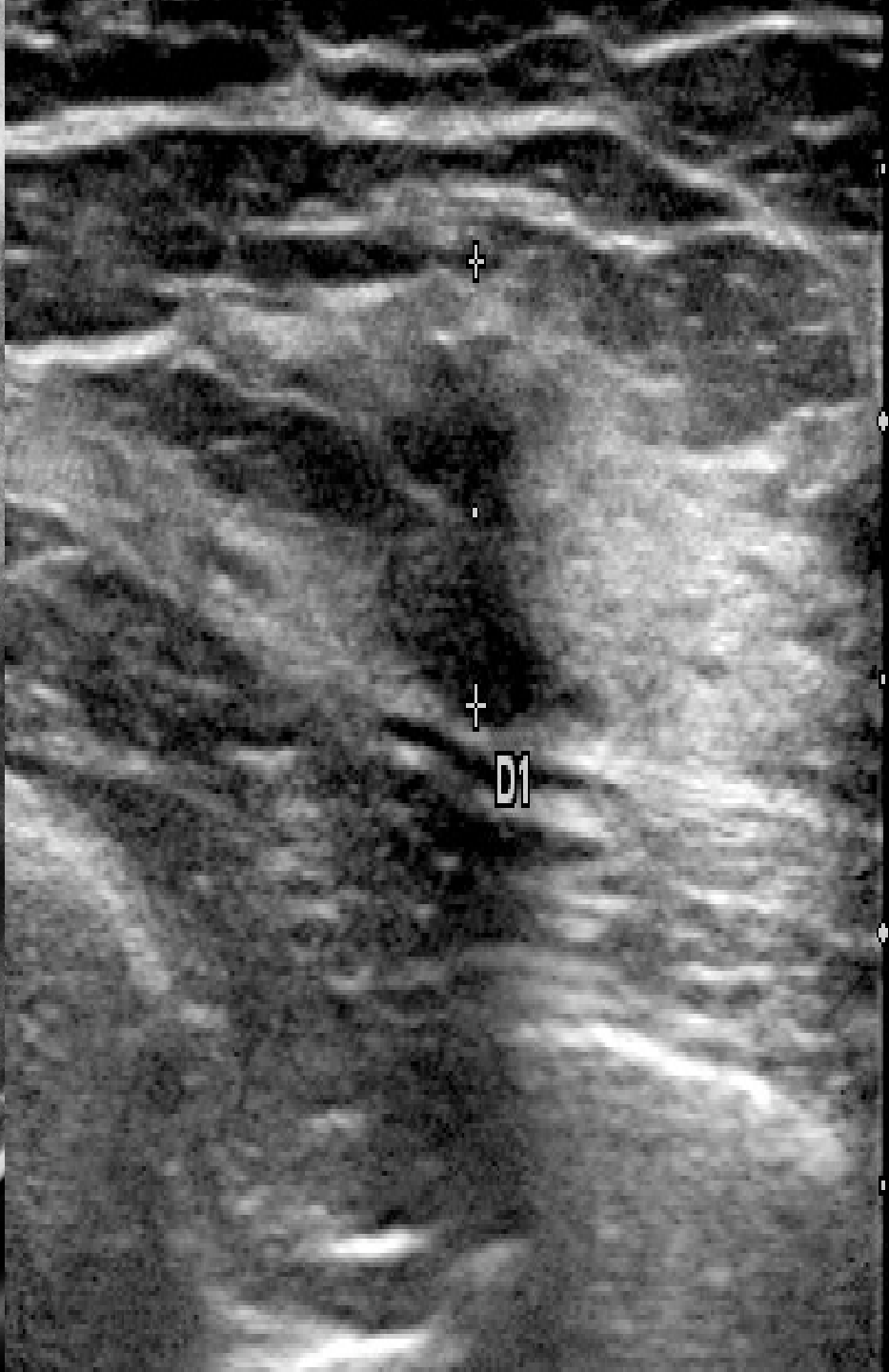
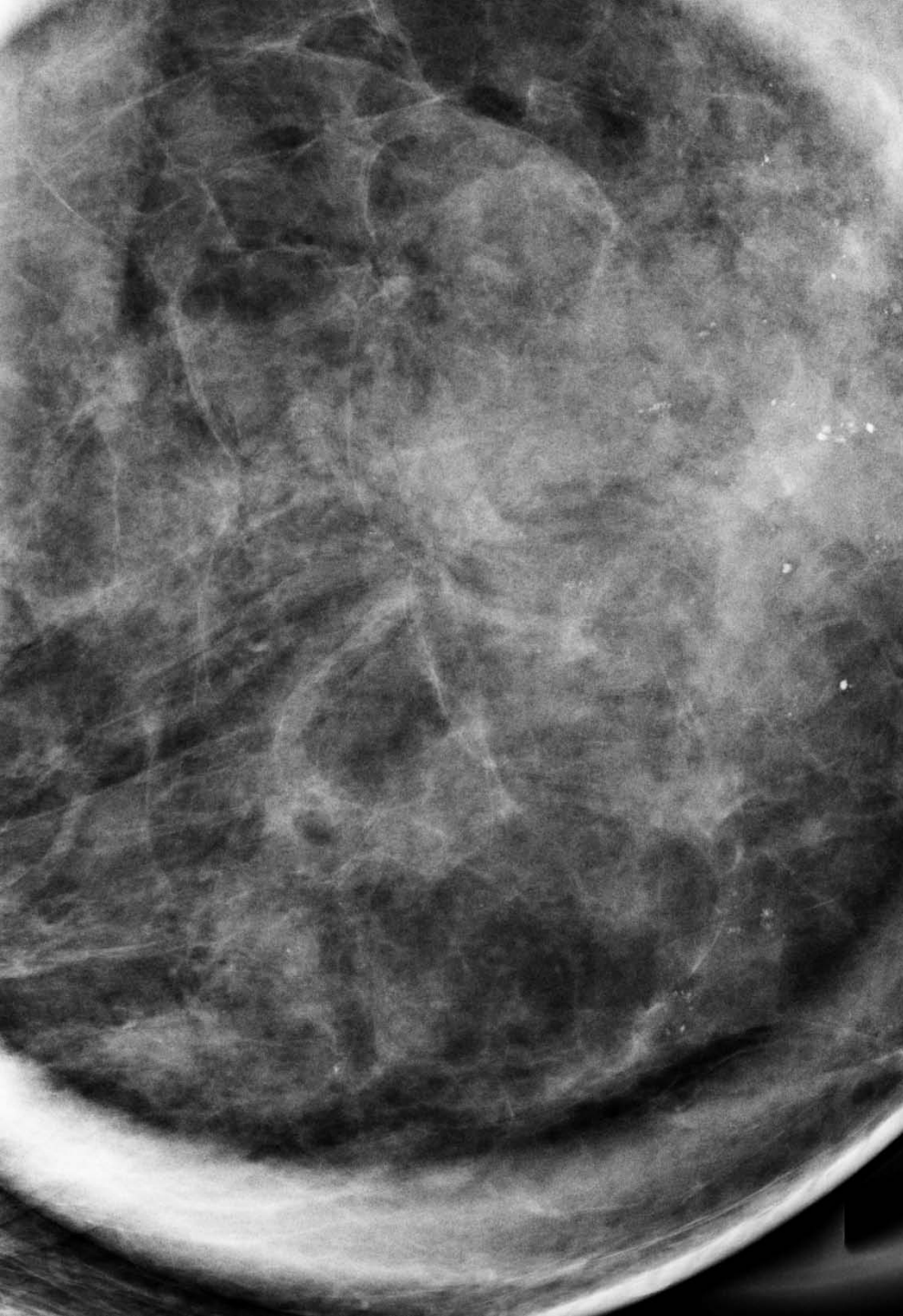


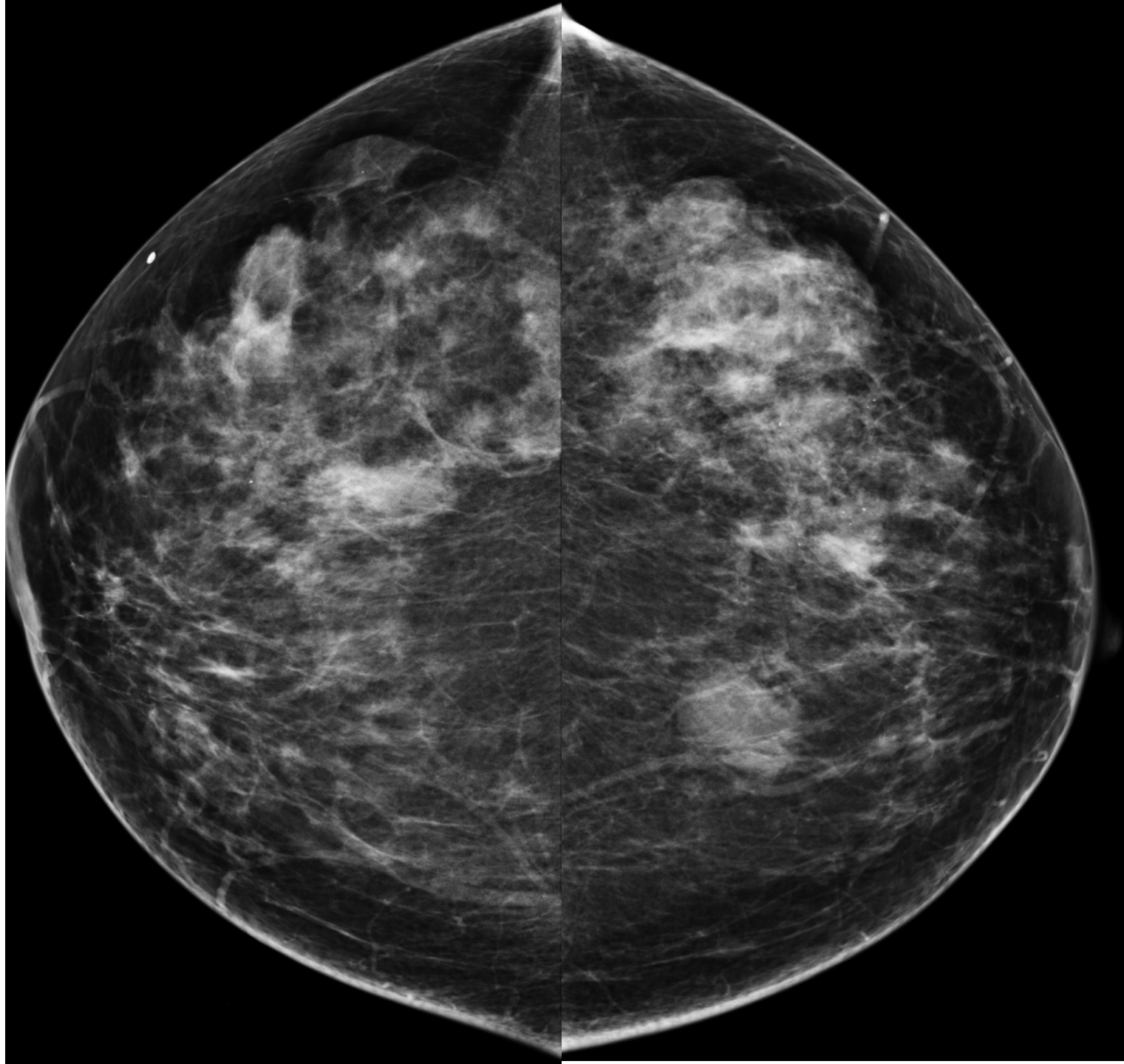


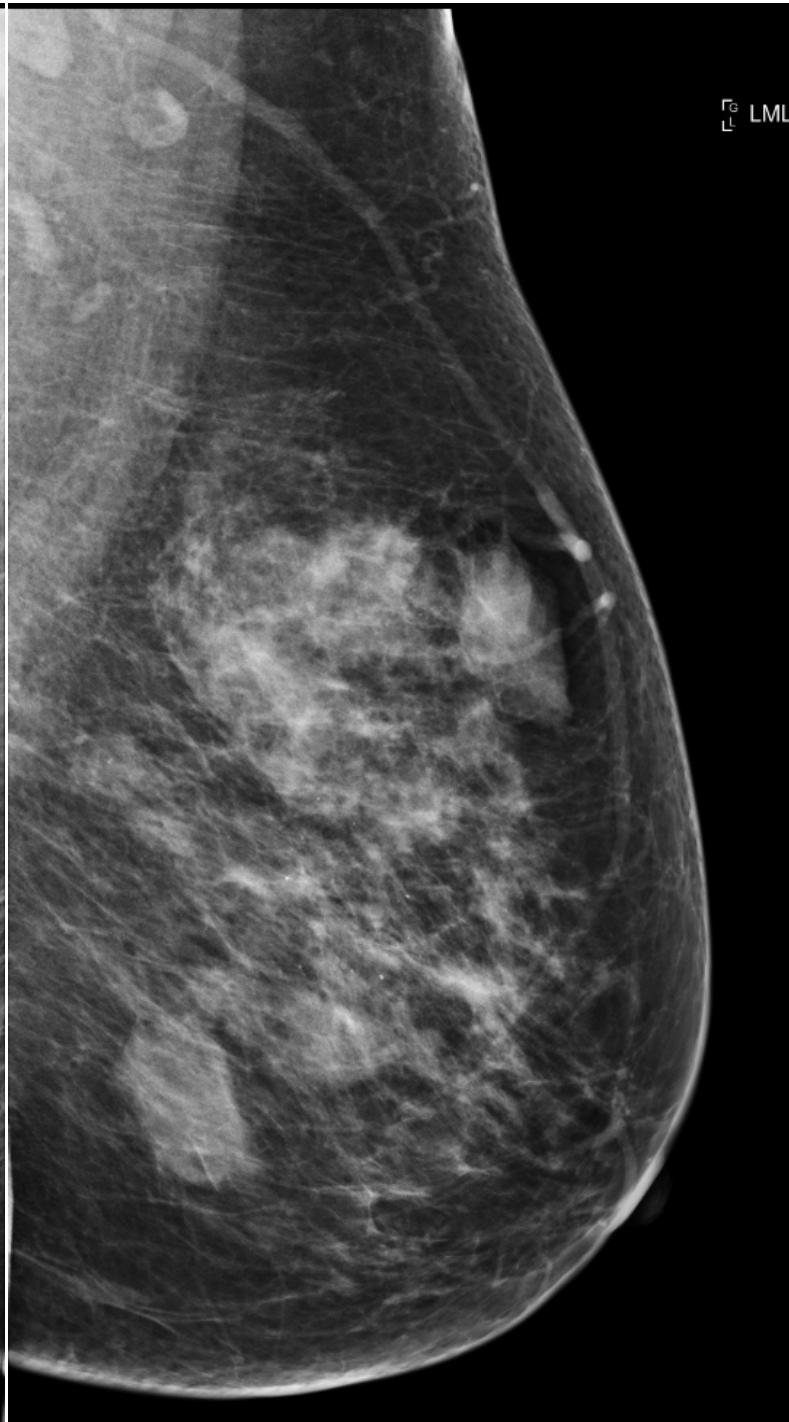
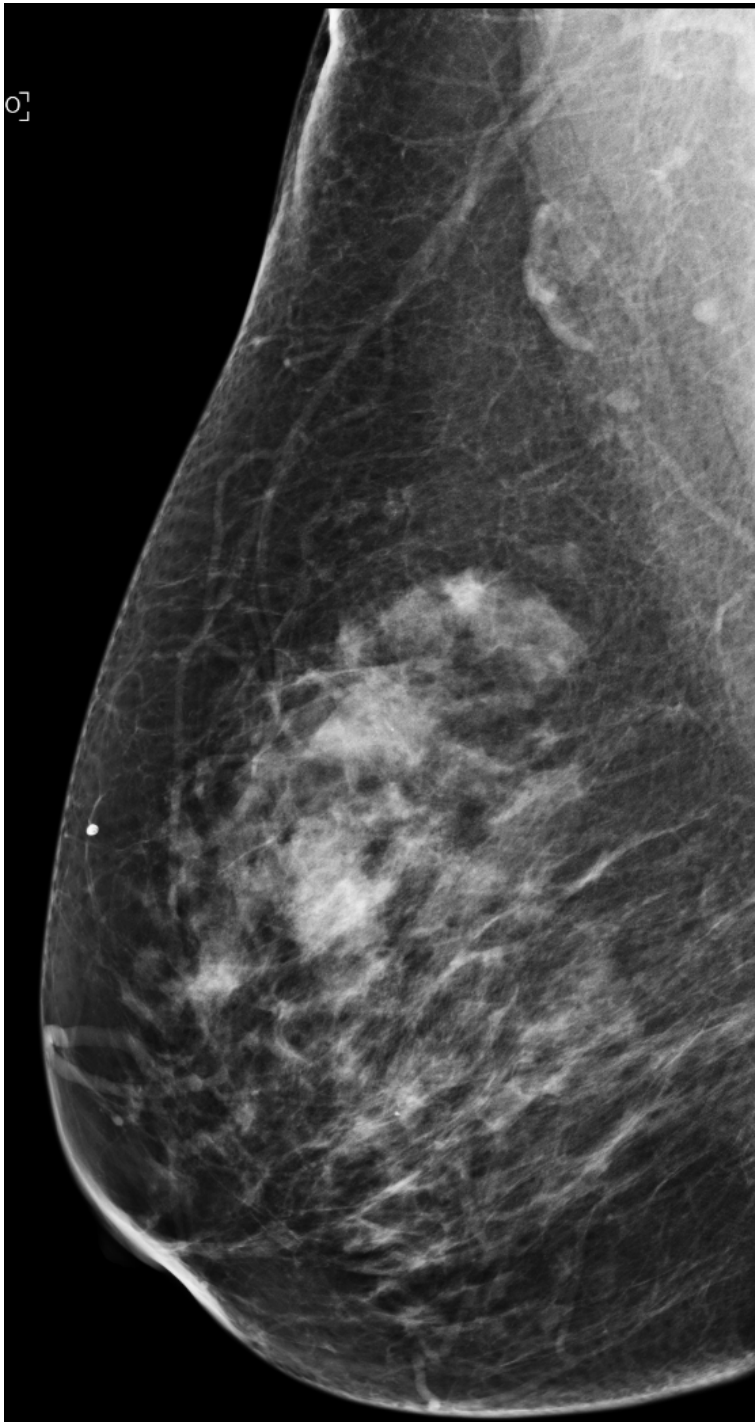


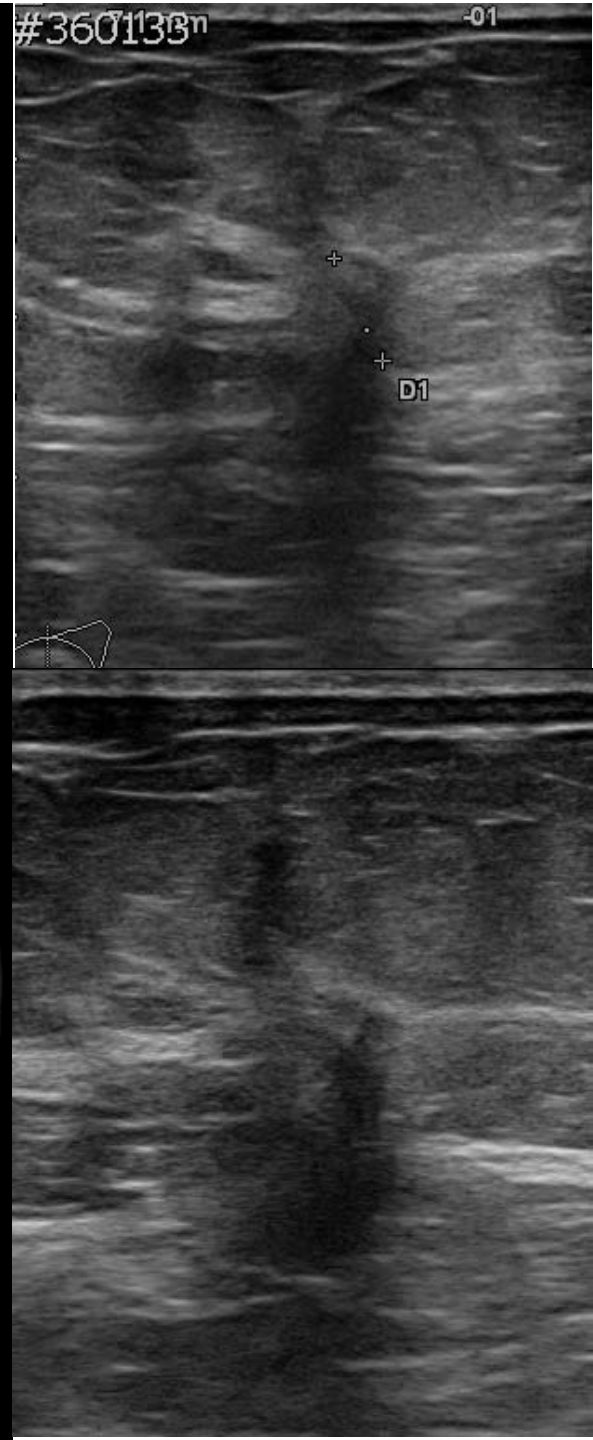
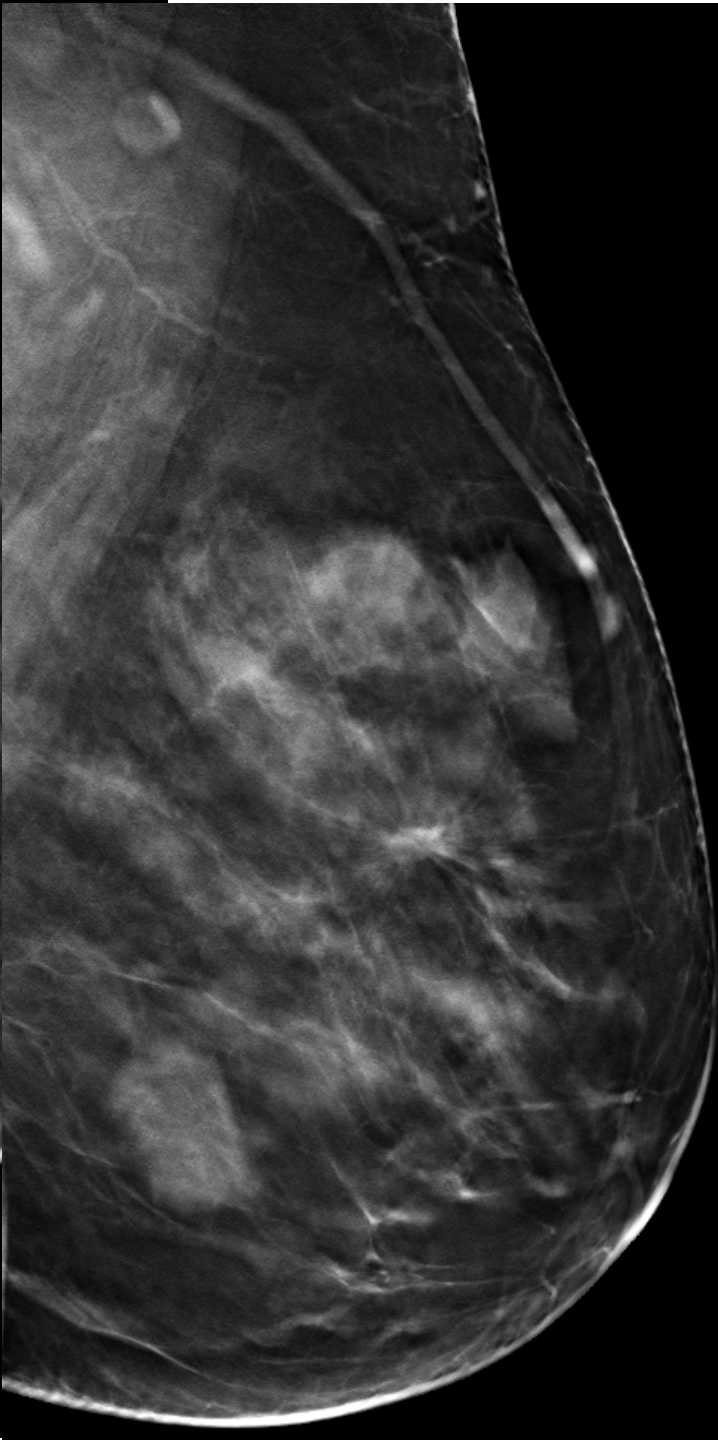
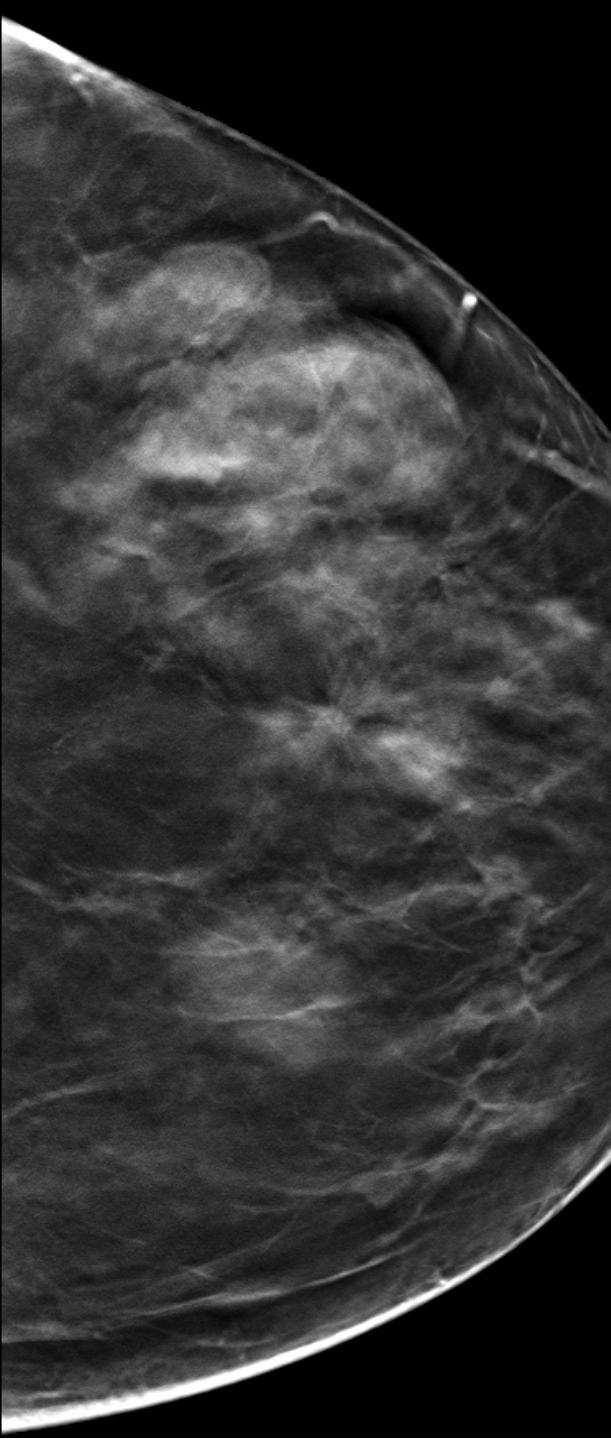
















Grazie per l'attenzione !