

Supplementary Table S1:

Characteristic		Casting-type calcification			P-value (χ^2)	Cramer's V
		Absent (N=269)	Non- Predominant (N=75)	Predominant (N=83)		
		(N, Residual)	(N, Residual)	(N, Residual)		
Tumor grade	G1	33,1.5	7,-0.4	5,-1.5	0.153	—
	G2	162,1.2	41,-0.7	45,-0.8		
	G3	74,-2.3	27,0.9	33,1.8		
Tumor size	T1	127,1	37,0.7	30,-1.9	0.216	—
	T2	126,-0.6	35,-0.3	44,1		
	T3	16,-0.7	3,-1	9,1.8		
Axillary node metastasis	N0	150,1.9	39,0	34,-2.3	0.13	—
	N1	69,-0.8	17,-0.9	29,1.8		
	N2+	50,-1.5	19,1.1	20,0.8		
ER	Negative	69,-2.8	23,0	38,3.4	0.002	0.169
	Positive	200,2.8	52,0	45,-3.4		
	P [#]	P ^a =0.385	P ^b =0.051	P ^c < 0.001*		
PR	Negative	92,-4.5	31,-0.2	58,5.6	< 0.001	0.278
	Positive	177,4.5	44,0.2	25,-5.6		
	P [#]	P ^a =0.254	P ^b < 0.001*	P ^c < 0.001*		
Ki67	Ki67 < 20%	71,4	10,-2.1	10,-2.8	< 0.001	0.24
	Ki67 > 30%	99,-4	40,2.1	47,2.8		
	P [#]	P ^a =0.005*	P ^b =0.745	P ^c =0.001*		
HER2	Negative	174,6.1	33,-1.6	18,-6	< 0.001	0.338
	Positive	80,-6.1	35,1.6	53,6.0		
	P [#]	P ^a =0.002*	P ^b =0.005*	P ^c < 0.001*		
AJCC Stage	Stage I	115,0.8	35,1.1	26,-2	0.201	—
	Stage II	105,0.3	24,-1.3	35,0.8		
	Stage III	49,-1.4	16,0.2	22,1.5		

"P[#]" represents P-values for pairwise comparisons: "P^a" for absent group vs. non-predominant group, "P^b" for non-predominant group vs. predominant group, "P^c" for absent group vs. predominant group. After Bonferroni correction for multiple comparisons, the significance level was adjusted to 0.0167. Groups marked with an asterisk (*) indicate pairwise comparisons where the original P-value reached this level of significance.

Considering that our patients had completed standardized anti-tumor therapy, we used the 8th edition of the AJCC Cancer Staging Manual as the tumor staging basis for all patients. In this study, patients with undetermined HER-2 status were not administered anti-HER-2 therapy. Discrepancies between the 8th edition AJCC staging and anatomical staging defer to the latter.

Supplementary Table S2a:

Univariate analysis	5-year RFS rate		5-year OS rate	
	HR (95%CI)	P	HR (95%CI)	P
Age				
< 40	Reference			
40-65	1.2(0.47-3.07)	0.701	3.51(0.47-26.12)	0.221
> 65	1.85(0.56-6.05)	0.311	5.98(0.67-53.46)	0.11
Tumor grade				
G1-2	Reference			
G3	2.68(1.50-4.78)	0.001	2.37(1.08-5.20)	0.031
Tumor size				
T1	Reference			
T2	2.41(1.19-4.90)	0.015	3.76(1.24-11.43)	0.019
T3	7.9(3.35-18.63)	< 0.001	14.04(4.10-48.03)	< 0.001
Axillary node metastasis,				
N0	Reference			
N1	1.43(0.58-3.58)	0.434	6.68(1.39-32.13)	0.018
N2	5.35(2.35-12.12)	< 0.001	11.07(2.15-57.04)	0.004
N3	12.63(5.78-27.60)	< 0.001	41.32(9.15-186.70)	< 0.001
ER				
Positive	Reference			
Negative	2.01(1.13-3.58)	0.018	2.32(1.06-5.09)	0.035
PR				
Positive	Reference			
Negative	1.63(0.91-2.92)	0.097	2.39(1.06-5.40)	0.037
HER2				
Negative	Reference			
Positive	2.18(1.19-3.99)	0.012	2.73(1.17-6.37)	0.021
Indeterminate	0.73(0.17-3.16)	0.673	0.78(0.10-6.27)	0.818
Mass				
Absent	Reference			
Present	1.30(0.64-2.61)	0.47	1.87(0.64-5.45)	0.251
Casting-type calcification model1				
Absent	Reference			
Present	1.86(1.04-3.31)	0.036	2.99(1.34-6.65)	0.007
Casting-type calcification model2				
Absent	Reference			
Non-Predominant	2.00(0.96-4.19)	0.065	3.76(1.48-9.53)	0.005
Predominant	1.75(0.88-3.50)	0.113	2.42(0.92-6.36)	0.073

Supplementary Table S2b:

Multivariate analysis	5-year RFS rate		5-year OS rate	
	HR (95%CI)	P	HR (95%CI)	P
Tumor grade				
G1-2	Reference			
G3	1.60(0.83-3.09)	0.161	1(0.40-2.51)	1
Tumor size				
T1	Reference			
T2	1.50(0.72-3.13)	0.281	2.08(0.67-6.44)	0.203
T3	4.98(1.98-12.54)	0.001	4.66(1.26-17.32)	0.021
Axillary node metastasis,				
N0	Reference			
N1	0.88(0.34-2.29)	0.796	3.68(0.72-18.74)	0.116
N2	3.21(1.35-7.64)	0.009	5.47(1.01-29.56)	0.048
N3	7.89(3.44-18.06)	< 0.001	25.92(5.27-127.44)	< 0.001
ER				
Positive	Reference			
Negative	1.63(0.86-3.06)	0.133	1.92(0.81-4.54)	0.136
HER2				
Negative	Reference			
Positive	1.16(0.56-2.40)	0.694	1.32(0.48-3.62)	0.593
Indeterminate	0.61(0.14-2.71)	0.519	0.79(0.10-6.59)	0.828
Casting-type calcification model1				
Absent	Reference			
Present	1.30(0.71-2.40)	0.400	2.32(0.96-5.57)	0.061

Supplementary Table S2c:

Multivariate analysis	5-year RFS rate		5-year OS rate	
	HR (95%CI)	P	HR (95%CI)	P
Tumor grade				
G1-2	Reference			
G3	1.55(0.80-3.00)	0.191	0.86(0.33-2.23)	0.756
Tumor size				
T1	Reference			
T2	1.53(0.73-3.21)	0.256	2.23(0.71-6.98)	0.168
T3	5.23(2.08-13.13)	< 0.001	4.81(1.32-17.57)	0.017
Axillary node metastasis,				
N0	Reference			
N1	0.90(0.35-2.34)	0.833	4.05(0.80-20.61)	0.092
N2	3.31(1.39-7.88)	0.007	5.77(1.07-31.09)	0.041
N3	8.04(3.49-18.53)	< 0.001	27.35(5.46-137.34)	< 0.001
ER				
Positive	Reference			
Negative	1.70(0.90-3.21)	0.103	2.15(0.90-5.11)	0.084
HER2				
Negative	Reference			
Positive	1.18(0.58-2.43)	0.645	1.42(0.53-3.77)	0.488
Indeterminate	0.67(0.15-2.96)	0.594	0.94(0.11-7.83)	0.954
Casting-type calcification model2				
Absent	Reference			
Non-Predominant	1.73(0.81-3.69)	0.159	3.69(1.33-10.21)	0.012
Predominant	1.06(0.51-2.20)	0.884	1.62(0.57-4.58)	0.366

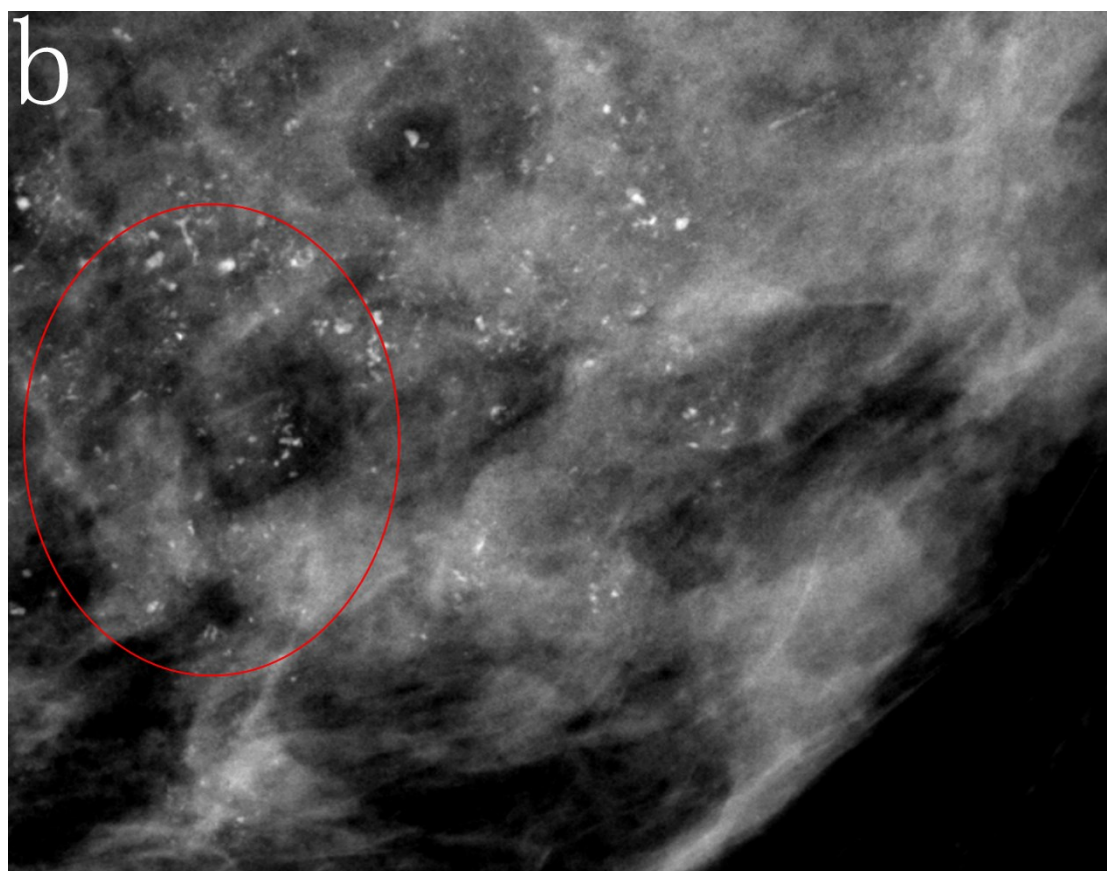
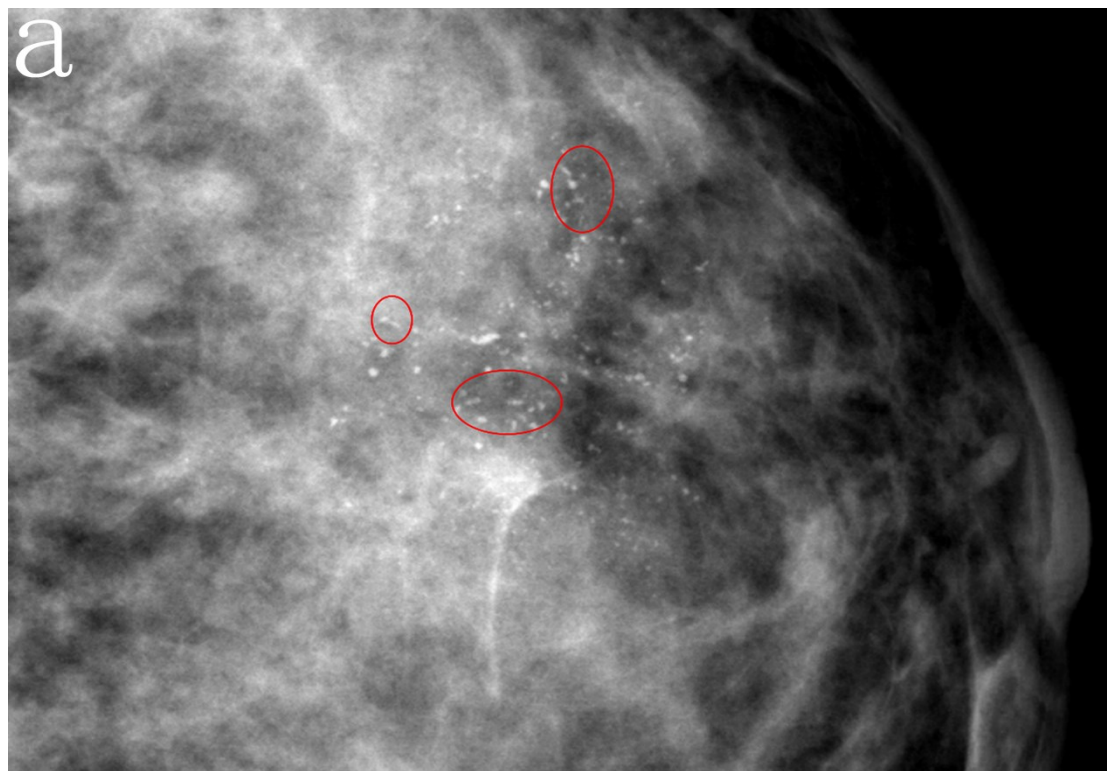
Table S2: Single-factor COX analysis (**Table S2a**) and multi-factor COX analysis (**Table S2b**、**S2c**) of the 5-year RFS rate and OS rate. HR, hazard ratio.

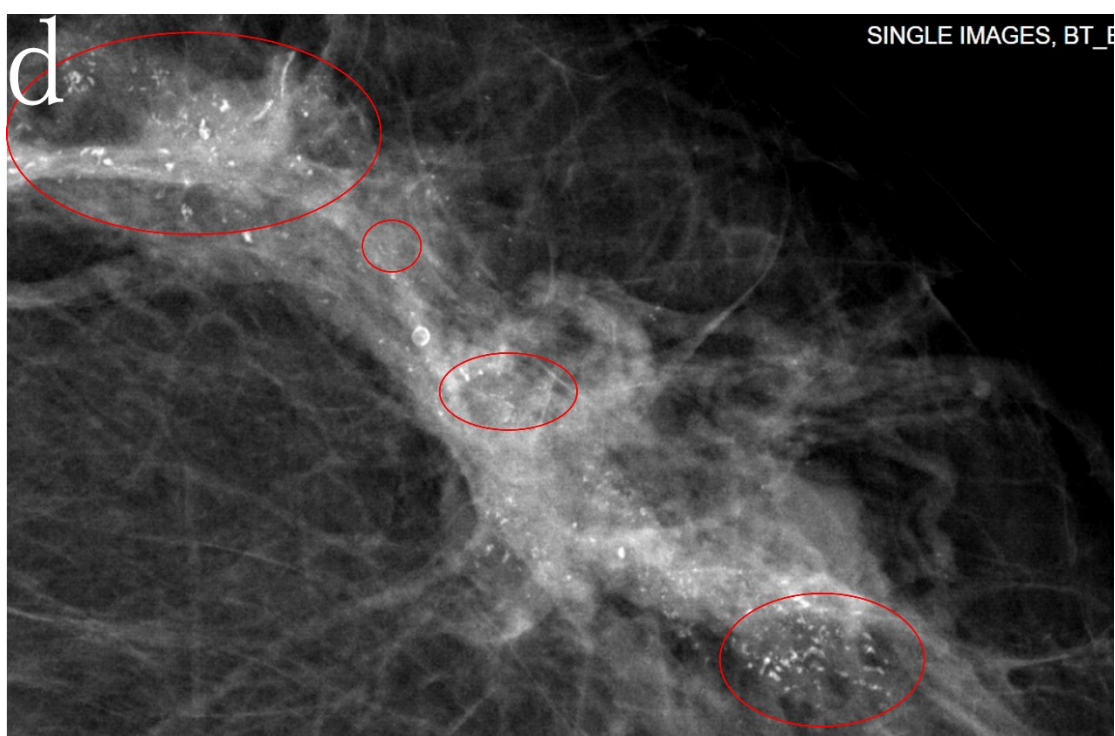
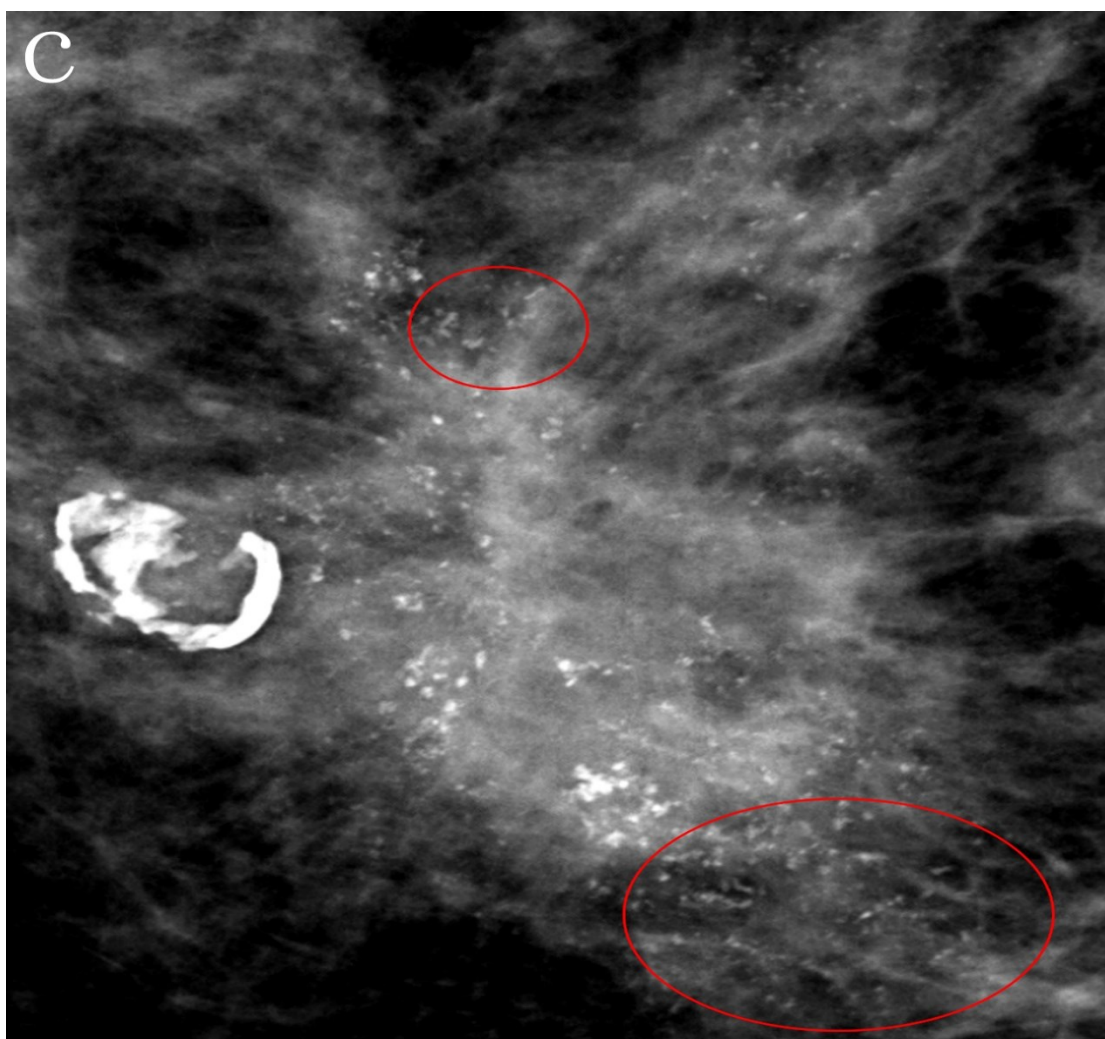
Supplementary Table S3:

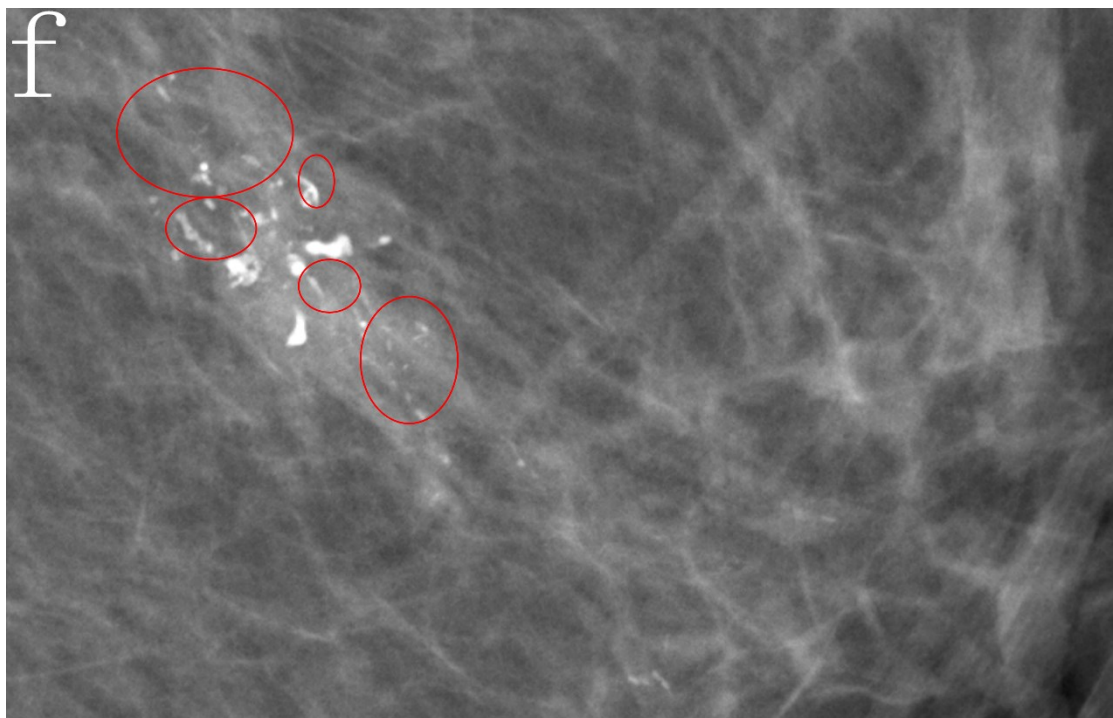
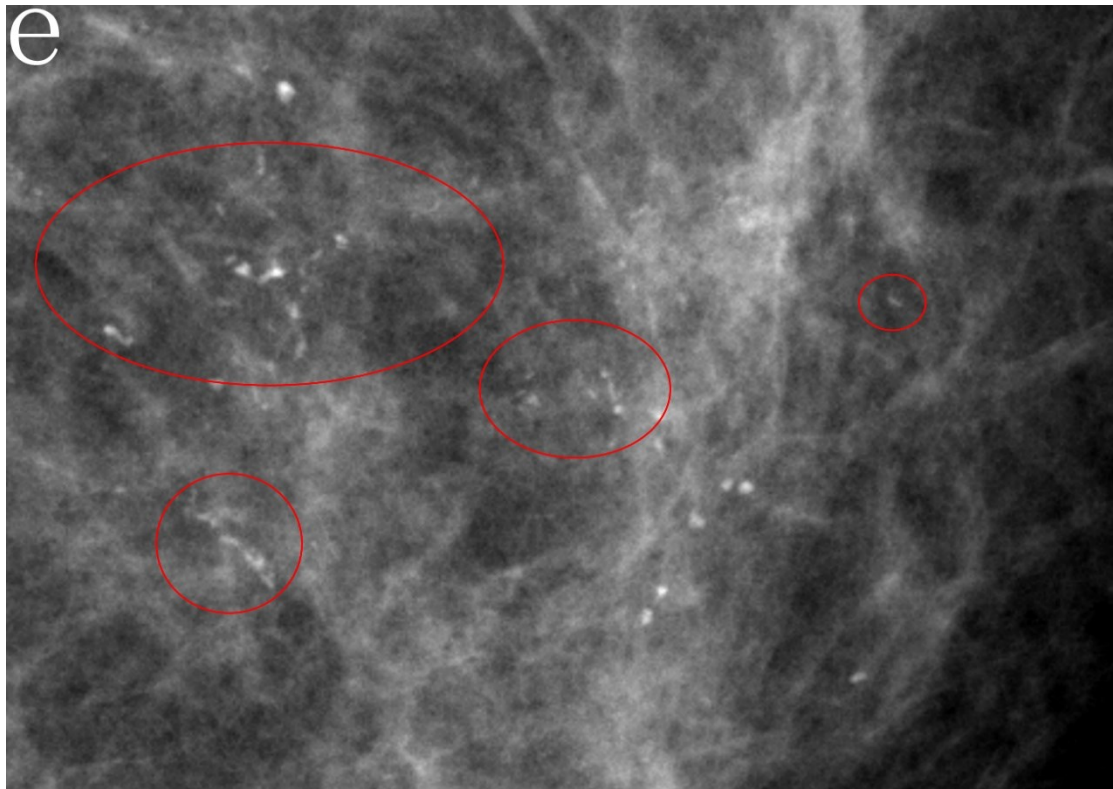
Subgroup		5-year RFS			5-year OS		
		Non-CC %	CC %	P-value	Non-CC %	CC %	P-value
Tumor grade	I	94.7	100	0.544	100	100	/
	II	91.5	76.5	0.006	98.3	78	< 0.001
	III	71.4	73.7	0.769	81.8	89.2	0.344
Tumor size	T1	93.4	86.8	0.21	98.9	92.1	0.043
	T2	85.1	73.5	0.107	92.3	83	0.114
	T3	50	55.6	0.741	71.6	55.6	0.516
Axillary node	Negative	92.3	92.7	0.959	99	97.4	0.487
	Positive	79.9	65.5	0.067	88.6	74.5	0.039
ER	Negative	76.8	75	0.855	87	84.1	0.747
	Positive	90.4	78.8	0.03	97	84	0.001
PR	Negative	81.1	77.6	0.674	87.1	86.2	0.937
	Positive	90	76.3	0.023	98.3	80.6	< 0.001
HER2	Negative	88.7	86.2	0.684	95.6	89.3	0.181
	Positive	84.2	67.3	0.037	92.6	77.8	0.033

Table S3: Subgroup analysis for 5-year outcome differences between patients with and without CC. The bold text indicates statistical significance (P<0.05).

Supplementary FigS1: Six images selected following deliberation on controversial categorization.







Supplementary FigS1: Six contentious radiographic images were classified after discussion, with the extent of calcification circumscribed (indicated by red circles) as follows: Cases where the calcified area covered less than three-quarters of the total calcification were categorized as the CC-non-predominant group (Figures **a-c**); those where calcification extended to at least three-quarters were assigned to the CC-predominant group (Figures **d-f**).