Supplementary Table 1 Clinicopathological characteristics of the training set and the validation set in TNBC

Clinicopathological characteristics	Total (n=243)	Training set n (%)	Validation set n (%)	χ^2	*p* value
Age(years)				0.057	0.889
≤50	117	81 (47.6)	36 (49.3)		
>50	126	89 (52.4)	37 (50.7)		
Location of tumor				2.259	0.133
Left breast	131	97 (57.1)	34 (46.6)		
Right breast	112	73 (42.9)	39 (53.4)		
Surgery				2.346	0.138
Mastectomy	223	153 (90.0)	70 (95.9)		
Breast-conserving	20	17 (10.0)	3 (4.1)		
Menstrual status				0.016	1.000
Premenopausal	118	83 (48.8)	35 (47.9)		
Postmenopausal	125	87 (51.2)	38 (52.1)		
Pregnancies number				0.273	0.872
0	5	4 (2.4)	1 (1.4)		
1, 2, 3	190	133 (78.2)	57 (78.1)		
≥4	48	33 (19.4)	15 (20.5)		
cT				6.661	0.084
T1	27	23 (13.5)	4 (5.5)		
T2	155	111 (65.4)	44 (60.2)		
T3	51	30 (17.6)	21 (28.8)		
T4	10	6 (3.5)	4 (5.5)		
cN				5.418	0.067
N1	97	76 (44.7)	21 (28.8)		
N2	91	52 (30.6)	39 (53.4)		
N3	55	42 (24.7)	13 (17.8)		
Histological type				0.048	1.000
IDC	234	164 (96.5)	70 (95.9)		
Others	9	6 (3.5)	3 (4.1)		
Histological grade				0.045	0.889
I-II	114	79 (46.5)	35 (47.9)		
III	129	91 (53.5)	38 (52.1)		
TILs				0.051	0.883
<10%	159	112 (65.9)	47 (64.4)		
≥10%	84	58 (34.1)	26 (35.6)		
HER2 status				0.046	0.888
IHC 0	104	72 (42.4)	32 (43.8)		
IHC 1+/ 2+FISH-	139	98 (57.6)	41 (56.2)		
Ki-67 expression				0.923	0.458
<20%	9	5 (2.9)	4 (5.5)		
≥20%	234	165 (97.1)	69 (94.5)		
p53 expression				0.533	0.479
Negative	98	66 (38.8)	32 (43.8)		
Positive	145	104 (61.2)	41 (56.2)		
CK5/6 expression				0.464	0.564
Negative	92	62 (36.5)	30 (41.1)		
Positive	151	108 (63.5)	43 (58.9)		
EGFR exprssion				0.017	1.000
Negative	31	22 (12.9)	9 (12.3)		
Positive	212	148 (87.1)	64 (87.7)		
AR expression				3.511	0.083
Negative	151	113 (66.5)	38 (52.1)		
Positive	92	57 (33.5)	35 (47.9)		
Lymphovascular invasion				0.023	1.000
No	224	157 (92.4)	67 (91.8)		
Yes	19	13 (7.6)	6 (8.2)		
Breast pCR				0.125	0.757
pCR	67	48 (28.2)	19 (26.0)		
non-pCR	176	122 (71.8)	54 (74.0)		
Axillary lynph node status				1.364	0.262
ypN0	107	79 (46.5)	28 (38.4)		
ypN+	136	91 (53.5)	45 (61.6)		
NAT regimen				0.259	0.897
TA	179	124 (72.9)	55 (75.3)		
TA→TP	37	26 (15.3)	11 (15.1)		
TP	27	20 (11.8)	7 (9.6)		
NAT cycles				0.285	0.719
4	45	30 (17.6)	15 (20.5)		
>4	198	140 (82.4)	58 (79.5)		

Supplementary Table 2 Ultrasonographic characteristics of the training set and the validation set in TNBC pre- and post- NAT

Ultrasonographic characteristics	Total (n=243)	Training set n (%)	Validation set n (%)	t/χ^2/Z	*p* value
Maximum tumor diameter (mm)					
Before NAT		34 (11, 131)	40 (10, 121)	1.682	0.089
After NAT		20 (0, 92)	22 (0, 100)	-1.585	0.113
Tumor remission rate(%, mean±SD)		38.46±28.87	36.33±24.27	0.553	0.581
RECIST					
CR	11	10 (5.9)	1 (1.4)	3.955	0.266
PR	141	98 (57.6)	43 (58.9)		
SD	88	59 (34.7)	29 (39.7)		
PD	3	3 (1.8)	0		
Peritumoral echogenicity pre-NAT				0.873	1.000
Enhancement	211	148 (87.1)	63 (86.3)		
Unremarkable	32	22 (12.9)	10 (13.7)		
Peritumoral echogenicity post-NAT				1.051	0.343
Enhancement	179	122 (71.8)	57 (78.1)		
Unremarkable	64	48 (28.2)	16 (21.9)		
Peritumoral echogenicity changes				1.229	0.327
Unchanged	207	142 (83.5)	65 (89.0)		
Changed	36	28 (16.5)	8 (11.0)		
Posterior echogenicity pre-NAT				1.763	0.414
Unremarkable	86	56 (32.9)	30 (41.1)		
Attenuation	147	106 (62.4)	41 (56.2)		
Enhancement	10	8 (4.7)	2 (2.7)		
Posterior echogenicity post-NAT				1.552	0.460
Unremarkable	159	107 (62.9)	52 (71.2)		
Attenuation	8	60 (35.3)	20 (27.4)		
Enhancement	4	3 (1.8)	1 (1.4)		
Posterior echogenicity changes				0.005	1.000
Unchanged	169	118 (69.4)	51 (69.9)		
Changed	74	52 (30.6)	22 (30.1)		
Tumor CDFI signal pre-NAT				0.124	0.940
Prominent and hypervascular	183	127 (74.7)	56 (76.7)		
Dot-linear	36	26 (15.3)	10 (13.7)		
Not observed	24	17 (10.0)	7 (9.6)		
Tumor CDFI signal post-NAT				2.028	0.363
Prominent and hypervascular	101	66 (38.8)	35 (47.9)		
Dot-linear	40	28 (16.5)	12 (16.5)		
Not observed	102	76 (44.7)	26 (35.6)		
Tumor CDFI signal changes				2.442	0.295
Unchanged	128	84 (49.4)	44 (60.3)		
Reduced	104	78 (45.9)	26 (35.6)		
Increased	11	8 (4.7)	3 (4.1)		
Minimal transverse diameter of lymph node (mm)					
Pre-NAT		12 (3, 40)	13 (4, 34)	-1.185	0.236
Post-NAT		6 (0, 27)	7 (0,25)	-0.819	0.413
Lymph node remission rate (%，mean±SD)		42.89±28.35	44.62±27.01	-0.443	0.658
Lymph node CDFI signal before NAT				1.195	0.550
Prominent and hypervascular	121	82 (48.2)	39 (53.4)		
Dot-linear	23	15 (8.9)	8 (11.0)		
Not observed	99	73 (42.9)	26 (35.6)		
Lymph node CDFI signal post-NAT				0.316	0.854
Prominent and hypervascular	70	48 (28.2)	22 (30.1)		
Dot-linear	27	18 (10.6)	9 (12.3)		
Not observed	146	104 (61.2)	42 (57.6)		
Lymph node CDFI signal changes				0.367	0.832
Unchanged	168	118 (69.4)	50 (68.5)		
Reduced	66	45 (26.5)	21 (28.8)		
Increased	9	7 (4.1)	2 (2.7)		
Hyperechoic medulla visible post-NAT				0.500	0.524
No	233	162 (95.3)	71 (97.3)		
Yes	10	8 (4.7)	2 (2.7)		

Supplementary Table 3 Univariate analysis of clinicopathological characteristics influencing the achievement of ypN0 status in TNBC in training set

Clinicopathological characteristics	Total (n=170)	ypN0 n (%)	ypN+ n (%)	χ^2	*p* value
Age(years)				0.175	0.758
≤50	81	39 (49.4)	42 (46.2)		
>50	89	40 (50.6)	49 (53.8)		
Location of tumor				0.825	0.438
Left breast	97	48 (60.8)	49 (53.8)		
Right breast	73	31 (39.2)	42 (46.2)		
Surgery				0.003	1.000
Mastectomy	153	71 (89.9)	82 (90.1)		
Breast-conserving	17	8 (10.1)	9 (9.9)		
Menstrual status				0.017	1.000
Premenopausal	83	39 (49.4)	44 (48.4)		
Postmenopausal	87	40 (50.6)	47 (51.6)		
Pregnancies number				0.456	0.796
0	4	2 (2.5)	2 (2.2)		
1, 2, 3	133	60 (75.9)	73 (80.2)		
≥4	33	17 (21.5)	16 (17.6)		
cT				5.291	0.152
T1	23	14 (17.7)	9 (9.9)		
T2	111	53 (67.1)	58 (63.7)		
T3	30	11 (13.9)	19 (20.9)		
T4	6	1 (1.3)	5 (5.5)		
cN				15.390	< 0.001
N1	76	48 (60.8)	28 (30.8)		
N2	52	17 (21.5)	35 (38.4)		
N3	42	14 (17.7)	28 (30.8)		
Histological type				2.221	0.217
IDC	164	78 (98.7)	86 (94.5)		
Others	6	1 (1.3)	5 (5.5)		
Histological grade				8.966	0.003
I-II	79	27 (34.2)	52 (57.1)		
III	91	52 (65.8)	39 (42.9)		
TILs				0.977	0.336
<10%	112	49 (62.0)	63 (69.2)		
≥10%	58	30 (38.0)	28 (30.8)		
HER2 status				1.159	0.351
IHC 0	72	30 (38.0)	42 (46.2)		
IHC 1+/2+FISH-	98	49 (62.0)	49 (53.8)		
Ki-67 expression				0.087	1.000
<20%	5	2 (2.5)	3 (3.3)		
≥20%	165	77 (97.5)	88 (96.7)		
p53 expression				4.430	0.041
Negative	66	24 (30.4)	42 (46.2)		
Positive	104	55 (69.6)	49 (53.8)		
CK5/6 expression				1.483	0.264
Negative	62	25 (31.6)	37 (40.7)		
Positive	108	54 (68.4)	54 (59.3)		
EGFR exprssion				0.127	0.820
Negative	22	11 (13.9)	11 (12.1)		
Positive	148	68 (86.1)	80 (87.9)		
AR expression				1.291	0.329
Negative	113	56 (70.9)	57 (62.6)		
Positive	57	23 (29.1)	34 (37.4)		
Lymphovascular invasion				5.468	0.022
No	157	77 (97.5)	80 (87.9)		
Yes	13	2 (2.5)	11 (12.1)		
Breast pCR				36.537	< 0.001
pCR	48	40 (50.6)	8 (8.8)		
non-pCR	122	39 (49.4)	83 (91.2)		
NAT regimen				12.390	0.002
TA	124	60 (75.9)	64 (70.3)		
TA→TP	26	5 (6.3)	21 (23.1)		
TP	20	14 (17.7)	6 (6.6)		
NAT cycles				7.840	0.008
4	30	7 (8.9)	23 (25.3)		
>4	140	72 (91.1)	68 (74.7)		

Supplementary Table 4 Univariate analysis of ultrasonographic characteristics influencing the achievement of ypN0 status in TNBC in training set

Ultrasonographic characteristics	Total (n=170)	Training set n (%)	Validation set n (%)	t/χ^2/Z	*p* value
Maximum tumor diameter (mm)					
Before NAT		34 (11, 131)	40 (10, 121)	-1.855	0.064
After NAT		20 (0, 92)	22 (0, 100)	-3.392	< 0.001
Tumor remission rate(%, mean±SD)		42.86±29.64	30.86±26.04	3.831	< 0.001
RECIST				18.990	< 0.001
CR	10	9 (11.4)	1 (1.1)		
PR	98	53 (67.1)	45 (49.4)		
SD	59	16 (20.2)	43 (47.3)		
PD	3	1 (1.3)	2 (2.2)		
Peritumoral echogenicity pre-NAT				2.993	0.109
Enhancement	148	65 (82.3)	83 (91.2)		
Unremarkable	22	14 (17.7)	8 (8.8)		
Peritumoral echogenicity post-NAT				8.821	0.004
Enhancement	122	48 (60.8)	74 (81.3)		
Unremarkable	48	31 (39.2)	17 (18.7)		
Peritumoral echogenicity changes				6.164	0.021
Unchanged	142	60 (75.9)	82 (90.1)		
Changed	28	19 (24.1)	9 (9.9)		
Posterior echogenicity pre-NAT				2.867	0.239
Unremarkable	56	31 (39.2)	25 (27.5)		
Attenuation	106	44 (55.7)	62 (68.1)		
Enhancement	8	4 (5.1)	4 (4.4)		
Posterior echogenicity post-NAT				5.371	0.068
Unremarkable	107	57 (72.2)	50 (54.9)		
Attenuation	60	21 (26.5)	39 (42.9)		
Enhancement	3	1 (1.3)	2 (2.2)		
Posterior echogenicity changes				0.895	0.405
Unchanged	118	52 (65.8)	66 (72.5)		
Changed	52	27 (34.2)	25 (27.5)		
Tumor CDFI signal pre-NAT				2.163	0.339
Prominent and hypervascular	127	63 (79.7)	64 (70.3)		
Dot-linear	26	9 (11.4)	17 (18.7)		
Not observed	17	7 (8.9)	10 (11.0)		
Tumor CDFI signal post-NAT				6.017	0.049
Prominent and hypervascular	66	24 (30.4)	42 (46.2)		
Dot-linear	28	12 (15.2)	16 (17.6)		
Not observed	76	43 (54.4)	33 (36.2)		
Tumor CDFI signal changes				6.324	0.042
Unchanged	84	33 (41.8)	51 (56.0)		
Reduced	78	44 (55.7)	34 (37.4)		
Increased	8	2 (2.5)	6 (6.6)		
Minimal transverse diameter of node (mm)					
Pre-NAT		10 (3, 40)	13 (5, 36)	-3.375	0.001
Post-NAT		5 (0, 14)	8 (0, 27)	-5.763	< 0.001
Lymph node remission rate (%，mean±SD)		50.31±25.54	36.43±29.21	3.274	0.001
Lymph node CDFI signal pre-NAT				2.933	0.231
Prominent and hypervascular	82	35 (44.3)	47 (51.6)		
Dot-linear	15	10 (12.7)	5 (5.5)		
Not observed	73	34 (43.0)	39 (42.9)		
Lymph CDFI signal post-NAT				22.532	< 0.001
Prominent and hypervascular	48	9 (11.4)	39 (42.9)		
Dot-linear	18	13 (16.5)	5 (5.5)		
Not observed	104	57 (72.2)	47 (51.6)		
Lymph node CDFI signal changes				10.372	0.006
Unchanged	118	47 (59.5)	71 (78.0)		
Reduced	45	30 (38.0)	15 (16.5)		
Increased	7	2 (2.5)	5 (5.5)		
Hyperechoic medulla visible post-NAT				0.867	0.474
No	162	74 (93.7)	88 (96.7)		
Yes	8	5 (6.3)	3 (3.3)		