

Research Article

Validation of a Nomogram Predicting Non-Sentinel Lymph Node Metastases among Patients with Breast Cancer after Primary Systemic Therapy – a transSENTINA Substudy

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Suppl. table 1. Development of the SENTINA nomograms

Variable	Univariate p-value	Model of the SENTINA Nomogram		
		p-value	Odds ratio	95%-CI of OR
SENTINA nomogram				
Age (x vs. x-1 years)	0.55			
Diameter largest lymph node (x vs x-1 mm)	< 0.01*	<0.01	1.19	1.05-1.35
ER positive (yes/no)	<0.01*	0.15		
Extracapsular extension (yes/no)	0.14*	0.80		
Grading (I,II, III)	0.06*	0.27		
Lymph vascular invasion (yes/no)	0.11*	0.78		
Multifocality (yes/no)	0.22			
Tumor size (x vs. x-1 cm)	0.01*	0.09	1.31	0.96-1.78
Detection method (Routine, Serial, IHC)	0.23			
Number of resected sentinel lymph nodes (x vs x-1 SLN)	0.52			
Number of positive resected sentinel lymph nodes (x vs x-1 SLN)	<0.01*	0.08	2.04	0.91-4.58
Relative frequency of positive SLN (100% vs 0% positivity)	0.01*	0.24		
Model of the META nomogram				
MSKCC (x% vs. x-1% probability for +nonSLN)	0.03	<0.01	1.07	1.021-1.11
MDA (x vs. x-1 points)	0.43			
Tenon (x vs. x-1 points)	0.69			
Stanford (x% vs. x-1% probability for +nonSLN)	0.24			
Cambridge (x% vs. x-1% probability for +nonSLN)	0.73			
Mayo (x% vs. x-1% probability for +nonSLN)	0.14	0.06	1.02	1.00-1.03

* Included into the multivariable model (Full Model) and the variable selection for final model

(SENTINA nomogram). SENTINA model linear predictor: $-2.7541 + 0.1777 \times \text{Diameter largest}$

lymph node + 0.2695 x tumor size + 0.7147 x Number of positive resected SLN.

** after Backward-likelihood ratio variable selection.

Suppl. table 2. Patient characteristics of the validation cohort

Parameter N (%) or mean (SD)	All patients (Arm C)	Non-SLN negative patients	Non-SLN positive patients	p-value*
N	168 (100%)	98(58.3%)	70 (41.7%)	
Median age (years)	51.0	50.0	52.3	0.26
Median diameter of the largest SLN (cm)	4.8	2.3	8.2	<0.01
ER positive (yes vs. no)	110 (65.5%)	53 (54.1%)	54 (81.4%)	0.02
Extracapsular extension (yes vs. no)	23 (13.7%)	6 (5.4%)	17 (27.2%)	<0.01
Grading (I,II, III)				<0.01 †
I	7 (4.5%)	2 (2.3%)	5 (7.6%)	
II	84 (54.2%)	40 (44.9%)	44 (66.7%)	
III	64 (41.3%)	47 (52.8%)	17 (25.8%)	
Lymph vascular invasion (yes vs. no)	52 (31.90%)	19 (19.79%)	33 (49.3%)	<0.01
Multifocality (yes vs. no)	51 (30.36%)	21 (21.43%)	30 (42.9%)	<0.01
Median tumor size (cm)	2.3	1.8	3.0	<0.01
Pathological detection method				0.20 †
Routine	5 (3.0%)	1 (1.0%)	4 (5.7%)	
Serial	113 (67.3%)	69 (70.4%)	44 (68.9%)	
IHC	50 (29.8%)	28 (28.6%)	22 (31.4%)	
Number of resected sentinel lymph nodes				0.75 †

1-2	103 (61.3%)	61 (62.2%)	42 (60.0%)	
3-4	42 (25.0%)	22 (22.5%)	20 (28.6%)	
>4	23 (13.7%)	15 (15.3%)	8 (11.4%)	
Number of positive resected sentinel lymph nodes				<0.0001 †
0	73 (43.5%)	54 (55.1%)	19 (27.1%)	
1-2	82 (48.8%)	42 (45.9%)	40 (57.1%)	
3-4	10 (6.0%)	1 (1.0%)	9 (12.9%)	
>4	3 (1.8%)	1 (1.0%)	2 (2.9%)	
Relative frequency of positive SNLs (i.e. positive SNL/resected SNL)	0.4	0.3	0.6	<0.01

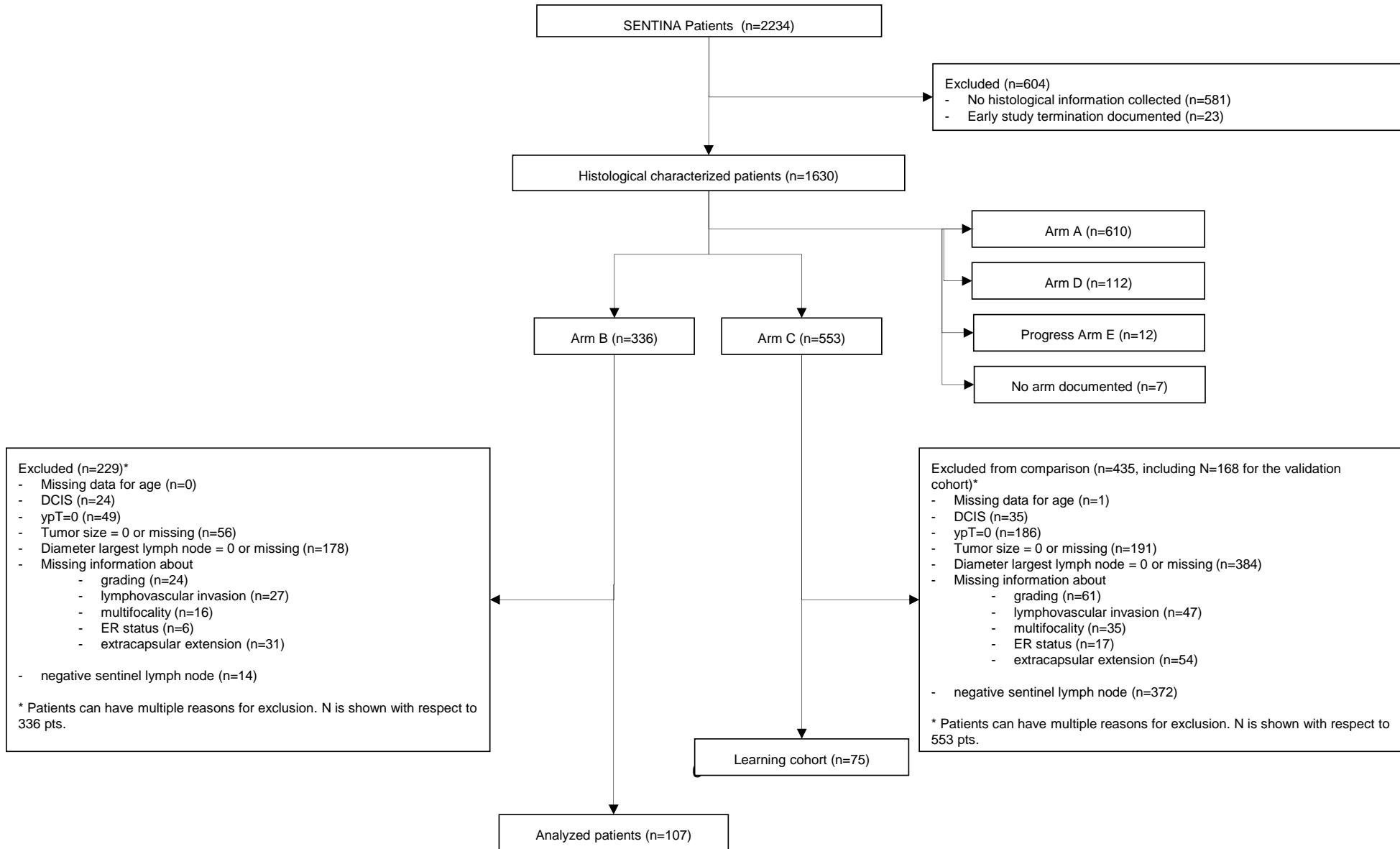
* Mann-Whitney-U tests or Chi-Squared test if not otherwise specified

† Fishers exact test

Suppl. table 3. Sensitivity and specificity of different cut-off values for the SENTINA nomogram (learning cohort, N=75)

Threshold	Sensitivity	Specificity	Youden's J
14.9%	100.0%	0.0%	< 0.001
15.6%	100.0%	2.9%	0.029
19.9%	100.0%	26.5%	0.265
30.4%	90.2%	44.1%	0.344
44.6%	78.1%	73.5%	0.516
45.0%	75.6%	73.5%	0.491
51.0%	68.3%	79.4%	0.477

Suppl. fig. 1. Consort diagram describing development of the patient population.



Suppl. fig. 2. Development of a reasonable cut-off value for the SENTINA nomogram with respect to sensitivity and specificity.

