

Supplementary

Table S1 Variable assignment

Factors	Assignment
Age (years)	<60 =1
	≥60 =2
Sex	Female =0
	Male =1
Race	Asian or Pacific Islander =1
	American Indian/Alaska Native =2
	Black =3
	White =4
Marital status	Single/unmarried =1
	Married =2
	Divorced/separated =3
	Widowed =4
Income (USD)	<40,000 =1
	40,000–79,999 =2
	80,000–119,999 =3
	≥120,000 =4
Time from diagnosis to treatment (days)	<30 =1
	30–59 =2
	≥60 =3
Surgery (primary site)	Yes =1
	No =0
Surgery (regional lymph node)	Yes =1
	No =0
Radiotherapy	Yes =1
	No/unknown =0
Chemotherapy	Yes =1
	No/unknown =0
Lymph node size (cm)	No lymph node metastasis =0
	<1 =1
	≥1 =2

Table S1 (continued)

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Factors	Assignment
Tumor size (mm)	<30 =1
	30–59 =2
	≥60 =3
Bone metastasis	Yes =1
	No =0
Brain metastasis	Yes =1
	No =0
Liver metastasis	Yes =1
	No =0
Lung metastasis	Yes =1
	No =0
Number of metastases	0=0
	1=1
	2=2
	3=3
T stage	4=4
	T0 =0
	T1 =1
	T2 =2
N stage	T3 =3
	T4 =4
	Tx =5
	N0 =0
N stage	N1 =1
	N2 =2
	N3 =3
	Nx =4

USD, US dollar; N, node; T, tumor.

Table S2 Baseline table of training set and testing set

Factors	Total (n=689)	Training set (n=482)	Testing set (n=207)	Statistic	P
Age (years)				$\chi^2=1.51$	0.219
<60	374 (54.28)	269 (55.81)	105 (50.72)		
≥60	315 (45.72)	213 (44.19)	102 (49.28)		
Sex				$\chi^2=1.05$	0.306
Female	157 (22.79)	115 (23.86)	42 (20.29)		
Male	532 (77.21)	367 (76.14)	165 (79.71)		
Race				$\chi^2=3.10$	0.376
Asian or Pacific Islander	287 (41.96)	210 (43.93)	77 (37.38)		
American Indian/Alaska Native	17 (2.49)	12 (2.51)	5 (2.43)		
Black	87 (12.72)	56 (11.72)	31 (15.05)		
White	293 (42.84)	200 (41.84)	93 (45.15)		
Marital status				$\chi^2=2.62$	0.453
Single/unmarried	187 (28.68)	132 (29.01)	55 (27.92)		
Married	359 (55.06)	255 (56.04)	104 (52.79)		
Divorced/separated	64 (9.82)	43 (9.45)	21 (10.66)		
Widowed	42 (6.44)	25 (5.49)	17 (8.63)		
Income (USD)				–	0.229
<40,000	7 (1.02)	3 (0.62)	4 (1.93)		
40,000–79,999	330 (47.90)	225 (46.68)	105 (50.72)		
80,000–119,999	293 (42.53)	209 (43.36)	84 (40.58)		
≥120,000	59 (8.56)	45 (9.34)	14 (6.76)		
Time from diagnosis to treatment (days)				$\chi^2=0.20$	0.906
<30	324 (56.06)	227 (55.77)	97 (56.73)		
30–59	167 (28.89)	117 (28.75)	50 (29.24)		
≥60	87 (15.05)	63 (15.48)	24 (14.04)		
Surgery (primary site)				$\chi^2=0.46$	0.499
No	658 (95.50)	462 (95.85)	196 (94.69)		
Yes	31 (4.50)	20 (4.15)	11 (5.31)		
Surgery (regional lymph node)				$\chi^2=0.01$	0.934
No	655 (95.07)	458 (95.02)	197 (95.17)		
Yes	34 (4.93)	24 (4.98)	10 (4.83)		
Radiotherapy				$\chi^2=0.42$	0.517
No/unknown	300 (43.54)	206 (42.74)	94 (45.41)		
Yes	389 (56.46)	276 (57.26)	113 (54.59)		

Table S2 (continued)

Table S2 (continued)

Factors	Total (n=689)	Training set (n=482)	Testing set (n=207)	Statistic	P
Chemotherapy				$\chi^2=0.50$	0.480
No/unknown	172 (24.96)	124 (25.73)	48 (23.19)		
Yes	517 (75.04)	358 (74.27)	159 (76.81)		
Lymph node size (cm)				$\chi^2=0.04$	0.978
No lymph node metastasis	84 (18.88)	60 (18.87)	24 (18.90)		
<1	338 (75.96)	242 (76.10)	96 (75.59)		
≥1	23 (5.17)	16 (5.03)	7 (5.51)		
Tumor size (mm)				$\chi^2=1.82$	0.402
<30	86 (22.45)	56 (21.21)	30 (25.21)		
30–59	219 (57.18)	157 (59.47)	62 (52.10)		
≥60	78 (20.37)	51 (19.32)	27 (22.69)		
Bone metastasis				$\chi^2=1.26$	0.262
No	332 (48.19)	239 (49.59)	93 (44.93)		
Yes	357 (51.81)	243 (50.41)	114 (55.07)		
Brain metastasis				$\chi^2=0.06$	0.810
No	635 (92.16)	445 (92.32)	190 (91.79)		
Yes	54 (7.84)	37 (7.68)	17 (8.21)		
Liver metastasis				$\chi^2=0.07$	0.785
No	491 (71.26)	342 (70.95)	149 (71.98)		
Yes	198 (28.74)	140 (29.05)	58 (28.02)		
Lung metastasis				$\chi^2=0.81$	0.369
No	459 (66.62)	316 (65.56)	143 (69.08)		
Yes	230 (33.38)	166 (34.44)	64 (30.92)		
Number of metastases				$\chi^2=3.95$	0.413
0	104 (15.09)	77 (15.98)	27 (13.04)		
1	382 (55.44)	262 (54.36)	120 (57.97)		
2	158 (22.93)	111 (23.03)	47 (22.71)		
3	39 (5.66)	26 (5.39)	13 (6.28)		
4	6 (0.87)	6 (1.24)	0 (0.00)		
N				$\chi^2=2.68$	0.613
N0	103 (14.95)	71 (14.73)	32 (15.46)		
N1	197 (28.59)	131 (27.18)	66 (31.88)		
N2	219 (31.79)	155 (32.16)	64 (30.92)		
N3	142 (20.61)	103 (21.37)	39 (18.84)		
Nx	28 (4.06)	22 (4.56)	6 (2.90)		

Table S2 (continued)

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Factors	Total (n=689)	Training set (n=482)	Testing set (n=207)	Statistic	P
T				$\chi^2=6.63$	0.250
T0	9 (1.31)	8 (1.66)	1 (0.48)		
T1	155 (22.50)	107 (22.20)	48 (23.19)		
T2	84 (12.19)	61 (12.66)	23 (11.11)		
T3	148 (21.48)	93 (19.29)	55 (26.57)		
T4	199 (28.88)	146 (30.29)	53 (25.60)		
Tx	94 (13.64)	67 (13.90)	27 (13.04)		

Data are presented as n (%). χ^2 : Chi-square test. USD, US dollar; N, node; T, tumor.

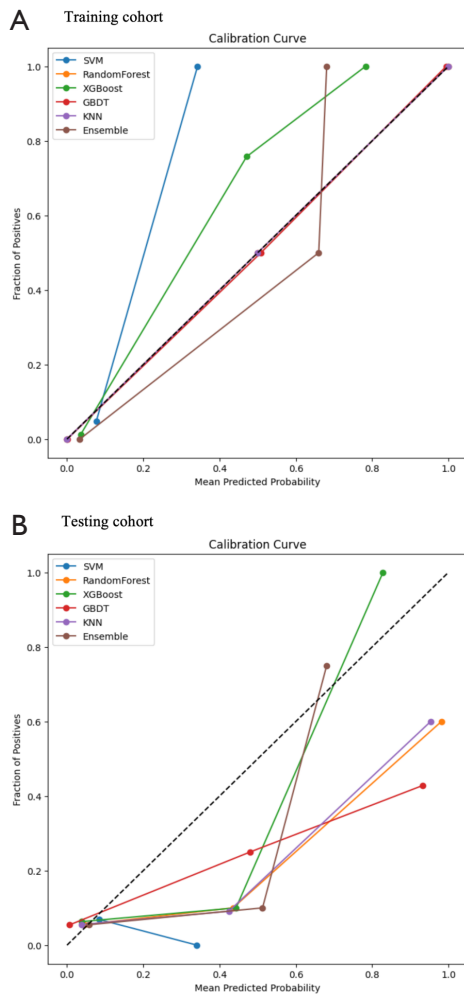


Figure S1 Different models' calibration curve on training and testing cohorts. GBDT, gradient boosting decision tree; KNN, k-nearest neighbor; SVM, support vector machine; XGBoost, extreme gradient boosting.

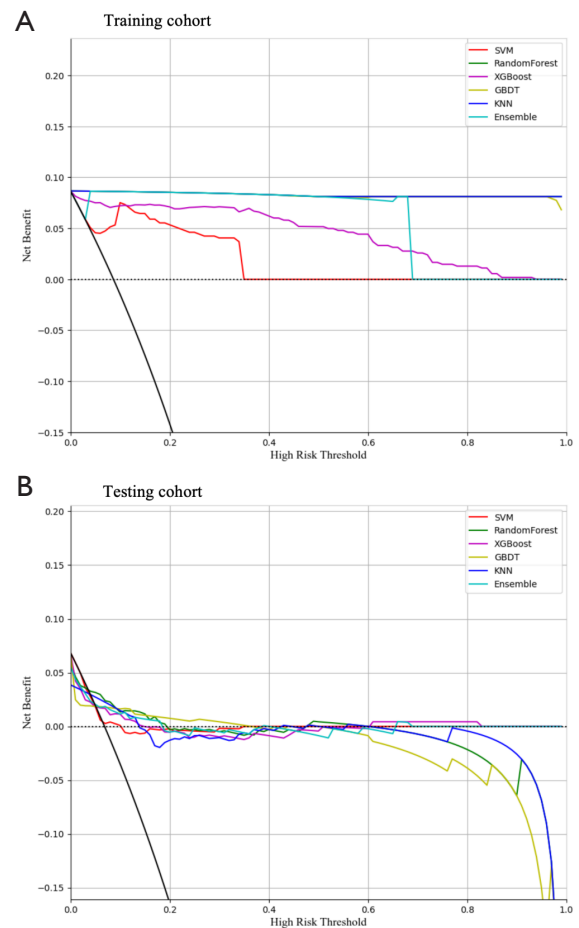


Figure S2 Different models' DCA on training and testing cohorts. DCA, decision curve analysis; GBDT, gradient boosting decision tree; KNN, k-nearest neighbor; SVM, support vector machine; XGBoost, extreme gradient boosting.