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SUPPLEMENTAL DATA

Conditional cancer-specific survival in breast cancer with de novo bone metastases: A SEER-based study

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Table S1. Multivariable Cox proportional hazards regression analysis of predictors for cancer-specific survival in the training cohort

Variables	β	S.E	Z	*p*	HR (95% CI)
Brain					
No					1.00 (Reference)
Yes	0.49	0.08	6.24	<0.001	1.63 (1.40 ~ 1.90)
Liver					
No					1.00 (Reference)
Yes	0.51	0.06	9.23	<0.001	1.67 (1.50 ~ 1.86)
Lung					
No					1.00 (Reference)
Yes	0.25	0.05	4.54	<0.001	1.28 (1.15 ~ 1.42)
Subtype					
HR-/HER2-					1.00 (Reference)
HR-/HER2+	-1.19	0.12	-10.34	<0.001	0.30 (0.24 ~ 0.38)
HR+/HER2-	-0.99	0.07	-13.51	<0.001	0.37 (0.32 ~ 0.43)
HR+/HER2+	-1.42	0.09	-15.52	<0.001	0.24 (0.20 ~ 0.29)
N stage					
N0					1.00 (Reference)
N1	0.01	0.06	0.25	0.804	1.01 (0.91 ~ 1.14)
N2	0.16	0.08	2.01	0.045	1.18 (1.01 ~ 1.38)
N3	0.22	0.07	2.93	0.003	1.25 (1.08 ~ 1.44)
Surgery					
No surgery					1.00 (Reference)
Surgery	-	0.05	-	<0.001	0.59 (0.53 ~ 0.65)

	0.54		10.26		
Age					
20-39					1.00 (Reference)
40-69	0.06	0.08	0.76	0.448	1.06 (0.91 ~ 1.25)
70+	0.38	0.09	4.14	<0.001	1.46 (1.22 ~ 1.74)

Abbreviations**:** CI, confidence interval; HER2, human epidermal growth factor receptor 2; HR, hazard ratio (regression results) or hormone receptor (molecular subtype); N stage, regional lymph node stage; S.E, standard error.

Table S2. Group-level calibration analysis of predicted versus observed survival at 1-, 3-, 5-, and 10-year horizons

Time point	Group	Training cohort (*n* = 2809)			Validation cohort (*n* = 1204)		
		n	Mean predicted probability	Kaplan–Meier estimate	*n*	Mean predicted probability	Kaplan–Meier estimate
1 year	1	563	0.623	0.563	261	0.640	0.615
	2	594	0.782	0.763	225	0.788	0.746
	3	557	0.835	0.867	298	0.838	0.861
	4	582	0.864	0.887	182	0.870	0.906
	5	513	0.909	0.945	238	0.908	0.937
3 years	1	563	0.242	0.227	261	0.265	0.276
	2	594	0.451	0.445	225	0.460	0.451
	3	557	0.557	0.566	298	0.563	0.561
	4	582	0.622	0.644	182	0.636	0.629
	5	513	0.733	0.765	238	0.731	0.795
5	1	563	0.091	0.122	261	0.106	0.170

years							
	2	594	0.241	0.226	225	0.250	0.242
	3	557	0.351	0.330	298	0.359	0.343
	4	582	0.428	0.435	182	0.446	0.355
	5	513	0.574	0.601	238	0.573	0.587
10 years	1	563	0.020	0.057	261	0.025	0.056
	2	594	0.086	0.112	225	0.091	0.102
	3	557	0.163	0.123	298	0.169	0.077
	4	582	0.231	0.211	182	0.247	0.201
	5	513	0.384	0.377	238	0.382	0.372

Table S3. Calibration metrics for the prediction model at different time points

Cohort	Time (months)	Calibration slope (95% CI)	Calibration intercept	O/E ratio	Brier score (IPCW)
Training	12	1.299 (1.162–1.437)	0.011	0.983	0.138
Validation	12	1.192 (0.985–1.399)	−0.009	0.975	0.137
Training	36	1.113 (0.994–1.231)	−0.011	0.974	0.213
Validation	36	1.214 (1.035–1.392)	−0.014	0.967	0.210
Training	60	0.958 (0.845–1.071)	−0.014	0.986	0.196
Validation	60	0.866 (0.698–1.034)	0.004	0.997	0.198
Training	120	0.946 (0.812–1.081)	0.024	0.994	0.125
Validation	120	1.222 (1.007–1.438)	0.153	1.022	0.111

Table S4. Cause-specific Cox model versus Fine–Gray competing-risk model

Variable	Cause-specific HR	*p*	Fine–Gray SHR	*p*
Age 40–69	1.065	0.441	0.992	0.905
Age 70+	1.462	<0.001	1.188	0.027
HR-/HER2+	0.298	<0.001	0.377	<0.001
HR+/HER2-	0.364	<0.001	0.482	<0.001
HR+/HER2+	0.237	<0.001	0.320	<0.001
Liver	1.680	<0.001	1.604	<0.001
Brain	1.646	<0.001	1.347	<0.001
Lung	1.283	<0.001	1.198	<0.001
Surgery	0.581	<0.001	0.663	<0.001
N1	1.014	0.811	1.053	0.320
N2	1.180	0.043	1.115	0.137
N3	1.248	0.003	1.312	<0.001

Abbreviations**:** HER2, human epidermal growth factor receptor 2; HR, hazard ratio (regression results) or hormone receptor (molecular subtype); N, regional lymph node stage; SHR, subdistribution hazard ratio.