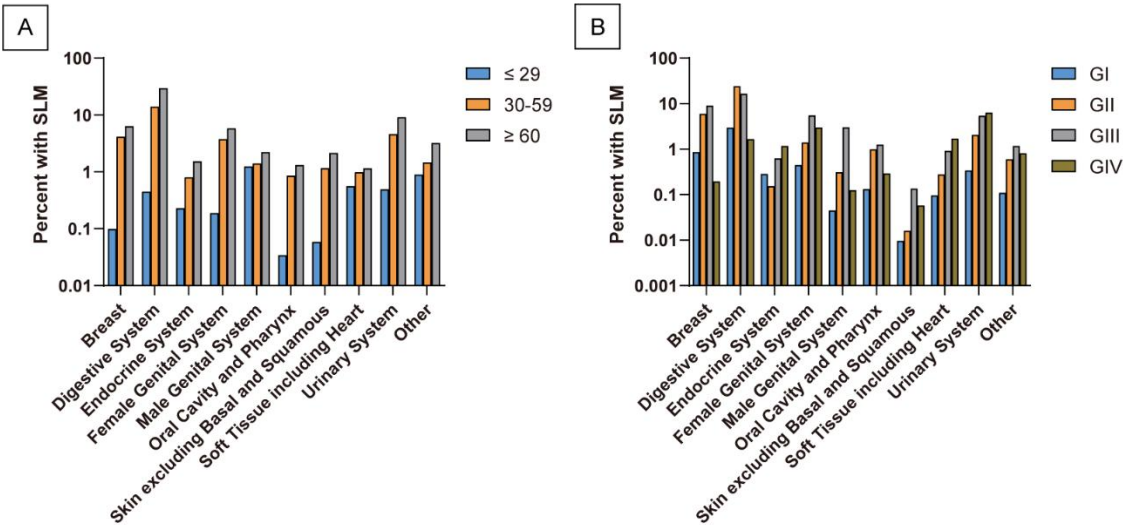
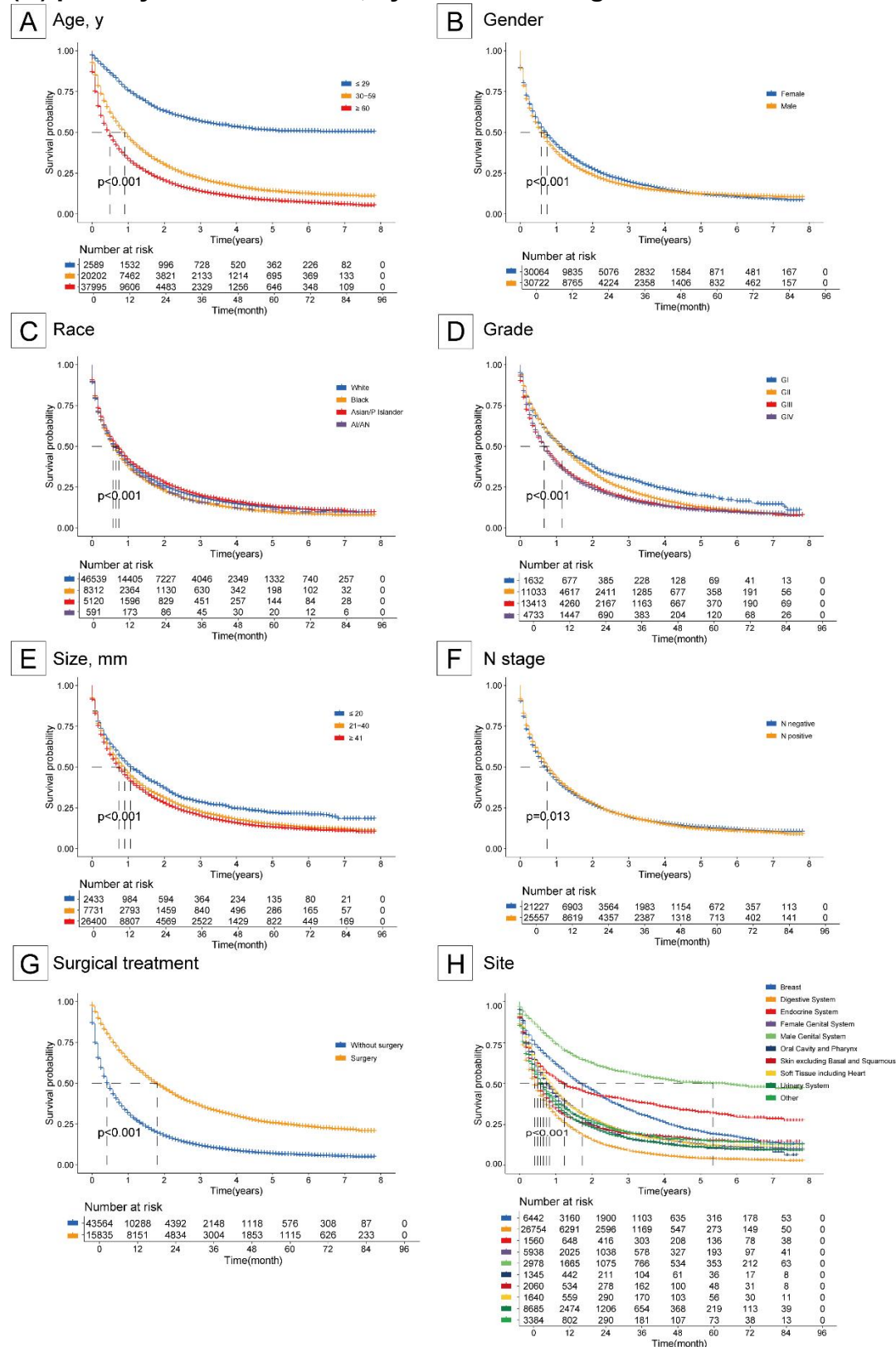


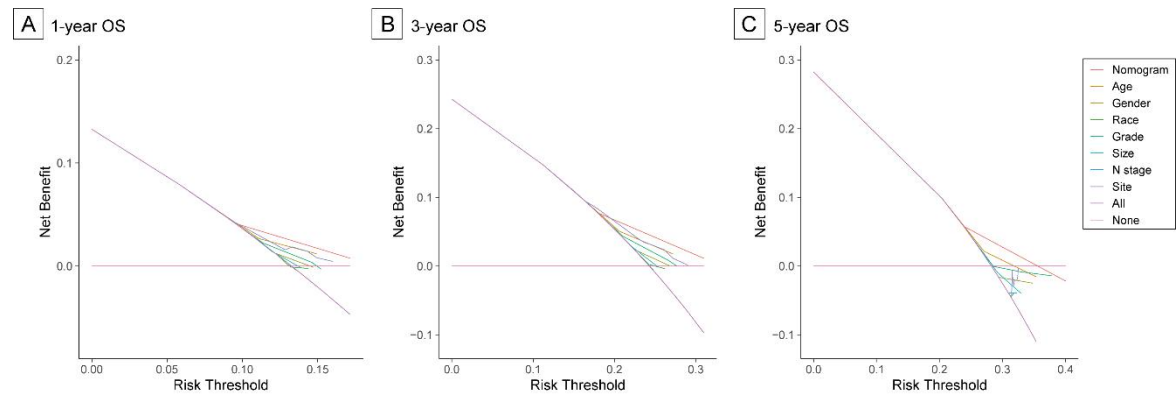
Supplementary Figure 1. (A) Age and (B) primary tumor grade at diagnosis of SLM by primary tumor site. SLM, synchronous lung metastases.



Supplementary Figure 2. Survival duration of SLM by (A) age, (B) gender, (C) race, (D) grade, (E) tumor size, (F) N stage, (G) surgical treatment, and (G) primary tumor site. SLM, synchronous lung metastases.



Supplementary Figure 3. DCA of the nomogram and clinical parameters of patients with SLM. (A) 1-year survival benefit, (B) 3-year survival benefit, and (C) 5-year survival benefit in the SEER cohort. DCA, decision curve analysis; SLM, synchronous lung metastases.



Supplementary Table 1. Site distribution of primary cancers with synchronous lung metastases (SLM).

Tumor Site	N	%
Breast	6505	
Digestive system	27099	
Anus, Anal Canal and Anorectum	225	0.83
Appendix	57	0.21
Colon	5433	20.05
Cecum	1324	4.89
Esophagus	2264	8.35
Gallbladder	361	1.33
Liver	3401	12.55
Pancreas	6615	24.41
Rectum	3123	11.52
Small Intestine	290	1.07
Stomach	1999	7.38
Large Intestine, NOS	935	3.45
Other Digestive Organs	1072	3.96
Endocrine system	1577	
Thyroid	1099	69.69
Other Endocrine including Thymus	478	30.31
Female genital system	6008	
Ovary	1982	32.99
Uterus	3498	58.22
Vagina	93	1.55
Vulva	98	1.63
Other Female Genital Organs	337	5.61
Male genital system	3004	
Penis	50	1.66
Prostate	1587	52.83
Testis	1356	45.14
Other Male Genital Organs	11	0.37
Oral cavity and pharynx	1356	
Floor of Mouth	38	2.80
Gum and Other Mouth	112	8.26
Hypopharynx	146	10.77
Lip	4	0.29
Nasopharynx	154	11.36
Oropharynx	107	7.89
Salivary Gland	224	16.52
Tongue	316	23.30
Tonsil	212	15.63
Other Oral Cavity and Pharynx	43	3.17
Skin excluding Basal and Squamous	2072	

Melanoma of the Skin	2013	97.15
Other Non-Epithelial Skin	59	2.85
Soft tissue including heart	1662	
Urinary system	8779	
Kidney and Renal Pelvis	7226	82.31
Ureter	87	0.99
Urinary Bladder	1369	15.59
Other Urinary Organs	97	1.10
Other	3431	

Supplementary Table 2. Overall incidence of synchronous lung metastases (SLM) over time.

Registry	Year	Rate	Lower CI	Upper CI	Number of SLM cases	Number at risk
SEER 18	2010	9.86	9.65	10.07	8,778	86,141,302
	2011	10.06	9.85	10.27	9,145	86,786,305
	2012	10.47	10.26	10.69	9,751	87,413,119
	2013	10.71	10.5	10.92	10,195	88,004,080
	2014	10.84	10.63	11.05	10,533	88,617,533
	2015	11.12	10.91	11.33	11,004	89,232,342
	2016	12.14	11.92	12.36	12,266	89,814,929
	2017	12.03	11.81	12.24	12,390	90,298,311

Supplementary Table 3. Incidence of synchronous lung metastases (SLM) over time on the basis of primary tumor site, age, gender, race, and grade.

Variables	2010	2011	2012	2013	2014	2015	2016	2017	APC	95% CI
Site										
All Sites	9.86	10.06	10.47	10.71	10.84	11.12	12.14	12.03	3.08*	2.3-3.86
Breast	1.04	1.11	1.11	1.19	1.19	1.14	1.17	1.11	0.94	-0.63-2.55
Digestive System	4.34	4.47	4.71	4.89	4.95	5.03	5.11	5.01	2.19*	1.21-3.17
Endocrine System	0.29	0.24	0.24	0.27	0.29	0.3	0.31	0.29	2.26	-1.02-5.66
Female Genital System	0.9	0.91	0.98	0.92	0.98	1.03	1.07	1.05	2.47*	1.36-3.58
Male Genital System	0.41	0.44	0.46	0.49	0.49	0.54	0.6	0.62	6.04*	4.93-7.16
Oral Cavity and Pharynx	0.19	0.22	0.23	0.25	0.24	0.25	0.23	0.23	1.9	-1.24-5.13
Skin excluding Basal and Squamous	0.41	0.38	0.41	0.44	0.41	0.41	0.43	0.44	1.11	-0.44-2.69
Soft Tissue including Heart	0.3	0.27	0.27	0.27	0.29	0.29	0.3	0.31	1.52	-0.32-3.38
Urinary System	1.4	1.55	1.53	1.52	1.6	1.69	1.66	1.68	2.30*	1.17-3.44
Age, y										
≤ 29	0.84	0.9	0.91	0.85	0.87	0.88	1.14	1.07	3.69*	0.48-7
30-59	6.73	6.96	7.32	7.64	7.5	7.89	8.54	8.32	3.27*	2.32-4.24
≥ 60	40.57	41.07	42.62	43.38	44.52	45.15	49.06	49.08	2.97*	2.26-3.68
Gender										
Male	10.9	11.22	11.51	11.97	12.06	12.16	13.46	13.44	3.12*	2.24-4.01
Female	9.05	9.17	9.66	9.69	9.9	10.32	11.05	10.88	2.97*	2.21-3.73
Race										
White	9.56	10	10.28	10.55	10.67	10.91	12.09	11.87	3.24*	2.3-4.19
Black	13.2	12.88	14.13	13.61	13.99	14.46	14.62	15.09	2.00*	1.14-2.87
AI/AN	9.43	8.06	9.03	9.05	9.06	9.66	8.36	11.35	2.41	-1.38-6.36
Asian/P Islander	8.72	7.53	8.13	8.87	8.78	9.15	9.84	9.4	2.65*	0.57-4.77
Grade										
GI	0.25	0.26	0.25	0.29	0.31	0.28	0.29	0.29	2.29	-0.01-4.64
GII	1.7	1.85	1.77	1.78	1.82	1.77	1.83	1.81	0.5	-0.46-1.48
GIII	2.11	2.19	2.18	2.24	2.17	2.25	2.13	2.06	-0.32	-1.53-0.91
GIV	0.69	0.68	0.69	0.7	0.8	0.82	0.92	0.85	4.58*	2.45-6.75

Supplementary Table 4. Univariate Cox analyses on variables for the prediction of overall survival (OS) of the patients with synchronous lung metastases (SLM).

Variables	Univariate analysis		P-value
	HR	95% CI	
Year of diagnosis			< .001
2010-2011	1		
2012-2013	0.973	0.930-1.019	.249
2014-2015	0.936	0.893-0.981	.006
2016-2017	0.868	0.821-0.918	< .001
Age, y			< .001
≤ 29	1		
30-59	1.436	1.262-1.635	< .001
≥ 60	1.921	1.689-2.184	< .001
Gender			< .001
Female	1		
Male	1.244	1.202-1.287	< .001
Race			< .001
White	1		
Black	1.093	1.041-1.148	< .001
Asian/P Islander	0.932	0.877-0.990	.022
AI/AN	1.033	0.864-1.235	.723
Grade			< .001
GI	1		
GII	1.153	1.058-1.256	.001
GIII	1.518	1.394-1.652	< .001
GIV	1.545	1.412-1.691	< .001
Size, mm			< .001
≤ 20	1		
21-40	1.075	0.992-1.165	.080
≥ 41	1.238	1.151-1.332	< .001
N Stage			.014
N negative	1		
N positive	1.045	1.009-1.082	.014
Primary tumor site			< .001
Breast	1		
Digestive System	1.839	1.752-1.931	< .001
Endocrine System	1.600	1.419-1.803	< .001
Female Genital System	1.439	1.341-1.544	< .001
Male Genital System	0.733	0.560-0.960	.024
Oral Cavity and Pharynx	1.644	1.476-1.832	< .001
Skin excluding Basal and Squamous	1.600	0.885-2.893	.120
Soft Tissue including	1.520	1.379-1.675	< .001

Heart			
Urinary System	1.486	1.402-1.575	< .001
Other	1.243	1.098-1.407	.001

Supplementary Table 5. Baseline characteristics of patients with synchronous lung metastases (SLM) in the training and validation cohorts.

Variables	All patients (n=19,081) N (%)	Training set (n=12,721) N (%)	Validation set (n=6,360) N (%)	P-value
Year of diagnosis				.373
2010-2011	4215 (22.09%)	2824 (22.20%)	1391 (21.87%)	
2012-2013	4640 (24.32%)	3062 (24.07%)	1578 (24.81%)	
2014-2015	5129 (26.88%)	3396 (26.70%)	1733 (27.25%)	
2016-2017	5097 (26.71%)	3439 (27.03%)	1658 (26.07%)	
Age, y				.801
≤ 29	294 (1.54%)	195 (1.53%)	99 (1.56%)	
30-59	4734 (24.81%)	3138 (24.67%)	1596 (25.09%)	
≥ 60	14053 (73.65%)	9388 (73.80%)	4665 (73.35%)	
Gender				.947
Male	8526 (44.68%)	5682 (44.67%)	2844 (44.72%)	
Female	10555 (55.32%)	7039 (55.33%)	3516 (55.28%)	
Race				.606
AI/AN	170 (0.89%)	113 (0.89%)	57 (0.90%)	
Asian/P Islander	1789 (9.38%)	1210 (9.51%)	579 (9.10%)	
Black	2706 (14.18%)	1824 (14.34%)	882 (13.87%)	
White	14416 (75.55%)	9574 (75.26%)	4842 (76.13%)	
Size, mm				.320
≤ 20	2002 (10.49%)	1308 (10.28%)	694 (10.91%)	
21-40	3807 (19.95%)	2544 (20.00%)	1263 (19.86%)	
≥ 41	6529 (34.22%)	4384 (34.46%)	2145 (33.73%)	
N Stage				.831
N negative	7594 (39.80%)	5056 (39.75%)	2538 (39.91%)	
N positive	11487 (60.20%)	7665 (60.25%)	3822 (60.09%)	
Grade				.406
GI	999 (5.24%)	644 (5.06%)	355 (5.58%)	
GII	6962 (36.49%)	4659 (36.62%)	2303 (36.21%)	
GIII	7830 (41.04%)	5207 (40.93%)	2623 (41.24%)	
GIV	3290 (17.24%)	2211 (17.38%)	1079 (16.97%)	
Primary tumor site				.584
Breast	3898 (20.43%)	2575 (20.24%)	1323 (20.80%)	
Digestive System	7803 (40.89%)	5215 (41.00%)	2588 (40.69%)	
Endocrine System	457 (2.40%)	312 (2.45%)	145 (2.28%)	
Female Genital System	1722 (9.02%)	1118 (8.79%)	604 (9.50%)	
Male Genital System	120 (0.63%)	85 (0.67%)	35 (0.55%)	
Oral Cavity and Pharynx	537 (2.81%)	361 (2.84%)	176 (2.77%)	
Skin excluding Basal and Squamous	19 (0.10%)	13 (0.10%)	6 (0.09%)	

Soft Tissue including Heart	711 (3.73%)	495 (3.89%)	216 (3.40%)	
Urinary System	3366 (17.64%)	2246 (17.66%)	1120 (17.61%)	
Other	448 (2.35%)	301 (2.37%)	147 (2.31%)	
Presence of bone, brain or liver metastasis at diagnosis				.734
Yes	9868 (51.72%)	6555 (51.53%)	3313 (52.09%)	
No	8977 (47.05%)	6006 (47.21%)	2971 (46.71%)	
Unknown	236 (1.24%)	160 (1.26%)	76 (1.19%)	
Surgery				.225
Yes	9236 (48.40%)	6197 (48.71%)	3039 (47.78%)	
No/Unknown	9845 (51.60%)	6524 (51.29%)	3321 (52.22%)	
