

Table SI. Baseline laboratory indicators of patients with non-small cell lung cancer and bone metastasis (n=233).

Indicator	Total (n=233)	Survival (n=51)	Death	P-value
			n=182	
ESR	10.0 (6.00; 29.0)	8.00 (6.00; 26.5)	11.0 (6.00; 32.0)	0.45
WBC	8.00 (6.14; 10.3)	7.47 (5.94; 9.14)	8.20 (6.32; 10.5)	0.18
PLT	249 (200; 310)	249 (200; 290)	248 (200; 318)	0.53
Hb	135 (121; 147)	141 (126; 153)	134 (120; 147)	0.44
CEA	26.9 (8.93; 118)	26.9 (18.1; 58.2)	25.7 (7.12; 149)	0.88
AFP	5.02 (2.65; 18.3)	10.7 (3.19; 27.9)	4.54 (2.45; 15.8)	0.02
CA125	15.5 (7.40; 48.0)	9.00 (5.25; 19.0)	20.3 (10.1; 62.9)	<0.001
CA_199	5.13 (0.70; 16.6)	1.07 (0.65; 6.97)	6.58 (0.70; 19.9)	< 0.01
CYFRA21-1	14.5 (7.10; 19.7)	14.1 (10.1; 18.5)	14.7 (6.55; 21.1)	0.80
SCC	4.70 (0.79; 17.6)	12.9 (1.35; 18.8)	1.95 (0.70; 16.9)	< 0.01
NSE	10.6 (1.61; 16.3)	2.16 (0.66; 8.98)	12.1 (2.24; 17.8)	<0.001
IL-6	6.43 (3.88; 29.2)	4.66 (3.42; 8.07)	11.5 (4.15; 30.5)	< 0.01
DD	52.0 (1.45; 69.0)	68.0 (30.5; 74.0)	12.2 (1.30; 68.0)	<0.001
FIB	9.22 (4.08; 43.0)	42.0 (4.98; 45.0)	6.20 (3.91; 41.0)	<0.001
TP	58.0 (24.0; 70.0)	40.0 (26.0; 70.0)	59.5 (23.2; 70.0)	0.50
ALT	121 (22.0; 227)	189 (28.0; 235)	43.5 (21.2; 218)	0.04
ALB	35.0 (18.0; 43.0)	28.0 (18.5; 43.0)	36.5 (17.2; 43.0)	0.52
CRP	4.78 (3.81; 6.72)	4.54 (3.70; 5.38)	4.96 (3.99; 7.50)	0.05
LYM	1.52 (1.07; 2.05)	1.67 (1.19; 2.12)	1.45 (1.05; 2.00)	0.18
Neu	5.64 (4.16; 7.83)	5.28 (3.70; 7.02)	5.85 (4.30; 8.04)	0.13
AST	25.0 (18.0; 48.0)	32.0 (21.0; 64.0)	24.0 (18.0; 44.8)	0.05
GGT	84.0 (35.0; 135)	103 (52.5; 136)	71.5 (32.0; 131)	0.07
LDH	112 (2.30; 208)	2.30 (2.22; 126)	156 (2.33; 220)	<0.001
ALP	68.0 (11.0; 105)	21.1 (5.92; 83.0)	75.0 (17.1; 109)	< 0.001
Ca	2.11 (1.39; 2.35)	1.72 (1.17; 2.29)	2.16 (1.56; 2.36)	0.03
TC	3.73 (2.67; 4.78)	3.46 (2.62; 4.31)	3.78 (2.72; 4.83)	0.12
TG	1.17 (0.98; 1.53)	1.13 (0.98; 1.36)	1.21 (0.96; 1.56)	0.20
HDL	1.15 (0.99; 1.38)	1.18 (1.02; 1.35)	1.15 (0.99; 1.41)	0.84
LDL	2.86 (2.35; 3.49)	2.83 (2.56; 3.40)	2.87 (2.29; 3.51)	0.70
PLR	163 (122; 230)	145 (107; 203)	169 (124; 245)	0.09
NLR	3.76 (2.45; 6.39)	3.31 (2.30; 5.10)	4.03 (2.49; 6.96)	0.05
SII	945 (578; 1670)	796 (461; 1320)	980 (601; 1774)	0.03
PNI	44.8 (29.1; 53.4)	43.8 (34.7; 54.3)	44.8 (28.5; 52.7)	0.30
CLR	3.44 (2.21; 6.01)	2.61 (1.77; 4.14)	3.77 (2.29; 7.43)	<0.01
CAR	0.20 (0.10; 0.34)	0.17 (0.09; 0.25)	0.20 (0.11; 0.45)	0.03
ALI	173 (87.0; 315)	234 (157; 369)	155 (77.2; 310)	0.01
BMI	21.3 (20.4; 23.9)	22.5 (20.8; 24.6)	20.9 (20.2; 23.5)	0.04
NLDA	3.75 (0.14; 13.2)	6.20 (2.97; 11.2)	1.21 (0.14; 16.2)	0.33
HALP	23.4 (12.0; 41.2)	26.5 (13.0; 40.7)	21.4 (11.5; 41.1)	0.37

Continuous variables are presented as median (interquartile range, IQR), expressed as median (P25; P75). ESR, erythrocyte sedimentation rate; WBC, white blood cell count; PLT, platelet count; Hb, hemoglobin; CEA, carcinoembryonic antigen; AFP, alpha-fetoprotein; CA125, carbohydrate antigen 125; CA199, carbohydrate antigen 199; CYFRA21-1, cytokeratin 19 fragment; SCC, squamous cell carcinoma antigen; NSE, neuron-specific enolase; IL-6, interleukin-6; DD, D-dimer; FIB, fibrinogen; TP, total protein; ALT, alanine aminotransferase; ALB, albumin; CRP, C-reactive protein; LYM, lymphocyte count; Neu, neutrophil count;

AST, aspartate aminotransferase; GGT, gamma-glutamyl transferase; LDH, lactate dehydrogenase; ALP, alkaline phosphatase; Ca, calcium; TC, total cholesterol; TG, triglycerides; HDL, high-density lipoprotein cholesterol; LDL, low-density lipoprotein cholesterol; PLR, platelet-to-lymphocyte ratio; NLR, neutrophil-to-lymphocyte ratio; SII, systemic immune-inflammation index; PNI, prognostic nutritional index; CLR, C-reactive protein-to-lymphocyte ratio; CAR, C-reactive protein-to-albumin ratio; ALI, advanced lung cancer inflammation index; BMI, body mass index; NLDA, neutrophil-to-lymphocyte $\times$ D-dimer-to-albumin ratio; HALP, hemoglobin, albumin, lymphocyte and platelet score.

Table SII. Univariate Cox regression analysis of factors associated with overall survival in patients with non-small cell lung cancer and bone metastasis.

Variable	Comparison	Reference	HR (95%CI)	P-value
Age			1.02 (1.01; 1.04)	0.002
Sex	Male	Female	1.26 (0.93; 1.69)	0.135
T stage	T2	T1	1.01 (0.73; 1.39)	0.963
	T3	T1	1.57 (0.93; 2.65)	0.093
	T4	T1	0.85 (0.37; 1.95)	0.701
	Tx	T1	0.92 (0.42; 2.00)	0.830
N stage	N2	N1	0.92 (0.61; 1.40)	0.675
	N3	N1	0.88 (0.53; 1.45)	0.612
	NO	N1	0.68 (0.45; 1.04)	0.075
	Nx	N1	1.13 (0.55; 2.35)	0.734
Pathological type	Squamous cell carcinoma	Adenocarcinoma	1.73 (1.17; 2.55)	0.006
Lung metastasis	Yes	No	0.84 (0.622; 1.14)	0.270
Extrathoracic metastasis	Brain	Adrenal	0.48 (0.167; 1.36)	0.166
	Liver	Adrenal	1.35 (0.48; 3.74)	0.569
	Lymph node	Adrenal	2.12 (0.57; 7.89)	0.265
	Other	Adrenal	1.02 (0.363; 2.86)	0.971
	No	Adrenal	0.75 (0.31; 1.84)	0.533
SREs	Yes	No	0.83 (0.62; 1.12)	0.220
KPS score	KPS	KPS	0.99 (0.981; 1)	0.070
89Sr therapy	Yes	No	1.20 (0.64; 2.28)	0.567
Bisphosphonate therapy	Yes	No	0.631 (0.42; 0.95)	0.028
Combined therapy	Yes	No	1.27 (0.4; 06.4)	0.679
Primary surgery	Yes	No	0.37 (0.24; 0.57)	<0.001
Chemotherapy	Yes	No	0.74 (0.52; 1.06)	0.099
Radiotherapy	Yes	No	0.76 (0.39; 1.49)	0.420
Targeted therapy	Yes	No	1.12 (0.68; 1.85)	0.650
Immunotherapy	Yes	No	3.73 (0.52; 26.9)	0.192
Smoking history	Yes	No	0.91 (0.67; 1.29)	0.670
ESR			1.67 (1.21; 2.30)	0.002
WBC			1.67 (1.17; 2.37)	0.008
PLT			1.00 (1.00; 1.00)	0.091
Hb			0.99 (0.98; 1.00)	0.001
CEA			1.00 (1.00; 1.00)	0.055
AFP			1.00 (1.00; 1.00)	0.288
CA125			1.00 (1.00; 1.00)	0.439

CA_199			1.62 (1.19; 2.20)	0.002
CYFRA21_1			1.97 (1.34; 2.91)	<0.001
SCC			0.99 (0.98; 1.01)	0.291
NSE			2.02 (1.32; 3.08)	0.007
IL_6			1.53 (1.12; 2.10)	0.008
DD			0.99 (0.99; 1.00)	0.020
FIB			0.99 (0.98; 1.00)	0.014
TP			0.99 (0.99; 1.00)	0.762
ALT			1.00 (0.99; 1.00)	0.929
AST			1.00 (0.99; 1.00)	0.507
GGT			1.00 (0.99; 1.00)	0.176
LDH			2.28 (1.48; 3.51)	<0.001
ALP			1.87 (1.25; 2.78)	<0.001
Ca			1.13 (0.90; 1.42)	0.295
TC			1.05 (1.02; 1.09)	0.001
TG			1.00 (0.87; 1.15)	0.974
HDL			0.93 (0.58; 1.49)	0.762
LDL			0.96 (0.82; 1.13)	0.659
PLR			1.51 (1.00; 2.26)	0.048
NLR			1.64 (1.21; 2.21)	0.001
SII			1.75 (1.30; 2.35)	<0.001
PNI			0.70 (0.52; 0.96)	0.020
CAR			2.00 (1.24; 3.23)	0.005
CLR			1.83 (1.36; 2.46)	<0.001
ALI			0.56 (0.42; 0.75)	<0.001
BMI			0.57 (0.39; 0.83)	0.003
NLDA			1.46 (1.05; 2.04)	0.024
HALP			0.59 (0.41; 0.85)	0.004
ALB			0.67 (0.42; 1.07)	0.114
CRP			1.44 (1.04; 2.01)	0.030
LYM			0.97 (0.83; 1.13)	0.680
Neu			1.01 (0.99; 1.02)	0.332

SREs, skeletal-related events; KPS score, Karnofsky Performance Status score; ⁸⁹Sr therapy, strontium-89 therapy; ESR, erythrocyte sedimentation rate; WBC, white blood cell count; PLT, platelet count; Hb, hemoglobin; CEA, carcinoembryonic antigen; AFP, alpha-fetoprotein; CA125, carbohydrate antigen 125; CA_199, carbohydrate antigen 19-9; CYFRA21_1, cytokeratin 19 fragment; SCC, squamous cell carcinoma antigen; NSE, neuron-specific enolase; IL_6, interleukin-6; DD, D-dimer; FIB, fibrinogen; TP, total protein; ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma-glutamyl transferase; LDH, lactate dehydrogenase; ALP, alkaline phosphatase; Ca, calcium; TC, total cholesterol; TG, triglycerides; HDL, high-density lipoprotein cholesterol; LDL, low-density

lipoprotein cholesterol; PLR, platelet-to-lymphocyte ratio; NLR, neutrophil-to-lymphocyte ratio; SII, systemic immune-inflammation index; PNI, prognostic nutritional index; CAR, C-reactive protein-to-albumin ratio; CLR, C-reactive protein-to-lymphocyte ratio; ALI, advanced lung cancer inflammation index; BMI, body mass index; NLDA, neutrophil-to-lymphocyte x D-dimer-to-albumin ratio; HALP, hemoglobin, albumin, lymphocyte and platelet score; ALB, albumin; CRP, C-reactive protein; LYM, lymphocyte count; Neu, neutrophil count.

Table SIII. Time-dependent Brier scores of six prognostic models for predicting overall survival at 6, 12 and 24 months.

Model	Time (Month)	Brierscore	95% CI
Lasso_no	6	0.690	(0.629; 0.745)
	12	0.572	(0.509; 0.632)
	24	0.398	(0.332; 0.459)
Lasso_yes	6	0.660	(0.613; 0.704)
	12	0.563	(0.516; 0.622)
	24	0.395	(0.341; 0.452)
RF_no	6	0.696	(0.645; 0.738)
	12	0.571	(0.511; 0.637)
	24	0.395	(0.335; 0.465)
RF_yes	6	0.700	(0.655; 0.748)
	12	0.581	(0.514; 0.644)
	24	0.400	(0.339; 0.474)
XGBoost_no	6	0.675	(0.622; 0.719)
	12	0.566	(0.511; 0.618)
	24	0.398	(0.347; 0.463)
XGBoost_yes	6	0.657	(0.615; 0.704)
	12	0.562	(0.510; 0.612)
	24	0.398	(0.336; 0.448)

‘Yes’ and ‘no’ denote models with and without nutritional-inflammatory markers, respectively. LASSO, Least Absolute Shrinkage and Selection Operator; RF, Random Forest; XGBoost, extreme gradient boosting.

Table SIV. Calibration results of six prognostic models for predicting overall survival at 1, 3 and 5 years.

Model	Time (month)	Mean absolute error	90% quantile of error
Lasso_no	6	0.52	-0.30
Lasso_no	12	0.28	-0.15
Lasso_no	24	0.05	-0.004
Lasso_yes	6	0.50	-0.26
Lasso_yes	12	0.27	-0.10
Lasso_yes	24	0.06	-0.007
RF_no	6	0.50	-0.29
RF_no	12	0.27	-0.17
RF_no	24	0.06	-0.04
RF_yes	6	0.50	-0.30
RF_yes	12	0.28	-0.14
RF_yes	24	0.08	-0.02
XGBoost_no	6	0.51	-0.28
XGBoost_no	12	0.28	-0.15
XGBoost_no	24	0.06	-0.01
XGBoost_yes	6	0.50	-0.25
XGBoost_yes	12	0.27	-0.11
XGBoost_yes	24	0.06	-0.10

‘Yes’ and ‘no’ denote models with and without nutritional-inflammatory markers, respectively. LASSO, Least Absolute Shrinkage and Selection Operator; RF, Random Forest; XGBoost, extreme gradient boosting.