

Supplementary material

Supplement Table 1: Formulas of inflammation-related biomarkers.

Inflammation-related biomarkers	Formulas
GPR	$\text{GGT} \div \text{PLT}(10^9/\text{L})$
LMR	$\text{Lymphocyte} \div \text{Monocyte}$
NLR	$\text{Neutrophil} \div \text{Lymphocyte}$
PLR	$\text{PLT}(10^9/\text{L}) \div \text{Lymphocyte}$
NrLR	$\text{Neutrophil} \times \text{GGT} \div \text{Lymphocyte}$
APRI	$\text{AST} \div \text{PLT}(10^9/\text{L})$
ANRI	$\text{AST} \div \text{Neutrophil}$
ALRI	$\text{AST} \div \text{Lymphocyte}$
PNI	$\text{ALB} + 5 \times \text{Lymphocyte}$
SII	$\text{PLT}(10^9/\text{L}) \times \text{Neutrophil} \div \text{Lymphocyte}$

Abbreviations: GPR, gamma-glutamyl transpeptidase (GGT) to platelet ratio; LMR, lymphocyte to monocyte ratio; NLR, neutrophil to lymphocyte ratio; PLR, platelet to lymphocyte ratio; NrLR, neutrophil times GGT-to-lymphocyte ratio; APRI, aspartate aminotransferase (AST) to platelet ratio index; ANRI, AST to neutrophil ratio index; ALRI, AST to lymphocyte ratio index; PNI, prognostic nutritional index; SII, systemic immune-inflammation index.

Supplement Table 2: Univariate and multivariate Cox proportional hazards regression analysis of prognostic factors for OS in the training cohort.

Variables	Univariate analysis			Multivariate analysis		
	HR	95% CI	<i>P</i> value	HR	95% CI	<i>P</i> value
Age (year)	1.02	1.00-1.04	0.093	1.02	0.99-1.05	0.133
Sex (female VS male)	1.95	0.77-4.93	0.158			
HBV (positive VS negative)	1.66	0.80-3.45	0.177			
Ascites (no VS yes)	0.53	0.21-1.34	0.182			
Child-Pugh (A VS B)	2.62	0.93-7.34	0.068			
AFP (\leq 200 VS $>$ 200 ng/ml)	0.88	0.52-1.49	0.629			
HGB (g/dL)	1.00	1.00-1.00	0.281			
PLT count	1.00	1.00- 1.00	0.466			
AST (U/L)	1.00	1.00-1.01	0.304			
ALT (U/L)	1.00	1.00-1.01	0.546			
ALB (\leq 35 VS $>$ 35 g/L)	0.42	0.21-0.81	0.010	0.35	0.16-0.76	0.008
TB (μ mol/L)	0.98	0.92-1.04	0.521			
GGT (U/L)	1.00	1.00-1.01	0.086	0.99	0.99-1.00	0.084
BUN (\leq 6.7 VS $>$ 6.7 mmol/L)	4.44	2.07-9.54	$<$ 0.001	4.39	1.85-10.46	$<$ 0.001
UA (μ mol/L)	1.00	1.00- 1.00	0.694			
Creatinine (μ mol/L)	1.00	0.99-1.02	0.430			
PT (s)	0.89	0.67-1.19	0.444			
MVI (no VS yes)	1.96	1.15-3.35	0.013	1.85	1.03-3.35	0.041
Tumor capsule (ill- VS well-defined)	2.09	1.19-3.68	0.01			
Satellite nodules (no VS yes)	1.19	0.61-2.31	0.610			
Tumor Number						
1	1			1		

2	1.00	0.48-2.08	0.992	1.19	0.55-2.60	0.659
≥3	2.13	1.11-4.07	0.023	3.65	1.81-7.35	<0.001
Tumor Size (≤5.0 VS >5.0 cm)	1.30	0.75-2.26	0.353			
TACE (cTACE VS DEB-TACE)	1.07	0.57-2.01	0.826			
Resection Margin (<1 VS ≥1 cm)	0.59	0.29-1.21	0.151			
Blood Transfusion (no VS yes)	1.20	0.68-2.11	0.530			
GPR (≤0.38/>0.38)	1.64	0.97-2.78	0.065	2.72	1.23-6.00	0.013
LMR (≤2.39/>2.39)	0.67	0.36-1.25	0.204			
NLR (≤2.00/>2.00)	1.73	1.01-2.96	0.045			
PLR (≤84.38/>84.38)	1.74	0.91-3.31	0.092	3.58	1.67-7.67	0.001
NrLR (≤644.61/>644.61)	3.39	1.67-6.86	<0.001	3.46	1.00-11.99	0.051
APRI (≤0.30/>0.30)	0.69	0.36-1.35	0.283			
ANRI (≤4.76/>4.76)	0.52	0.22-1.23	0.139			
ALRI (≤41.96/>41.96)	1.54	0.81-2.93	0.190			
PNI (≤52.62/>52.62)	0.74	0.40-1.38	0.350			
SII (≤336.22/>336.22)	2.01	1.13-3.58	0.017			

Abbreviations: OS, overall survival; AFP an alpha fetoprotein; HGB hemoglobin; PLT platelet; AST aspartate aminotransferase; ALT alanine aminotransferase; GGT gamma-glutamyl transpeptidase; ALB albumin; TBIL total bilirubin; BUN blood urea nitrogen; UA uric acid; PT prothrombin time; MVI microvascular invasion; TACE transarterial chemoembolization; cTACE conventional TACE; DEB-TACE drug-eluting beads TACE; GPR, gamma-glutamyl transpeptidase (GGT) to platelet ratio; LMR, lymphocyte to monocyte ratio; NLR, neutrophil to lymphocyte ratio; PLR, platelet to lymphocyte ratio; NrLR, neutrophil times GGT-to-lymphocyte ratio; APRI, aspartate aminotransferase (AST) to platelet ratio index; ANRI, AST to neutrophil ratio index; ALRI, AST to lymphocyte ratio index; PNI, prognostic nutritional index; SII, systemic immune-inflammation index.

Supplement Table 3: The optimal cut-off values of inflammation-related biomarkers.

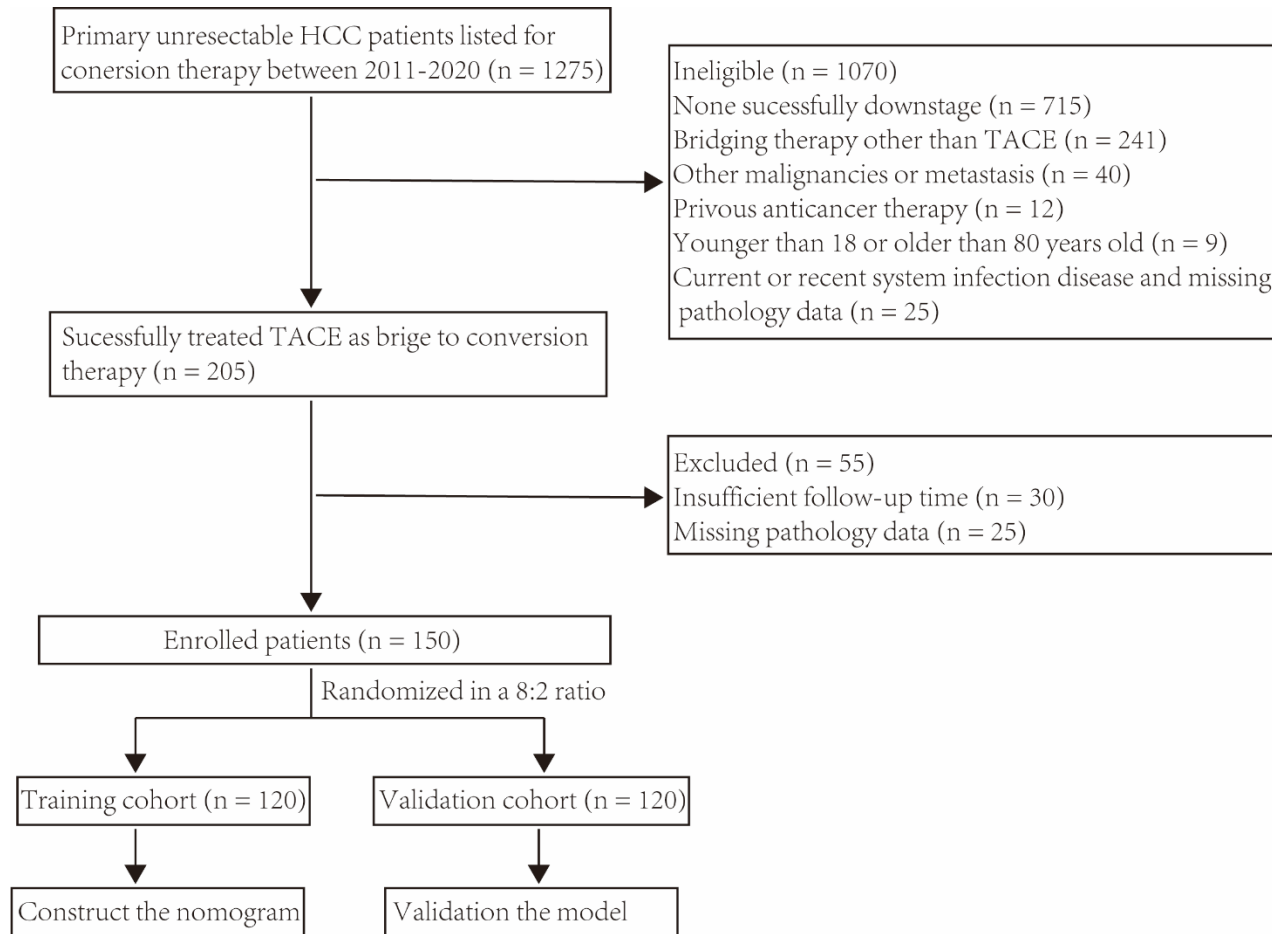
Inflammation-related marker	Cut-off value
GPR	0.38
LMR	2.39
NLR	2.00
PLR	84.38
NrLR	644.61
APRI	0.30
ANRI	4.76
ALRI	41.96
PNI	44.25
SII	336.22

Abbreviations: GPR, gamma-glutamyl transpeptidase (GGT) to platelet ratio; LMR, lymphocyte to monocyte ratio; NLR, neutrophil to lymphocyte ratio; PLR, platelet to lymphocyte ratio; NrLR, neutrophil times GGT-to-lymphocyte ratio; APRI, aspartate aminotransferase (AST) to platelet ratio index; ANRI, AST to neutrophil ratio index; ALRI, AST to lymphocyte ratio index; PNI, prognostic nutritional index; SII, systemic immune-inflammation index.

Supplement table 4: C-index and AUC of the nomogram and other staging systems.

Models	Cohort	C-index	1-yrsAUC(95%CI)	2-yrsAUC(95%CI)	3-yrsAUC(95%CI)
CT model	Training	0.752	0.779 (0.646-0.912)	0.801 (0.693-0.908)	0.839 (0.748-0.931)
	Validation	0.807	0.872 (0.682-1.000)	0.892 (0.753-1.000)	0.876 (0.727-1.000)
AJCC	Training	0.678	0.721 (0.636-0.806)	0.695 (0.594-0.795)	0.635 (0.526-0.745)
	Validation	0.685	0.564 (0.235-0.894)	0.552 (0.277-0.828)	0.705 (0.468-0.943)
CNLC	Training	0.705	0.723 (0.621-0.826)	0.721 (0.619-0.823)	0.649 (0.540-0.757)
	Validation	0.692	0.618 (0.278-0.957)	0.594 (0.310-0.879)	0.713 (0.480-0.946)
Okuda	Training	0.563	0.567 (0.429-0.705)	0.543 (0.431-0.655)	0.587 (0.484-0.690)
	Validation	0.680	0.591 (0.301-0.882)	0.585 (0.337-0.832)	0.656 (0.438-0.874)
CLIP	Training	0.565	0.559 (0.397-0.721)	0.543 (0.419-0.667)	0.609 (0.492-0.725)
	Validation	0.686	0.670 (0.213-1.000)	0.717 (0.405-1.000)	0.739 (0.490-0.988)
JIS	Training	0.715	0.739 (0.649-0.829)	0.740 (0.641-0.839)	0.652 (0.545-0.759)
	Validation	0.707	0.657 (0.258-1.000)	0.646 (0.314-0.978)	0.725 (0.480-0.970)
BCLC	Training	0.696	0.707 (0.591-0.822)	0.720 (0.620-0.820)	0.640 (0.530-0.751)
	Validation	0.728	0.719 (0.517-0.921)	0.651 (0.392-0.909)	0.749 (0.531-0.967)

Supplemental Figure 1: Study flowchart for inclusion and exclusion of patients.



Supplementary Figure 2 The ROC curves for prediction of the 1, 2, and 3-year OS rate in the training (A) and validation (B) cohort when only using clinical information (MVI, ALB, tumour number and BLIN) to construct a model

