

Table S1 Baseline characteristics of 4792 HCC cases.

Characteristic	Value
Age (years)	56.42 ± 12.13
Gender (male/female, %)	4153 (86.67)/639 (13.33)
Hepatitis B surface antigen (+/-, %)	3563 (74.35)/770 (16.07)
	Unknown 459 (9.58)
Hepatitis C virus antibody (+/-, %)	129 (2.69)/4204 (87.73)
	Unknown 459 (9.58)
Child-Pugh classifications (A/B/C, %)	2209 (46.10)/57 (1.19)/1 (0.02)
	Unknown 2525 (52.69)
Platelet count (x10 <sup>9</sup> /L)	196.35 ± 96.09
	Unknown 178 (3.71)
Albumin (mg/dL)	41.24 ± 4.72
	Unknown 205 (4.30)
Alanine aminotransferase (U/L)	46.48 ± 45.17
	Unknown 206 (4.30)
Aspartate aminotransferase (U/L)	55.50 ± 60.32
	Unknown 4.7%
Total bilirubin (umol/L)	17.89 ± 24.90
	Unknown 205 (4.30)
Prothrombin time (s)	12.16 ± 1.24
	Unknown 2030 (42.36)
Activated partial thromboplastin time (s)	27.87 ± 4.71
	Unknown 43.8%
Tumor numbers (one/two/more than two, %)	1094 (22.83)/404 (8.43)/1651 (34.45)
	Unknown 1643 (34.29)
Tumor size (≤2.0 cm/2.1-5.0 cm/>5.0 cm, %)	544 (11.35)/1169 (24.39)/1297 (27.07)
	Unknown 1782 (37.19)
Presence vascular invasion (+/-, %)	423 (8.83)/3105 (64.80)
	Unknown 1264 (26.38)
Presence extrahepatic metastasis (+/-, %)	429 (8.95)/2936 (61.27)
	Unknown 1427 (29.78)
Barcelona Clinic Liver Cancer staging (A/B/C, %)	1240 (25.88)/1235 (25.77)/725 (15.13)
	Unknown 1592 (33.22)
Presence of ascites (+/-, %)	164 (3.42)/3364 (70.20)
	Unknown 1264 (26.38)
Tumor differentiations (well/well-moderate/moderate/moderate poor/poor, %)	255 (5.32)/589 (12.29)/875 (18.26)/85 (1.77)/80 (1.67)
	Unknown 2908 (60.68)
Treatments (radical/non-radical, %)	2379 (49.65)/2413 (50.35)
Pre-treatment AFP (<25 ng/ml/≥25 ng/ml, %)	1830 (38.19)/2962 (61.81)
Pre-treatment DCP (<40 mAU/ml/≥40 mAU/ml, %)	981 (20.47)/3811 (79.53)
Progression-free survival (months)	8.03 ± 10.27
Overall survival (months)	11.52 ± 11.60

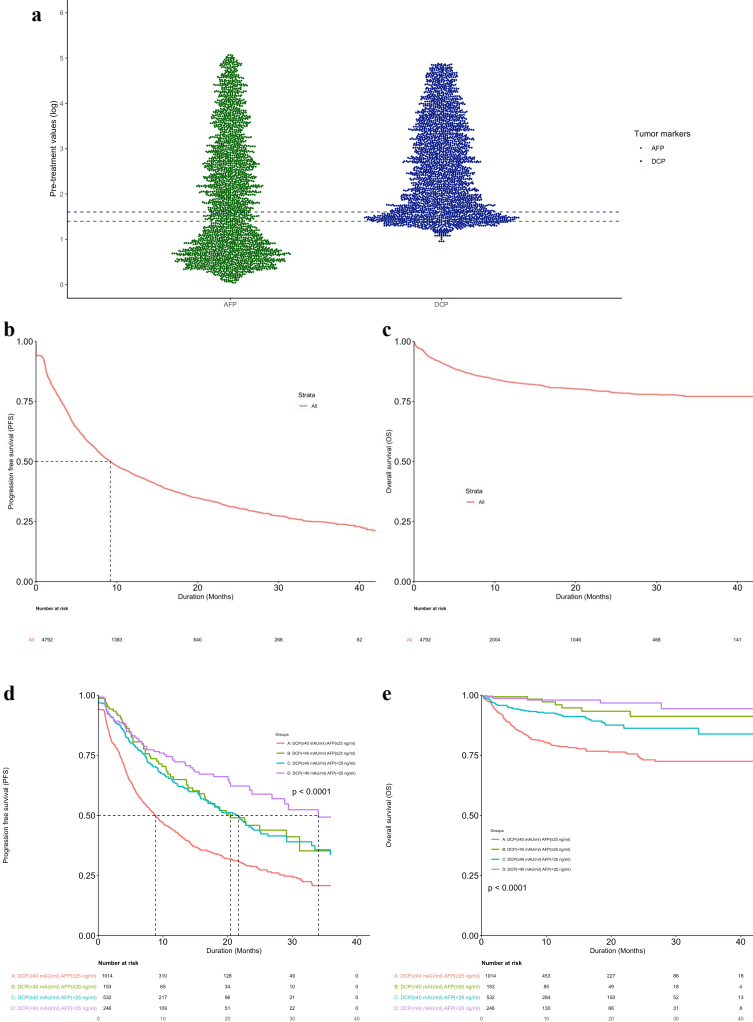
Data are presented as mean ± standard deviations or numbers with percentages in parentheses.

HCC, hepatocellular carcinoma; AFP, alpha-foetoprotein; DCP, des-gamma-carboxy prothrombin

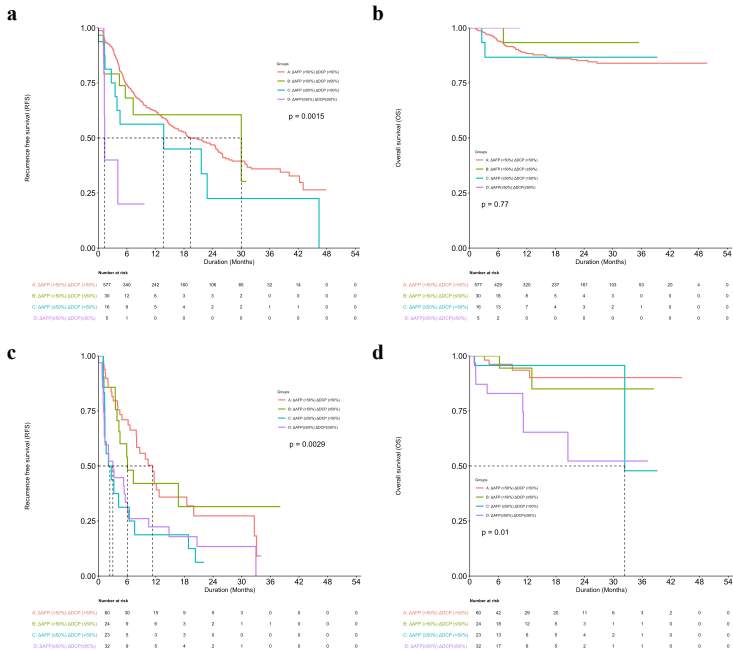
Table S2 Cox univariate survival analysis of predictors of overall survival and progression-free survival in 4792 HCC patients after treatments

Characteristic	Categories	Prognosis-free survival			Overall survival		
		Events/Total	HR (95% CI)	P-value	Events/Total	HR (95% CI)	P-value
<b>Age (years)</b>	≤65	1736/3584	1.0		507/3584	1.0	
	>65	545/1208	0.885 (0.804-0.974)	0.013	177/1208	1.035 (0.873-1.229)	0.690
<b>Sex</b>	Female	262/639	1.0		70/639	1.0	
	Male	2019/4153	1.194 (1.050-1.358)	0.007	614/4153	1.338 (1.045-1.714)	0.021
<b>Presence hepatitis B surface antigen</b>	No	334/770	1.0		106/770	1.0	
	Yes	1769/3563	1.018 (0.905-1.144)	0.770	506/3563	0.925 (0.750-1.140)	0.460
<b>Albumin (mg/dL)</b>	>35.0	1931/4101	1.0		529/4101	1.0	
	≤35.0	244/486	1.947 (1.703-2.226)	<0.001	113/486	2.779 (2.265-3.409)	<0.001
<b>Presence of ascites</b>	No	1609/3364	1.0		453/3364	1.0	
	Yes	81/164	2.125 (1.698-2.659)	<0.001	43/164	3.231 (2.359-4.426)	<0.001
<b>Total bilirubin (umol/L)</b>	<34.2	2073/4338	1.0		594/4338	1.0	
	34.2-51.3	68/148	1.440 (1.131-1.834)	0.003	27/148	1.913 (1.300-2.814)	<0.001
	>51.3	34/101	2.293 (1.631-3.223)	<0.001	21/101	3.789 (2.446-5.871)	<0.001
<b>Prothrombin time (s)</b>	<14.0	1100/2608	1.0		334/2608	1.0	
	≥14.0	51/154	1.120 (0.846-1.483)	0.430	26/154	1.870 (1.254-2.788)	0.002
<b>Activated partial thromboplastin time (s)</b>	32.0-43.0	165/382	1.0		63/382	1.0	
	<32.0	979/2356	0.836 (0.709-0.986)	0.034	296/2356	0.693 (0.528-0.910)	0.008
	>43.0	7/23	1.156 (0.542-2.463)	0.708	1/23	0.377 (0.052-2.719)	0.333
<b>Tumor numbers</b>	One	412/1094	1.0		107/1094	1.0	
	Two	170/404	1.129 (0.944-1.350)	0.180	37/404	0.949 (0.653-1.379)	0.780
	More than two	945/1651	2.046 (1.821-2.298)	<0.001	300/1651	2.153 (1.726-2.685)	<0.001
<b>Tumor size (cm)</b>	≤2	203/544	1.0		39/544	1.0	
	2.1-5.0	458/1169	0.925 (0.784-1.091)	0.360	72/1169	0.787 (0.533-1.163)	0.230
	>5.0	791/1297	1.942 (1.664-2.267)	<0.001	309/1297	3.680 (2.637-5.135)	<0.001
<b>Presence vascular invasion</b>	No	1428/3105	1.0		383/3105	1.0	
	Yes	262/423	2.426 (2.124-2.770)	<0.001	113/423	3.140 (2.542-3.878)	<0.001
<b>Presence extrahepatic metastasis</b>	No	1337/2936	1.0		346/2936	1.0	
	Yes	280/429	2.406 (2.113-2.740)	<0.001	116/429	3.171 (2.567-3.917)	<0.001
<b>Pre-treatment AFP (ng/ml)</b>	<25	700/1830	1.0		163/1830	1.0	
	≥25	1581/2962	1.704 (1.558-1.863)	<0.001	521/2962	2.165 (1.815-2.581)	<0.001
<b>Pre-treatment DCP (mAU/ml)</b>	<40	314/981	1.0		54/981	1.0	
	≥40	1967/3811	1.984 (1.761-2.236)	<0.001	630/3811	3.254 (2.464-4.297)	<0.001

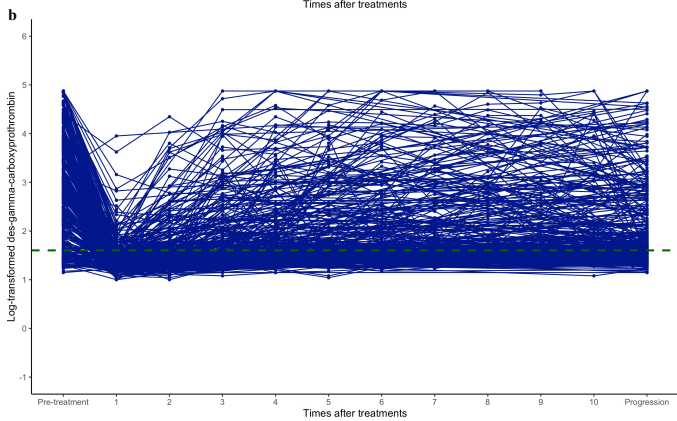
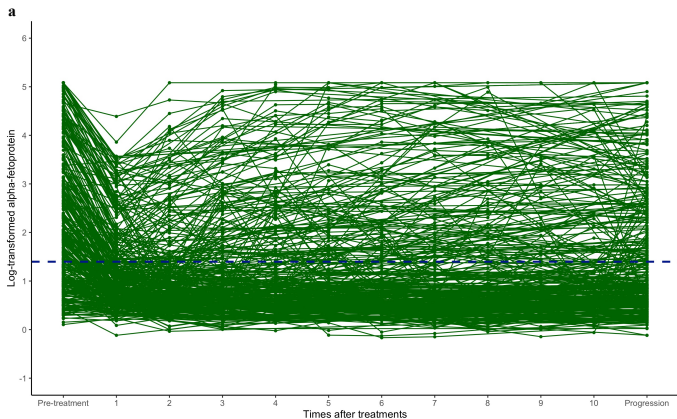
HCC, hepatocellular carcinoma; HR, hazard ratio; CI, confidence interval; AFP, alpha-fetoprotein; DCP, des-gamma-carboxy prothrombin.



**Figure S1** Log-transformed alpha-fetoprotein (AFP) and des-gamma-carboxyprothrombin (DCP) levels before treatments **a**. Progression-free survival (PFS) **b** and overall survival (OS) **c** curves of enrolled 4792 hepatocellular carcinoma (HCC) patients, and PFS **d** and OS **e** curves of grouped HCC patients that enrolled in the multivariate cox regression models based on the pre-treated AFP and DCP. Reference dashed lines were drawn in terms of diagnostic cut-off values for AFP [log(25)] and DCP [log(40)] in corresponding colours, respectively **a**. Group A, AFP $\geq 25$  ng/ml, DCP $\geq 40$  mAU/ml; Group B, AFP $\geq 25$  ng/ml, DCP $< 40$  mAU/ml; Group C, AFP $< 25$  ng/ml, DCP $\geq 40$  mAU/ml; Group D, AFP $< 25$  ng/ml, DCP $< 40$  mAU/ml, **d** and **e**.



**Figure S2** Recurrence-free survival (RFS) **a, c** and overall survival (OS) **b, d** curves regarding alpha-fetoprotein (AFP) and des-gamma-carboxyprothrombin (DCP) response rates of hepatocellular carcinoma patients who received resection **a, b** or ablation **c, d**. Group A, AFP response >50%, DCP response >50%; Group B, AFP response >50%, DCP response ≤50%; Group C, AFP response ≤50%, DCP response >50%; Group D, AFP response ≤50%, DCP response ≤50%.



**Figure S3** Log-transformed alpha-fetoprotein (AFP) **a** and des-gamma-carboxyprothrombin (DCP) **b** each follow-up after the first treatment among patients who were progressed at the last follow-up. Reference dashed lines were drawn in terms of diagnostic cut-off values for AFP [ $\log(25)$ ] and DCP [ $\log(40)$ ] in corresponding plots **a** and **b**, respectively.

## Hazard ratio

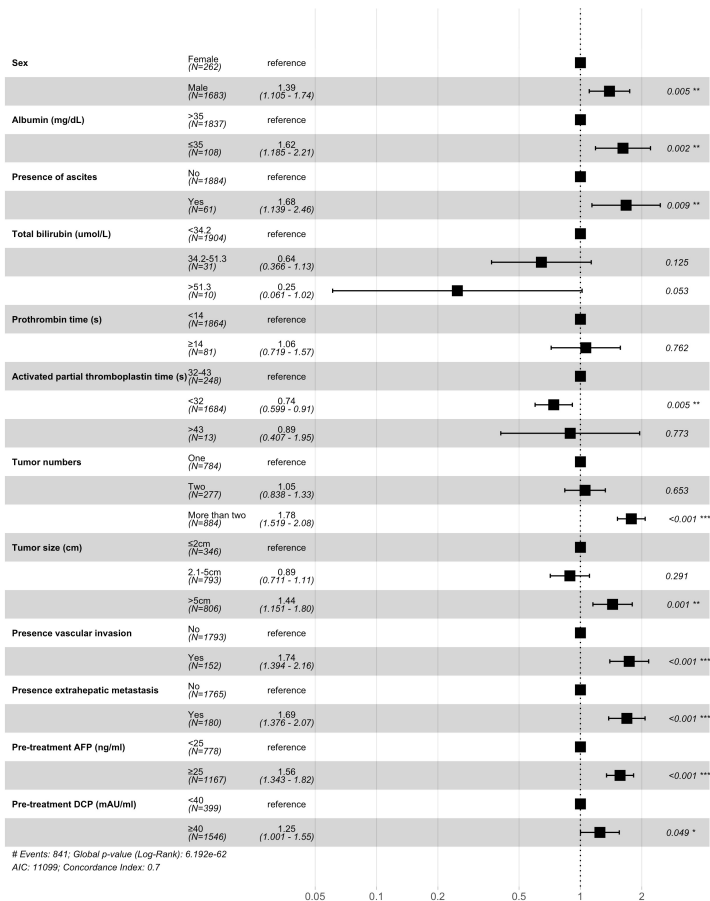


Figure S4 Forest plots from multivariate Cox regression models of overall survival.