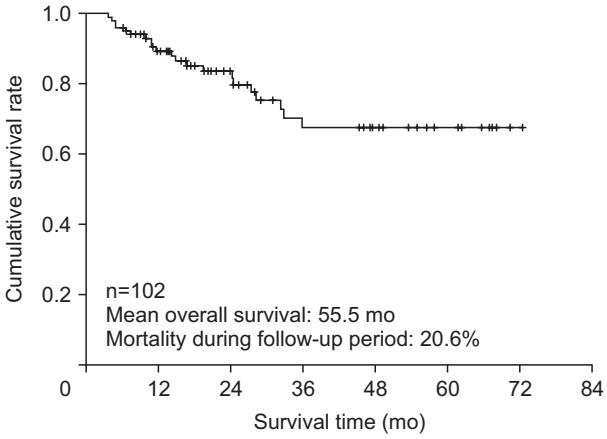
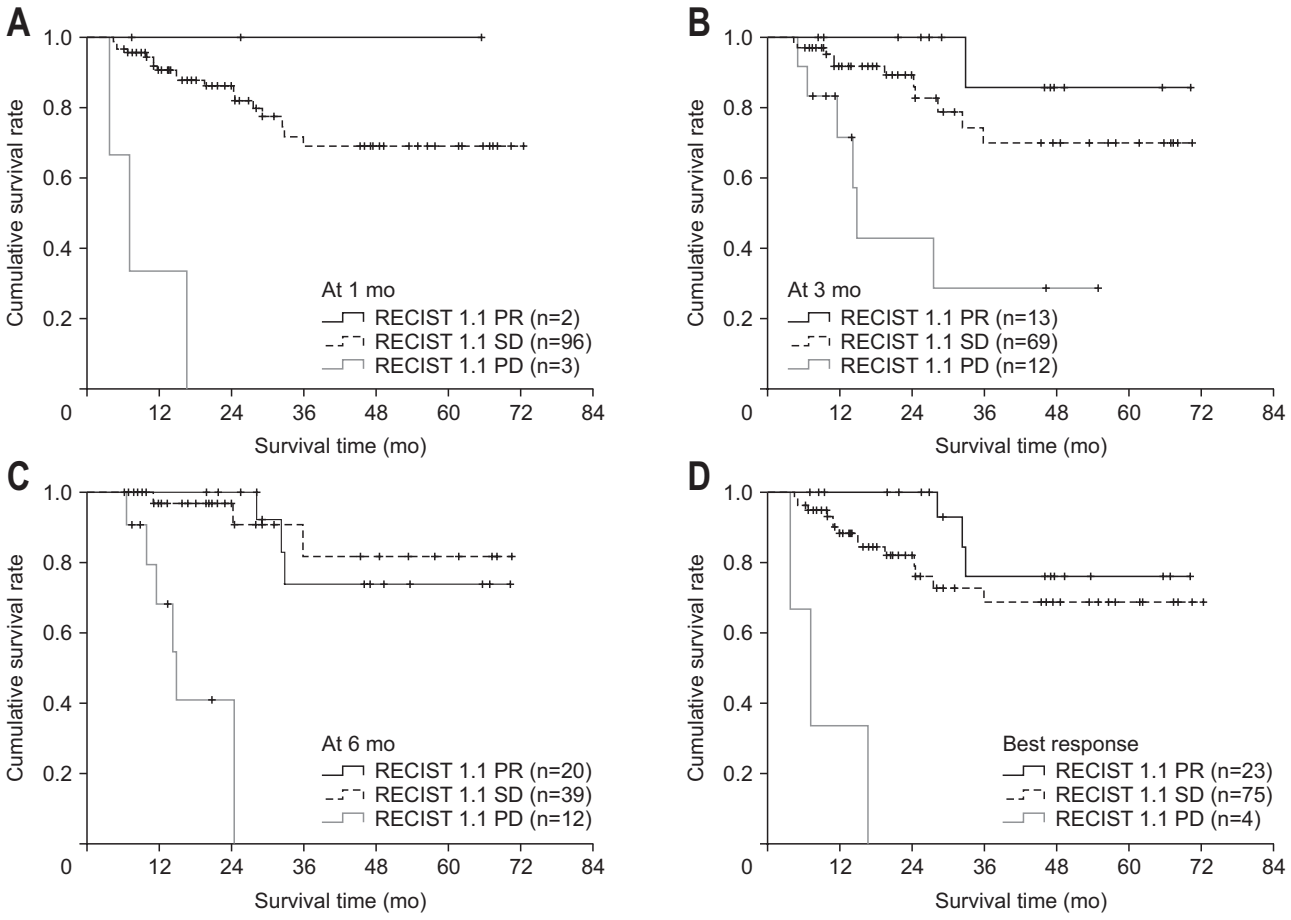
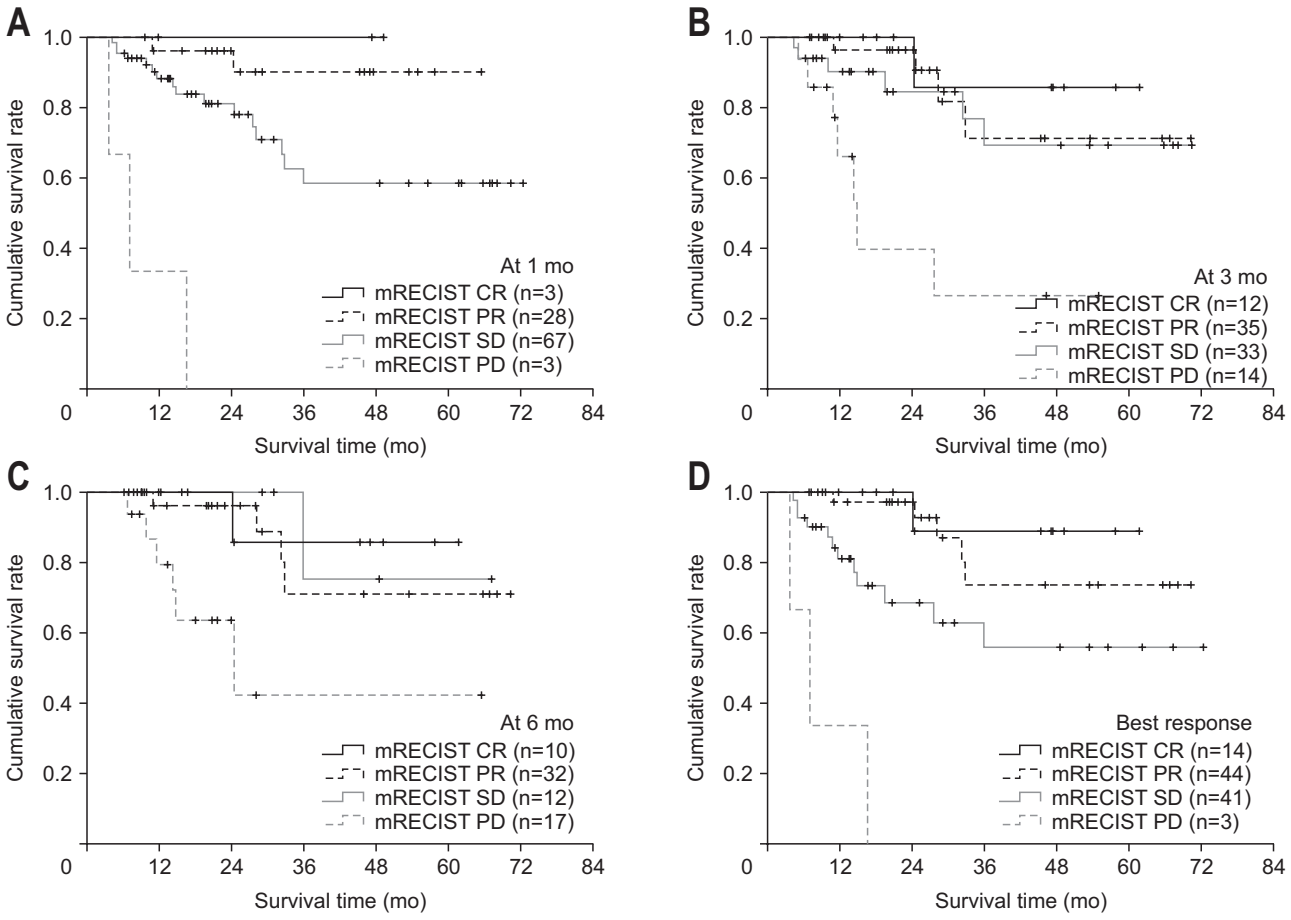


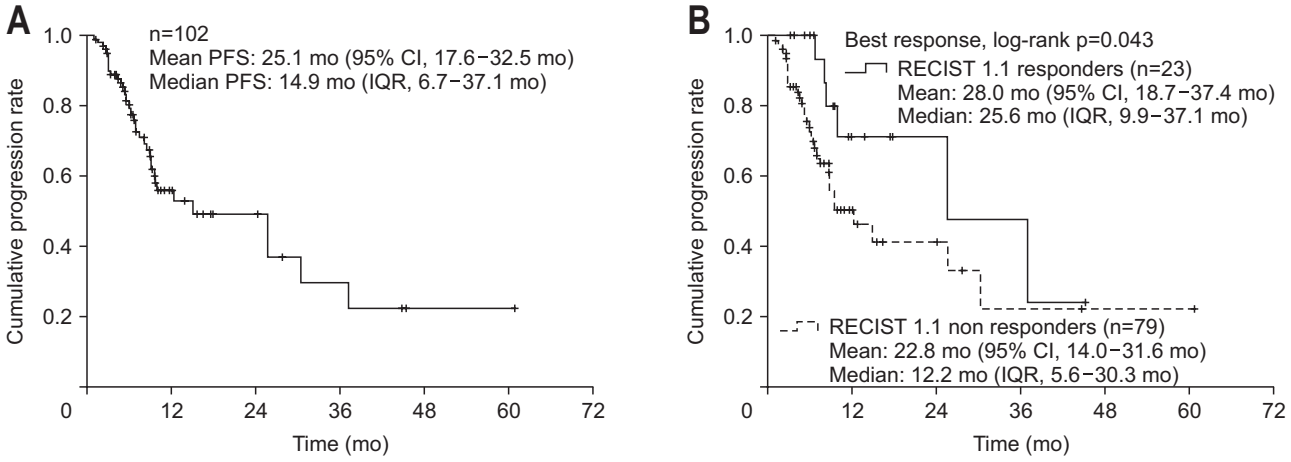
Supplementary Fig. 1. Kaplan-Meier analysis for overall survival.



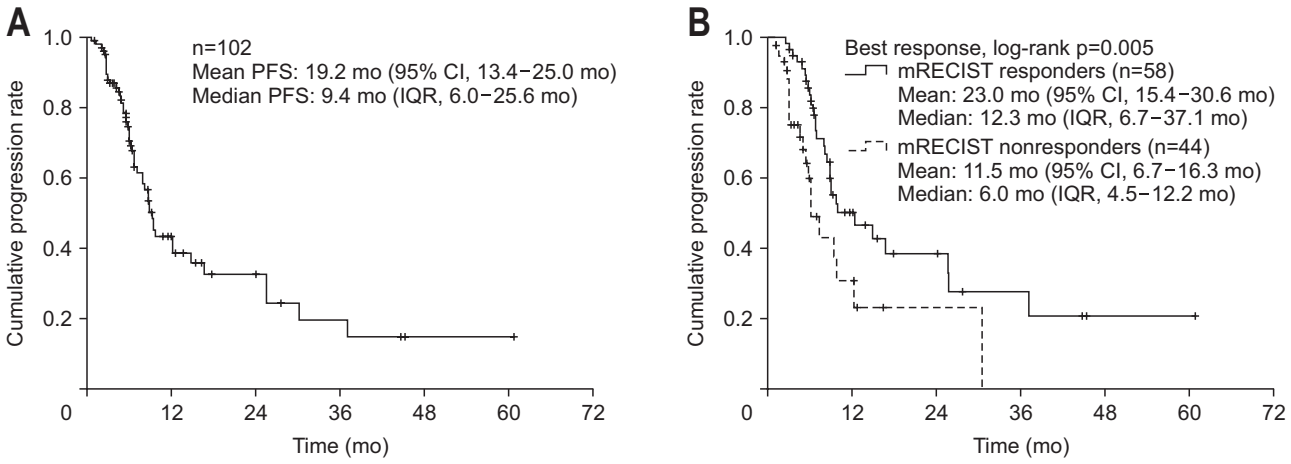
Supplementary Fig. 2. Kaplan-Meier curves for overall survival according to the RECIST 1.1 response at 1 month (A), 3 months (B), and 6 months (C) and as the best response (D).
RECIST, Response Evaluation Criteria in Solid Tumors; PR, partial response; SD, stable disease; PD, progressive disease.



Supplementary Fig. 3. Kaplan-Meier curves for overall survival according to the RECIST 1.1 response at 1 month (A), 3 months (B), and 6 months (C) and as the best response (D).
mRECIST, modified Response Evaluation Criteria in Solid Tumors; CR, complete response; PR, partial response; SD, stable disease; PD, progressive disease.



Supplementary Fig. 4. Kaplan-Meier analysis for progression-free survival (PFS) of overall patients (A) and comparing responders and nonresponders as the best response (B), according to RECIST 1.1.
CI, confidence interval; IQR, interquartile range; RECIST, Response Evaluation Criteria in Solid Tumors.



Supplementary Fig. 5. Kaplan-Meier analysis for progression-free survival (PFS) of overall patients (A) and comparing responders and nonresponders as the best response (B), according to mRECIST.
CI, confidence interval; IQR, interquartile range; mRECIST, modified Response Evaluation Criteria in Solid Tumors.

Supplementary Table 1. Response Assessments in RECIST 1.1 and mRECIST

Category	Target lesions	
	RECIST 1.1	Modified RECIST
CR	Disappearance of all target lesions	Disappearance of any intratumoral arterial enhancement in all target lesions
PR	At least a 30% decrease in the sum of diameters of target lesions, taking as reference the baseline sum of the diameters of target lesions	At least a 30% decrease in the sum of diameters of viable (enhancement in the arterial phase) target lesions, taking as reference the baseline sum of the diameters of target lesions
SD	Any cases that do not qualify for either PR or PD	Any cases that do not qualify for either PR or PD
PD	An increase of at least 20% in the sum of the diameters of target lesions, taking as reference the smallest sum of the diameters of target lesions recorded since treatment started	An increase of at least 20% in the sum of the diameters of viable (enhancing) target lesions, taking as reference the smallest sum of the diameters of viable (enhancing) target lesions recorded since treatment started
Category	Non-target lesions	
	RECIST 1.1	Modified RECIST
CR	Disappearance of all non-target lesions	Disappearance of any intratumoral arterial enhancement in all non-target lesions
IR&SD	Persistence of one or more non-target lesions	Persistence of intratumoral arterial enhancement in one or more non-target lesions
PD	Appearance of one or more new lesions and/or unequivocal progression of existing non-target lesions	Appearance of one or more new lesions and/or unequivocal progression of existing non-target lesions

mRECIST recommendations	
Pleural effusion and ascites	Cytopathologic confirmation of the neoplastic nature of any effusion that appears or worsens during treatment is required to declare PD.
Portal hepatis lymph node	Lymph nodes detected at the porta hepatis can be considered malignant if the lymph node short axis is at least 2 cm.
Portal vein thrombosis	Malignant portal vein thrombosis should be considered as a non-measurable lesion and thus included in the non-target lesion group.
New lesion	A new lesion can be classified as HCC it its longest diameter is at least 1 cm and the enhancement pattern is typical for HCC. A lesion with atypical radiological pattern can be diagnosed as HCC by evidence of at least 1cm interval growth.

Overall response assessment			
Target lesions	Non-target lesions	New lesions	Overall response
CR	CR	No	CR
CR	IR/SD	No	PR
PR	Non-PD	No	PR
SD	Non-PD	No	SD
PD	Any	Yes or no	PD
Any	PD	Yes or no	PD
Any	Any	Yes	PD

RECIST, Response Evaluation Criteria in Solid Tumors; mRECIST, modified RECIST; CR, complete response; PR, partial response; SD, stable disease; PD, progressive disease; IR, incomplete response; HCC, hepatocellular carcinoma.

Supplementary Table 2. Overall Survival According to the RECIST 1.1 and mRECIST Responses

Time point	RECIST 1.1					mRECIST				
	Response	No. (%)	Mean OS (95% CI)	p-value (log-rank)		Response	No. (%)	Mean OS (95% CI)	p-value (log-rank)	
At 1 month	CR	0	-	-	-	CR	3 (2.9)	Not reached	vs PR	0.624
									vs SD	0.278
									vs PD	0.036
	PR	2 (2.0)	Not reached	vs SD	0.454	PR	28 (27.5)	60.9 (54.8–67.0)	vs SD	0.031
				vs PD	0.063				vs PD	<0.001
	SD	96 (94.1)	56.6 (50.3–62.9)	vs PD	<0.001	SD	67 (65.7)	51.3 (42.9–59.7)	vs PD	<0.001
	PD	3 (2.9)	9.1 (1.5–16.7)	-	-	PD	3 (2.9)	9.1 (1.5–16.7)	-	-
At 3 months	CR	0	-	-	-	CR	12 (11.8)	56.3 (46.6–66.0)	vs PR	0.535
									vs SD	0.038
									vs PD	0.005
	PR	13 (12.7)	64.9 (55.2–74.6)	vs SD	0.233	PR	35 (34.3)	57.8 (47.0–68.6)	vs SD	0.531
				vs PD	0.003				vs PD	<0.001
	SD	69 (67.6)	56.2 (48.8–63.6)	vs PD	0.002	SD	33 (32.4)	55.7 (45.5–66.0)	vs PD	0.009
	PD	12 (11.8)	26.1 (12.7–39.5)	-	-	PD	14 (13.7)	25.0 (12.4–37.6)	-	-
At 6 months	CR	0	-	-	-	CR	10 (9.8)	56.3 (46.6–66.0)	vs PR	0.606
									vs SD	0.894
									vs PD	0.051
	PR	20 (19.6)	60.0 (50.1–70.0)	vs SD	0.844	PR	32 (31.4)	58.3 (48.0–68.6)	vs SD	0.613
				vs PD	<0.001				vs PD	0.004
	SD	39 (38.2)	62.7 (54.5–71.0)	vs PD	<0.001	SD	12 (11.8)	59.4 (46.1–72.7)	vs PD	0.030
	PD	12 (11.8)	17.0 (12.1–21.8)	-	-	PD	17 (16.7)	37.1 (19.8–54.5)	-	-
Best response	CR	0	-	-	-	CR	14 (13.7)	57.5 (49.8–65.2)	vs PR	0.451
									vs SD	0.048
									vs PD	<0.001
	PR	23 (22.5)	60.9 (51.6–70.2)	vs SD	0.188	PR	44 (43.1)	59.2 (50.5–67.9)	vs SD	0.020
				vs PD	<0.001				vs PD	<0.001
	SD	75 (73.5)	55.4 (48.0–62.9)	vs PD	<0.001	SD	41 (40.2)	48.0 (37.0–59.0)	vs PD	0.001
	PD	4 (3.9)	6.1 (4.2–7.9)	-	-	PD	3 (2.9)	9.1 (1.5–16.7)	-	-

RECIST, Response Evaluation Criteria in Solid Tumors; mRECIST, modified RECIST; OS, overall survival; CI, confidential interval; CR, complete response; PR, partial response; SD, stable disease; PD, progressive disease.

Supplementary Table 3. Causes of Progressive Disease by the RECIST 1.1 and mRECIST Criteria

Criteria	Time point	Local progression	Intrahepatic progression	Extrahepatic progression	Total patient
RECIST 1.1	1 Month	-	3 (100.0)	-	3
	3 Months	-	10 (83.3)	2 (16.7)	12
	6 Months	-	9 (75.0)	3 (25.0)	12
mRECIST	1 Month	-	3 (100.0)	-	3
	3 Months	-	13 (92.9)	1 (7.1)	14
	6 Months	2 (11.8)	11 (64.7)	4 (23.5)	17

Data are presented as number (%) number.
RECIST, Response Evaluation Criteria in Solid Tumors; mRECIST, modified RECIST.

Supplementary Table 4. Univariate Cox Proportional Analysis for Overall Survival

Variable	Univariate analysis	
	p-value	HR (95% CI)
Age	0.549	0.990 (0.956–1.024)
Age >70 yr	0.178	0.430 (0.126–1.470)
Male sex	0.860	1.103 (0.371–3.282)
Administered ^{90}Y activity, GBq	0.726	1.067 (0.743–1.533)
Sorafenib use after TARE	0.024	2.711 (1.142–6.439)
Diabetes mellitus	0.720	1.172 (0.493–2.787)
Hypertension	0.406	1.470 (0.593–3.644)
Body mass index	0.123	1.093 (0.976–1.123)
>25 kg/m^2 (obesity)	0.368	1.482 (0.629–3.493)
<17 kg/m^2 (low body mass index)	0.795	0.048 (too wide)
Viral etiology	0.950	0.968 (0.349–2.685)
Hepatitis B	0.946	1.034 (0.394–2.710)
Hepatitis C	0.924	0.906 (0.121–6.764)
Heavy alcohol intake	0.858	0.832 (0.110–6.262)
Liver cirrhosis	0.720	0.832 (0.305–2.273)
Platelet, $\times 10^9$/L	0.465	1.002 (0.997–1.006)
Serum albumin	0.001	0.241 (0.101–0.571)
<3.5 g/dL	0.015	2.939 (1.232–7.011)
<2.8 g/dL	<0.001	23.186 (4.162–129.167)
Total bilirubin, mg/dL	0.094	1.758 (0.908–3.406)
Serum aspartate aminotransferase, IU/L	0.123	1.007 (0.998–1.016)
Serum alanine aminotransferase, IU/L	0.976	1.000 (0.981–1.019)
Prothrombin time, INR	0.376	5.969 (0.115–310.877)
Baseline alpha-fetoprotein, ng/mL	0.539	1.000 (1.000–1.000)
Baseline DCP	0.003	1.000 (1.000–1.000)
DCP >13,000 mAU/mL	0.016	3.067 (1.232–7.634)
Infiltrative tumor	0.053	2.453 (0.987–6.099)
Tumor number	0.012	1.791 (1.137–2.821)
Multiple tumor	0.036	2.526 (1.064–5.999)
Tumors above 3	0.007	3.259 (1.382–7.687)
Maximal tumor size (continuous)	0.040	1.140 (1.006–1.291)
>11 cm	0.039	2.644 (1.050–6.659)
Tumor burden >50%	0.019	3.342 (1.216–9.184)
Multilobar distribution	0.011	3.025 (1.285–7.126)
Portal vein thrombosis	0.014	3.028 (1.250–7.332)
First branch	0.005	4.796 (1.601–14.364)
Hepatic vein invasion	0.002	5.787 (1.916–17.484)

HR, hazard ratio; CI, confidence interval; ^{90}Y, yttrium 90; TARE, transarterial radioembolization; INR, international normalized ratio; DCP, des-gamma-carboxyprothrombin.

Supplementary Table 5. Multivariate Cox Proportional Hazard Analysis for Overall Survival

Variable	p-value	HR (95% CI)
Albumin <3.5 g/dL	0.116	2.134 (0.830–5.487)
DCP >13,000 mAU/mL	0.838	0.855 (0.191–3.820)
Infiltrative type of tumor	0.635	1.487 (0.288–7.680)
Maximal tumor size >11 cm	0.748	0.755 (0.136–4.193)
Multiple tumors	0.525	1.442 (0.466–4.467)
Bilobar distribution of tumors	0.007	3.722 (1.433–9.669)
Tumor burden >50%	0.236	2.028 (0.629–6.537)
First branch portal vein tumor thrombosis	0.011	4.998 (1.449–17.237)
Hepatic vein invasion	<0.001	10.536 (2.995–37.062)
Sorafenib after TARE	0.213	1.936 (0.685–5.475)
Nonresponders (best response) by mRECIST	0.015	3.432 (1.272–9.259)

HR, hazard ratio; CI, confidence interval; DCP, des-gamma-carboxyprothrombin; TARE, transarterial radioembolization; mRECIST, modified Response Evaluation Criteria in Solid Tumors.

Supplementary Table 6. Cox Univariate Proportional Analysis for Progression-Free Survival by the mRECIST

Variable	Univariate analysis	
	p-value	HR (95% CI)
Age	0.266	0.987 (0.965–1.010)
Age >70 yr	0.386	0.775 (0.436–1.379)
Male sex	0.715	1.138 (0.568–2.279)
Administered ^{90}Y activity, GBq	0.804	0.969 (0.756–1.243)
Diabetes mellitus	0.778	0.923 (0.527–1.615)
Hypertension	0.666	0.884 (0.504–1.549)
Body mass index	0.223	0.945 (0.863–1.035)
>25 kg/m^2 (obesity)	0.785	0.878 (0.346–2.230)
Viral etiology	0.490	1.251 (0.662–2.362)
Hepatitis B	0.825	1.068 (0.596–1.914)
Hepatitis C	0.314	1.613 (0.636–4.088)
Heavy alcohol intake	0.203	0.398 (0.096–1.643)
Liver cirrhosis	0.695	0.885 (0.480–1.631)
Platelet, $\times 10^9$/L	0.671	1.001 (0.998–1.004)
Serum albumin	0.021	0.488 (0.266–0.895)
Albumin <3.5 g/dL	0.213	1.499 (0.792–2.836)
Albumin <2.8 g/dL	0.001	12.051 (2.665–54.494)
Total bilirubin, mg/dL	0.161	1.511 (0.848–2.691)
Serum aspartate aminotransferase, IU/L	0.014	1.010 (1.002–1.018)
Serum alanine aminotransferase, IU/L	0.141	1.009 (0.997–1.020)
Serum alkaline phosphatase, IU/L	0.082	1.003 (1.000–1.007)
Prothrombin time, INR	0.014	31.420 (2.008–491.766)
Baseline alpha-fetoprotein, ng/mL	0.395	1.000 (1.000–1.000)
Baseline DCP, mAU/mL	0.130	1.000 (1.000–1.000)
Infiltrative tumor	0.021	2.216 (1.127–4.358)
Multiple tumor	0.656	1.143 (0.634–2.061)
Tumors above 3	0.300	1.409 (0.737–2.694)
Maximal tumor size	0.327	1.051 (0.951–1.1620
>11 cm	0.621	1.215 (0.561–2.633)
Tumor burden >50%	0.812	1.153 (0.355–3.740)
Multilobar distribution	0.452	1.302 (0.654–2.590)
Portal vein thrombosis	0.052	2.011 (0.994–4.070)
First branch	0.062	2.732 (0.950–7.853)
Hepatic vein invasion	0.327	1.801 (0.556–5.835)
Nonresponse before progression by mRECIST	0.007	2.214 (1.245–3.936)

mRECIST, modified Response Evaluation Criteria in Solid Tumors; HR, hazard ratio; CI, confidence interval; ^{90}Y, yttrium 90; INR, international normalized ratio; DCP, des-gamma-carboxyprothrombin.

Supplementary Table 7. Cox Multivariate Proportional Analysis for Progression-Free Survival by the mRECIST

Variable	Univariate p-value	Multivariate analysis	
		p-value	HR (95% CI)
Serum albumin, g/dL	0.021	0.256	0.639 (0.296–1.383)
Serum aspartate aminotransferase, IU/L	0.014	0.774	1.001 (0.996–1.005)
Prothrombin time, INR	0.014	0.126	12.430 (0.493–313.640)
Infiltrative tumor	0.021	0.091	2.103 (0.889–4.974)
Portal vein thrombosis	0.052	0.532	1.345 (0.531–3.404)
Nonresponse before progression by mRECIST	0.007	0.014	2.151 (1.168–3.964)

mRECIST, modified Response Evaluation Criteria in Solid Tumors; HR, hazard ratio; CI, confidence interval; INR, international normalized ratio.

Supplementary Table 8. Cox Univariate Proportional Analysis for Progression-Free Survival by the RECIST

Variable	Univariate analysis	
	p-value	HR (95% CI)
Age	0.068	0.976 (0.951–1.002)
>70 yr	0.122	0.578 (0.288–1.159)
Male sex	0.413	1.440 (0.601–3.454)
Administered ^{90}Y activity, GBq	0.763	1.045 (0.786–1.389)
Diabetes mellitus	0.637	0.854 (0.445–1.641)
Hypertension	0.124	0.605 (0.319–1.148)
Body mass index	0.414	0.957 (0.862–1.063)
>25 kg/m^2 (obesity)	0.655	1.243 (0.479–3.227)
Viral etiology	0.348	1.437 (0.674–3.063)
Hepatitis B	0.279	1.483 (0.727–3.027)
Hepatitis C	0.830	0.855 (0.204–3.577)
Heavy alcohol intake	0.170	0.248 (0.034–1.816)
Liver cirrhosis	0.895	0.954 (0.476–1.913)
Platelet, $\times 10^9$/L	0.674	1.001 (0.997–1.004)
Serum albumin	0.021	0.437 (0.216–0.884)
Albumin <3.5 g/dL	0.273	1.507 (0.724–3.135)
Albumin <2.8 g/dL	0.001	14.196 (3.064–65.771)
Total bilirubin, mg/dL	0.131	1.632 (0.864–3.081)
Serum aspartate aminotransferase, IU/L	0.040	1.010 (1.000–1.019)
Serum alanine aminotransferase, IU/L	0.124	1.010 (0.997–1.024)
Serum alkaline phosphatase, IU/L	0.018	1.005 (1.001–1.008)
Prothrombin time, INR	0.017	48.875 (2.032–1175.660)
Baseline alpha-fetoprotein, ng/mL	0.448	1.000 (1.000–1.000)
Baseline DCP, mAU/mL	0.086	1.000 (1.000–1.000)
Infiltrative tumor	0.007	2.763 (1.320–5.784)
Multiple tumor	0.196	1.544 (0.799–2.985)
Tumors above 3	0.054	2.014 (0.988–4.104)
Maximal tumor size	0.155	1.086 (0.969–1.216)
>11 cm	0.357	1.488 (0.639–3.467)
Tumor burden >50%	0.460	1.568 (0.475–5.171)
Multilobar distribution	0.153	1.730 (0.816–3.671)
Portal vein thrombosis	0.006	2.818 (1.343–5.913)
First branch	0.021	3.576 (1.212–10.557)
Hepatic vein invasion	0.723	1.296 (0.310–5.427)
Noresponse before progression by RECIST	0.050	2.399 (0.999–5.760)

RECIST, Response Evaluation Criteria in Solid Tumors; HR, hazard ratio; CI, confidence interval; ^{90}Y, yttrium 90; INR, international normalized ratio; DCP, des-gamma-carboxyprothrombin.

Supplementary Table 9. Cox Multivariate Proportional Analysis for Progression-Free Survival by the RECIST

Variable	Univariate p-value	Multivariate analysis	
		p-value	HR (95% CI)
Serum albumin, g/dL	0.021	0.451	0.716 (0.300–1.706)
Serum alkaline phosphatase, IU/L	0.018	0.366	1.002 (0.997–1.007)
Prothrombin time, INR	0.017	0.130	21.968 (0.402–1201.101)
Infiltrative tumor	0.007	0.113	2.105 (0.838–5.284)
Portal vein thrombosis	0.006	0.173	2.007 (0.737–5.465)
Nonresponse before progression by RECIST	0.050	0.126	2.099 (0.811–5.432)

RECIST, Response Evaluation Criteria in Solid Tumors; HR, hazard ratio; CI, confidence interval; INR, international normalized ratio.