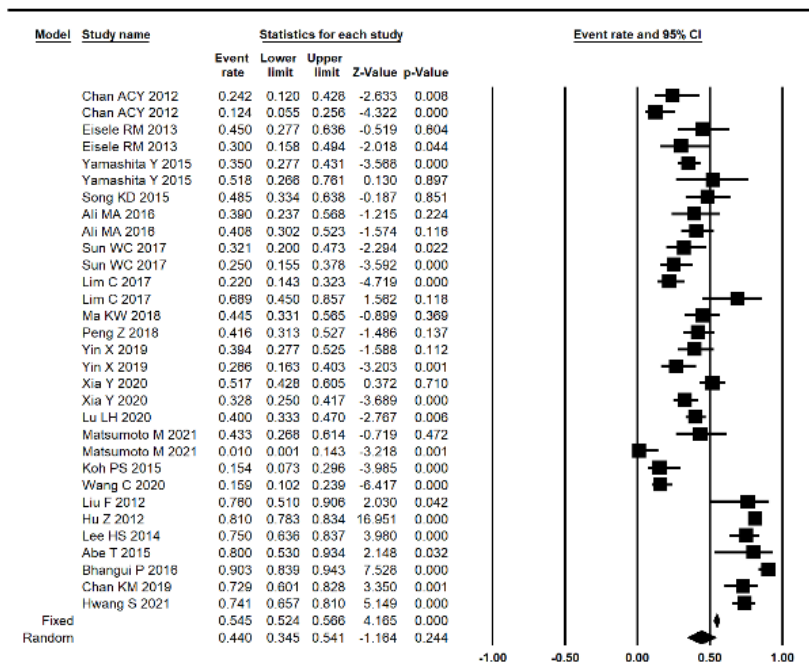
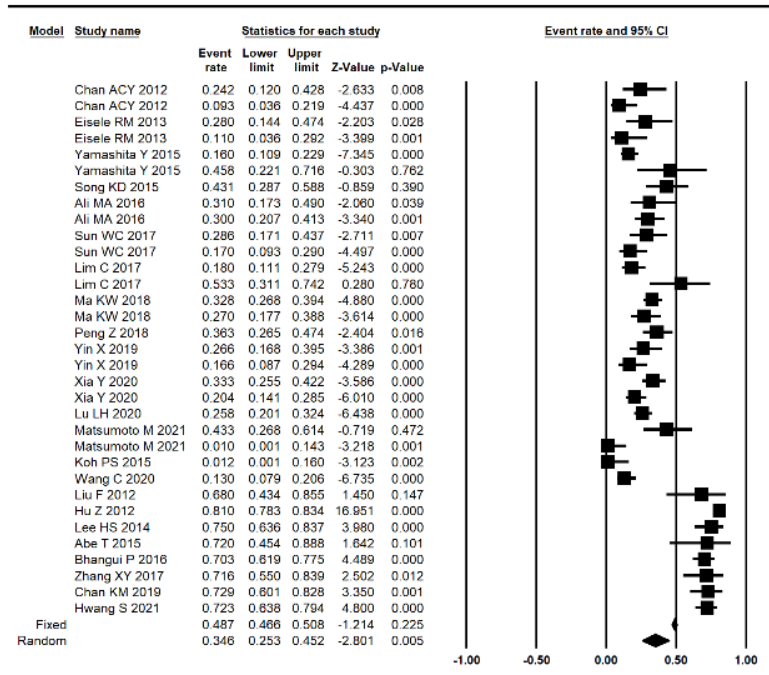


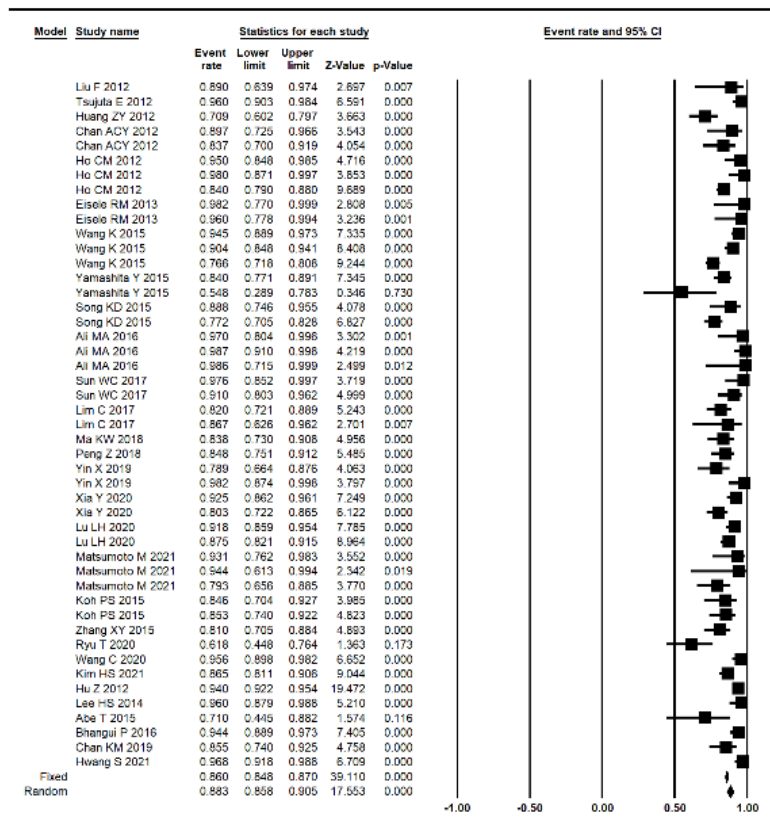
Supplementary Figure 1 Disease-free survival-1 year. Heterogeneity Q-value = 224.67, df (Q) = 30, $P < 0.001$, $I^2 = 86.65\%$. Overall effect $Z = 5.07$, $P < 0.001$.



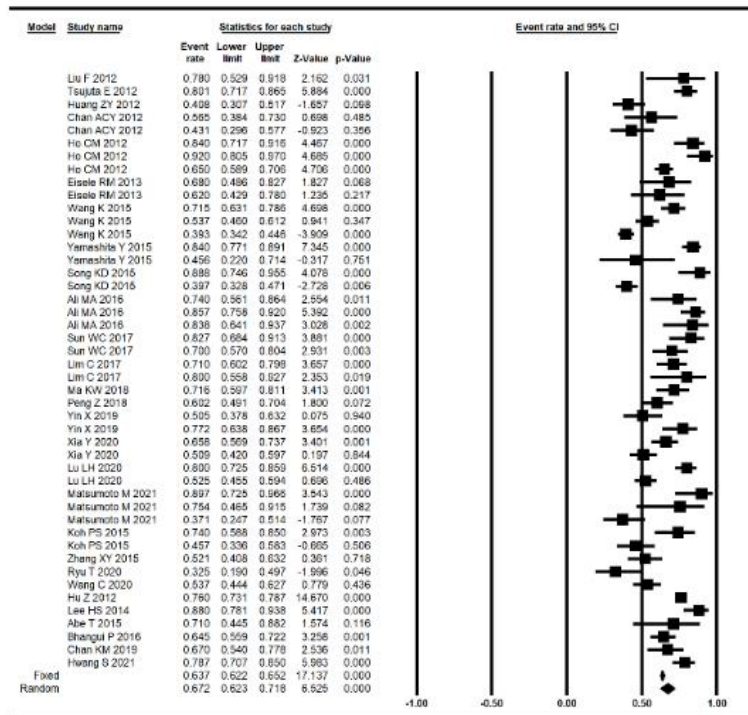
Supplementary Figure 2 Disease-free survival-3 years. Heterogeneity Q-value = 583.66, df (Q) = 30, $P < 0.001$, $I^2 = 94.86\%$, Overall effect $Z = -1.16$, $P = 0.244$.



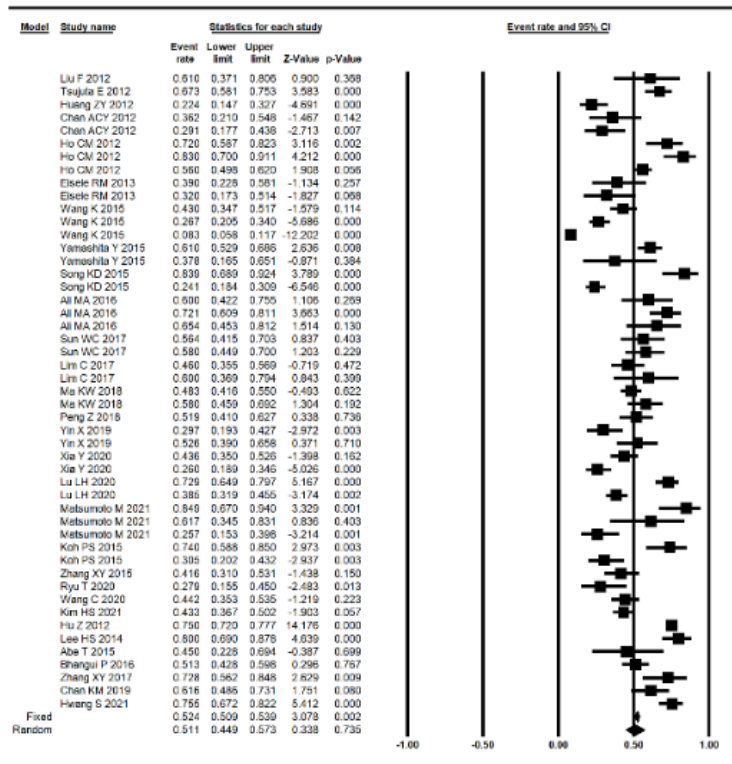
Supplementary Figure 3 Disease-free survival-5 years. Heterogeneity Q-value = 764.48, df (Q) = 32, $P < 0.001$, $I^2 = 95.81\%$, Overall effect $Z = -2.8$, $P = 0.005$.



Supplementary Figure 4 Overall survival-1 year. Heterogeneity Q-value = 219.82, df (Q) = 46, $P < 0.001$, $I^2 = 79.07\%$, Overall effect $Z = 17.55$, $P < 0.001$.



Supplementary Figure 5 Overall survival-3 years. Heterogeneity Q -value = 437.64, $df(Q) = 45$, $P < 0.001$, $I^2 = 89.72\%$, Overall effect $Z = 6.53$, $P < 0.001$.



Supplementary Figure 6 Overall survival-5 years. Heterogeneity Q-value = 730.28, df (Q) = 48, $P < 0.001$, $I^2 = 93.43\%$, Overall effect $Z = 0.34$, $P = 0.735$

Supplementary Table 1 List of 30 articles for analysis

ID	Author & reference code	country	year	case no	gender male %	age mean	time to recurr (mon)	DFS-1y	3y	5y	OS-1y	3y	5y
1d	Liu F(33)	China	2012	39	92.3	44	12.9	86	76	68	89	78	61
2a	Tsujuta E(34)	Japan	2012	112	71.4	68		/			96	80.1	67.3
3a	Huang ZY(35)	China	2012	82	96.3	44	27.3	/			70.9	40.8	22.4
4a	Chan ACY(36)	China	2012	29		52	12.2	41.4	24.2	24.2	89.7	56.5	36.2
4b	Chan ACY(36)	China	2012	45		59	8.7	32.2	12.4	9.3	83.7	43.1	29.1
5a	Ho CM(6)	Taiwan	2012	54	71.4	56.3	23.9	/			95	84	72
5b	Ho CM(6)	Taiwan	2012	50	78	61	20	/			98	92	83
5c	Ho CM(6)	Taiwan	2012	254	78	59.4	18.9	/			84	65	56
6d	Hu Z(37)	China	2012	888	92.2			73	51.8	45.8	54.8	45.6	37.8
7a	Eisele RM(21)	Germany	2013	27	55.6	60	39	82	45	28	100	68	39
7b	Eisele RM(21)	Germany	2013	27	70	68	21	51	30	11	96	62	32
8d	Lee HS(38)	Korea	2014	70	85.7	58.5	40	/			98.6	83.8	65.4
9a	Wang K(39)	China	2015	128	88.3	49.2	15.1	/			94.5	71.5	43
9b	Wang K(39)	China	2015	162	88.8	51.9	14.1	/			90.4	53.7	26.7

9c	Wang K(39)	China	2015	339	91.4	50.6	11.3	/			76.6	39.3	8.3
10d	Abe T(40)	Japan	2015	15	93.3	50.2		86.7	68.9	53.3	86.7	80	60
11b	Koh PS(41)	China	2016	42	76.2	63	8.92	/			77.2	39.7	24.1
11c	Koh PS(41)	China	2016	60	85	57	5.92	/			79.3	37.1	25.7
12a	Yamashita Y(42)	Japan	2015	146	67.8	68.2		70	35	16	84	84	61
12d	Yamashita Y (42)	Japan	2015	13	76.9	56.2		92	81	81	94	76	75
13c	Zhang XY(3)	China	2015	74	93.3	49.2	15.04	/			85.3	45.7	30.5
14a	Song KD(43)	Korea	2015	39	79	52.5	20.9	66.1	48.5	43.1	88.8	88.8	83.9
14b	Song KD(43)	Korea	2015	178	81.5	55.4	18	70.1	40.8	30	98.7	85.7	72.1
15d	Bhangui P(44)	France	2016	130	91		14	70	44.5	27	83.8	71.6	58
16a	Ali MA(45)	Taiwan	2016	31	64.5	58		58	39	31	97	74	60
16b	Ali MA(45)	Taiwan	2016	74	82.4	61		63	25	17	91	70	58
16d	Ali MA(45)	Taiwan	2016	25	80	54		83	75	75	96	88	80
17a	Sun WC(46)	Taiwan	2017	43	79	63	26	57	32.1	28.6	97.6	82.7	56.4
17b	Sun WC(46)	Taiwan	2017	57	66.7	65	14	60.8	26.6	16.6	98.2	77.2	52.6
18a	Lim C(47)	France	2017	81	83	58	38	56	22	18	82	71	46
18d	Lim C(47)	France	2017	18	18	62	19	100	80	72	71	71	45
19d	Zhang XY(48)	China	2017	36	86.1	47	16.6	91.1	90.3	70.3	94.4	64.5	51.3

20a	Ma KW(22)	China	2018	210	76.7	57				32.8			48.3
20d	Ma KW(22)	China	2018	67	74.1	56				71.6			72.8
21a	Peng Z(49)	China	2018	79	84.8	55		64.5	41.6	36.3	84.8	60.2	51.9
22a	Yin X(50)	China	2019	57	71.9	57.1	29	68.4	39.4	26.6	78.9	50.5	29.7
22b	Yin X(50)	China	2019	51	60.8	60.3	28	62.8	32.8	20.4	80.3	50.9	26
23d	Chan KM(51)	Taiwan	2019	58	86.2	54	14.7	86.6	72.9	72.9	85.5	67	61.6
24c	Ryu T(24)	Japan	2020	34	73	70	24.5			44.5	81	52.1	41.6
25a	Xia Y(52)	China	2020	120	89.2	50	29.5	85	51.7	33.3	92.5	65.8	43.6
25b	Xia Y(52)	China	2020	120	90.8	52	26.3	74.2	40	25.8	87.5	52.5	38.5
26a	Lu LH(53)	China	2020	138	88.7	50.3		/			91.8	82	72.9
26b	Lu LH(53)	China	2020	194	89.9	52.9		/			94.4	75.4	61.7
27c	Wang C(54)	China	2020	111	95.5	48		31.2	15.9	13	61.8	32.5	27.9
28c	Kim HS(26)	Korea	2021	203	83.7			/			95.6	53.7	44.2
29a	Matsumoto M(9)	Japan	2021	29	82.2	66	30	65.5	43.3	43.3	93.1	89.7	84.9
29b	Matsumoto M(9)	Japan	2021	13	100	66	19.2	30.8	15.4	0	84.6	74	74
29c	Matsumoto M(9)	Japan	2021	48	89.6	67	19.4	15.6	0	0	86.5	591	43.3
30d	Hwang S(27)	Korea	2021	125	88.8	53.2	12	86.4	74.1	72.3	96.8	78.7	75.5

a: repeated hepatectomy , b: radiofrequency ablation, c: trans-hepatic arterial chemoembolization, and d: liver transplantation

Supplementary Table 2 The results of pooled effect size and heterogeneity in each subgroup

Group	Number Studies	Pooled effect size			Heterogeneity			
		Effect size	95% CI	P-value	Q-value	df (Q)	P-value	I-squared
DFS-1y								
LT	10	0.826	0.761-0.875	<0.001	27.963	9	<0.001	67.82
RFA	8	0.584	0.483-0.679	0.104	32.812	7	<0.001	78.67
RH	11	0.659	0.583-0.727	<0.001	34.800	10	<0.001	71.26
TACE	2	0.236	0.115-0.424	0.008	4.024	1	0.045	75.15
Total between					38.717	3	<0.001	
Overall	31	0.672	0.625-0.716	<0.001	224.670	30	<0.001	86.65
DFS-3y								
LT	10	0.735	0.641-0.811	<0.001	59.622	9	<0.001	84.90
RFA	8	0.289	0.224-0.363	<0.001	21.983	7	0.003	68.16
RH	11	0.383	0.325-0.446	<0.001	23.982	10	0.008	58.30
TACE	2	0.058	0.004-0.497	0.049	4.053	1	0.044	75.33
Total between					51.163	3	<0.001	
Overall	31	0.414	0.37-0.46	<0.001	583.665	30	<0.001	94.86
DFS-5y								

LT	11	0.661	0.553-0.754	0.004	86.962	10	<0.001	88.50
RFA	8	0.190	0.14-0.253	<0.001	16.880	7	0.018	58.53
RH	12	0.293	0.244-0.347	<0.001	27.440	11	0.004	59.91
TACE	2	0.053	0.005-0.413	0.025	3.404	1	0.065	70.62
Total between					54.921	3	<0.001	
Overall	33	0.315	0.276-0.357	<0.001	764.476	32	<0.001	95.81
OS-1y								
LT	11	0.895	0.83-0.938	<0.001	45.559	10	<0.001	78.05
RFA	12	0.887	0.839-0.923	<0.001	35.128	11	<0.001	68.69
RH	16	0.898	0.856-0.929	<0.001	54.206	15	<0.001	72.33
TACE	8	0.825	0.767-0.872	<0.001	30.354	7	<0.001	76.94
Total between					6.582	3	0.086	
Overall	47	0.874	0.85-0.895	<0.001	219.820	46	<0.001	79.07
OS-3y								
LT	11	0.741	0.687-0.788	<0.001	23.773	10	0.008	57.94
RFA	12	0.648	0.554-0.732	0.002	84.121	11	<0.001	86.92
RH	16	0.726	0.654-0.787	<0.001	89.535	15	<0.001	83.25
TACE	7	0.473	0.375-0.572	0.592	45.443	6	<0.001	86.80

Total between					24.849	3	<0.001	
Overall	46	0.679	0.642-0.714	<0.001	437.642	45	<0.001	89.72
OS-5y								
LT	12	0.645	0.566-0.716	<0.001	53.970	11	<0.001	79.62
RFA	12	0.473	0.356-0.594	0.667	127.398	11	<0.001	91.37
RH	17	0.539	0.461-0.616	0.324	119.280	16	<0.001	86.59
TACE	8	0.328	0.207-0.477	0.025	138.203	7	<0.001	94.93
Total between					15.266	3	0.002	
Overall	49	0.546	0.497-0.594	0.068	730.285	48	<0.001	93.43

※ Random Effect Model, I square=95.81%