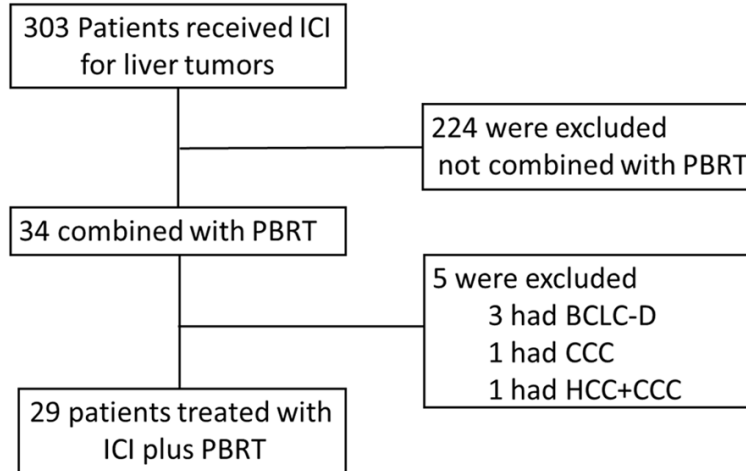


Proton beam radiotherapy and ICI for HCC



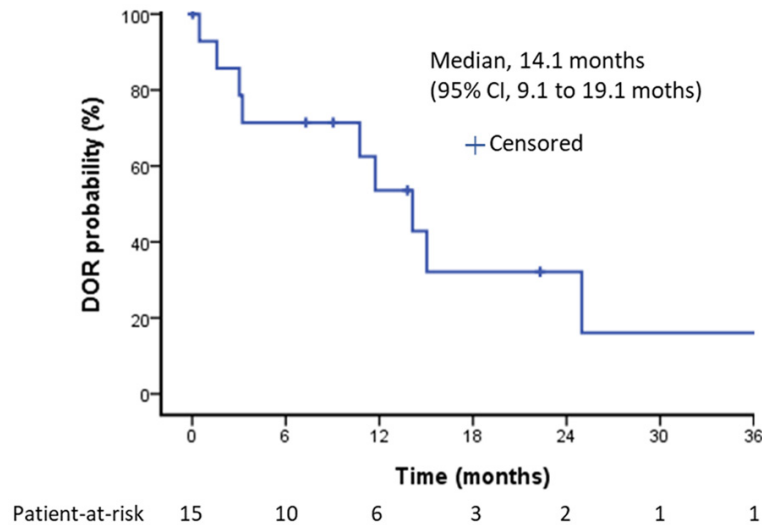
Supplementary Figure 1. Patient selection of the study. ICI, Immune Check Point Inhibitor; PBRT, Proton Beam Radiation Therapy; BCLC, Barcelona Clinic Liver Cancer; HCC, Hepatocellular Carcinoma; CCC, Cholangiocarcinoma.

Supplementary Table 1. Therapeutic summary of immune checkpoint inhibitors and proton beam radiotherapy

Treatment	N = 29, n (%)
Immune checkpoint inhibitor	
Anti-PD1 monotherapy	
Nivolumab	15 (51.7)
Pembrolizumab	2 (6.9)
Combo-immunotherapy	
Nivolumab-Sorafenib	2 (6.9)
Nivolumab-Lenvatinib	2 (6.9)
Nivolumab-Bevacizumab	2 (6.9)
Atezolizumab-Bevacizumab	4 (13.8)
Nivolumab-Ipilimumab	2 (6.9)
Proton beam radiotherapy	
66 grays/10 fractions (BED = 109.6 grays)	3 (10.3)
72.6 grays/22 fractions (BED = 96.6 grays)	18 (62.1)
60 grays/10 fractions (BED = 96.0 grays)	2 (6.9)
50 grays/10 fractions (BED = 75.0 grays)	2 (6.9)
45 grays/10 fractions (BED = 65.3 grays)	1 (3.4)
33 grays/5 fractions (BED = 54.8 grays)	2 (6.9)
33 grays/10 fractions (BED = 43.9 grays)	1 (3.4)

Abbreviations: PD1, Programmed Death-1; BED, Biological Effective Dose.

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Supplementary Figure 2. Kaplan-Meier estimates of DOR for responders. DOR, Duration of Response.

Supplementary Table 2. Reasons for stopping immune checkpoint inhibitor

Reasons	No. (%)
Treatment ongoing	2 (7)
Discontinued treatment	27 (93)
Primary reason discontinued treatment	
Radiologic disease progression	9 (31)
Clinical disease progression	3 (10)
Adverse events	5 (17)
Complete remission	4 (14)
Liver transplantation after partial remission	1 (3)
Patient choice	1 (3)
Lost to follow-up*	4 (14)
Discontinued treatment but in survival follow-up	7 (24)

*Two international medical service patients went back to their countries continuing treatment.

Supplementary Table 3. Subsequent anti-tumor therapy after immune checkpoint inhibitor plus proton beam radiotherapy

Treatments	No. (%)
≥ 1 Anticancer treatment during survival follow-up	10 (34)
Systemic treatment	7 (24)
Sorafenib	1 (3)
Lenvatinib	3 (10)
Regorafenib	1 (3)
Pembrolizumab	3 (10)
Chemotherapy	1 (3)
Investigational drug	2 (7)
Locoregional treatment	6 (21)
Transarterial chemoembolization	1 (3)
Radiofrequency Ablation	2 (7)
Proton beam radiation therapy	2 (7)
Liver transplantation	1 (3)