

### **Supplementary Figure 1. Species origin of transplantable PDX lines.**

A. Expression of human AFP, ALB, EPCAM, and GAPDH in PDX lines. Most of the PDX lines express human genes except HS125TG1.

B. Expression of human AFP, ALB, EPCAM, and GAPDH in PDX lines. HS125TG1 expresses mouse genes.

### **Supplementary Figure 2. PDXs maintain the features of parental tumor histology.**

A. H&E staining of parental tumors, passaged PDX lines, and thawed PDXs. Scale bar = 100 $\mu$ m.

B. IHC staining of parental tumor samples and PDXs with anti-Hep Par1, anti-EpCAM, and anti-CK19 antibodies. Scale bar = 100 $\mu$ m.

C. H&E staining of PDXs generated from biopsies and corresponding thawed PDXs. Scale bar = 100 $\mu$ m.

D. IHC staining of PDXs generated from biopsies with anti-Hep Par1, anti-EpCAM, and anti-CK19 antibodies. Scale bar = 100 $\mu$ m.

### **Supplementary Figure 3. Growth of established PDX lines in different recipient models.**

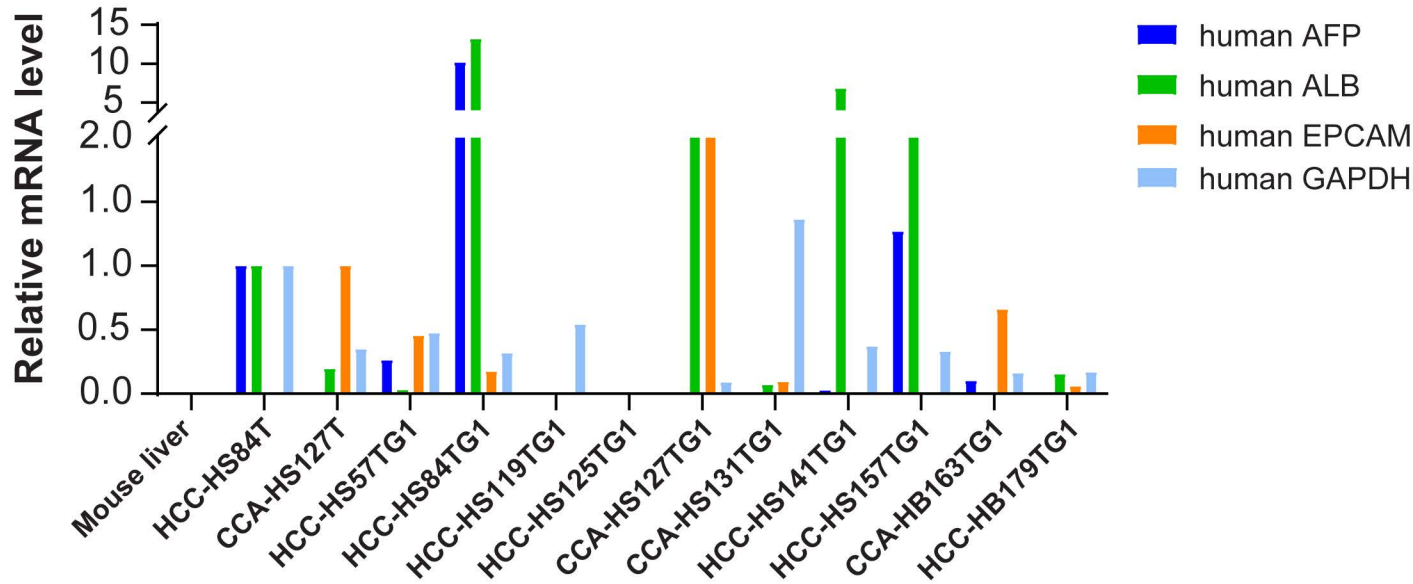
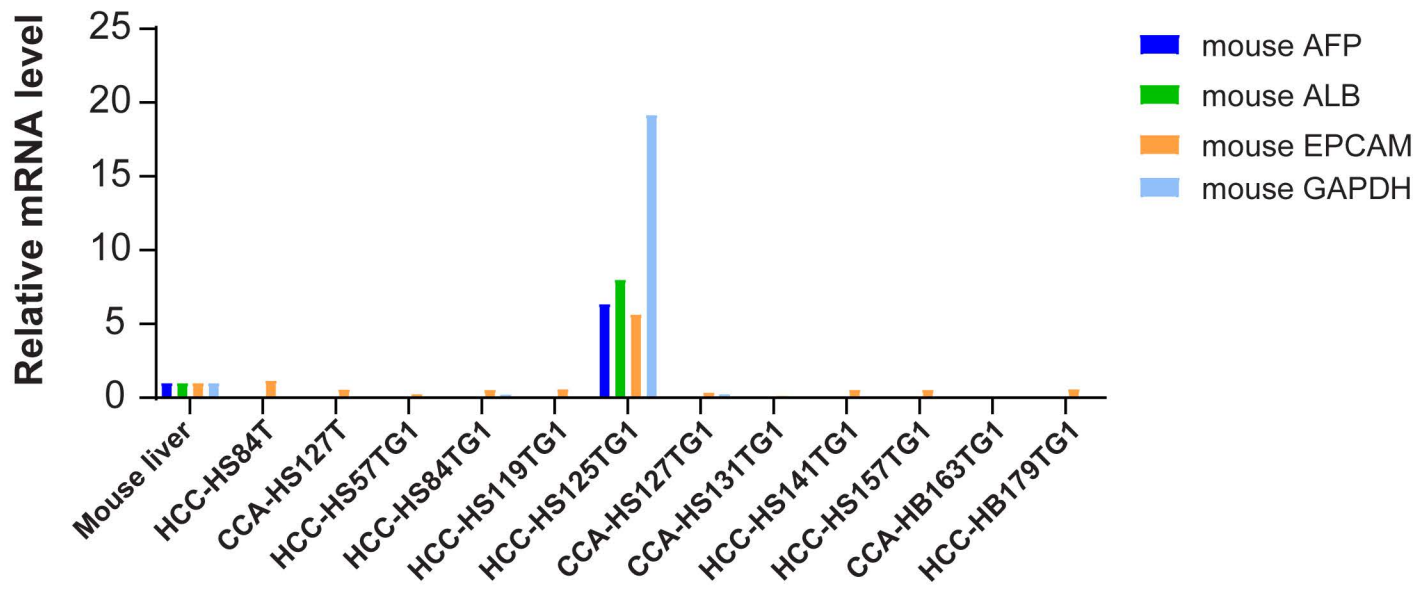
A. Growth curve of CCA-HS131 PDX in NSG mice, NSG mice after PHx, and FRG mice with NTBC water cycling (n = 6, 6, 6).

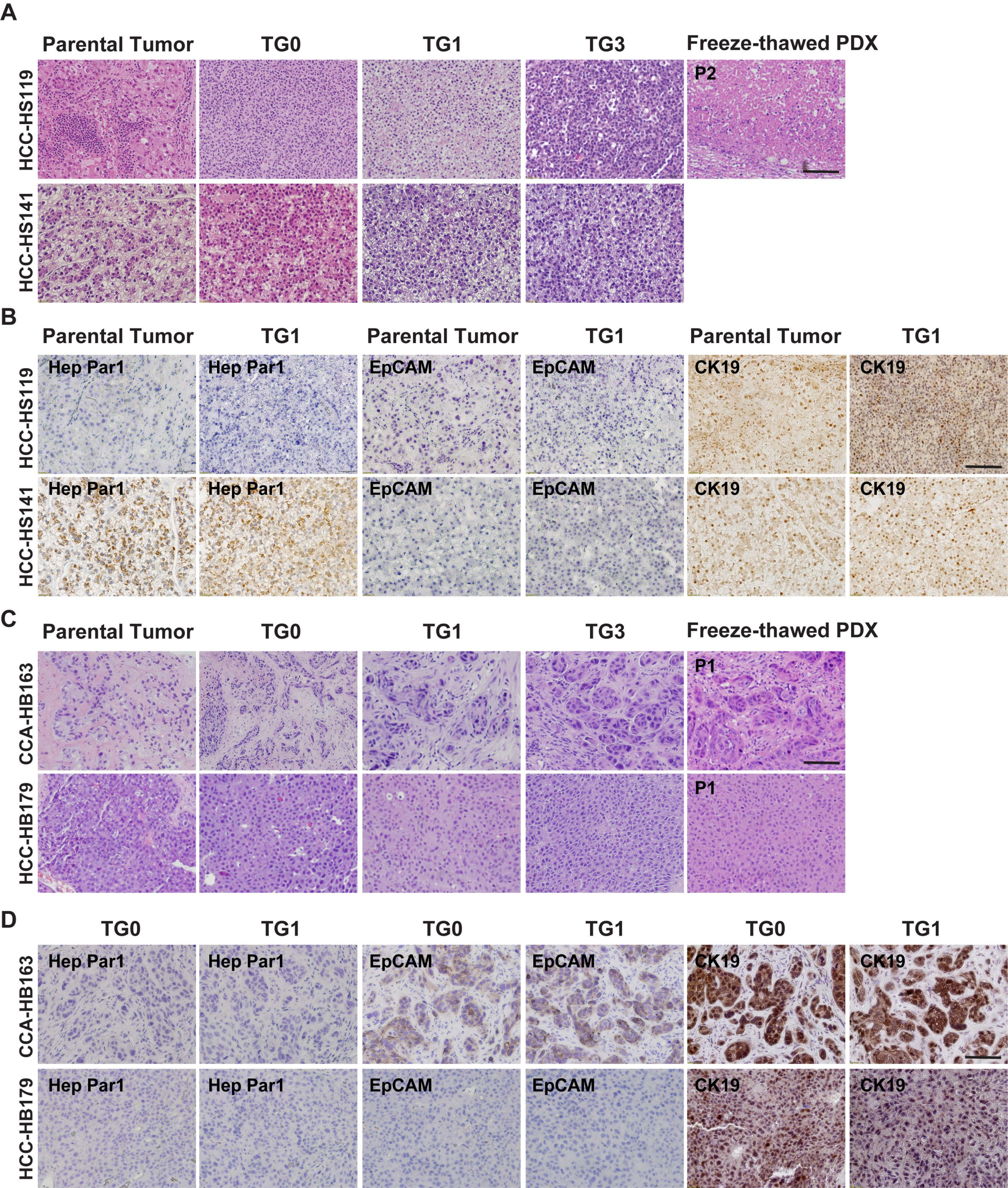
B. Growth curve of CCA-HB163 PDX in NSG mice, NSG mice after PHx, and FRG mice with NTBC water cycling (n = 6, 6, 4).

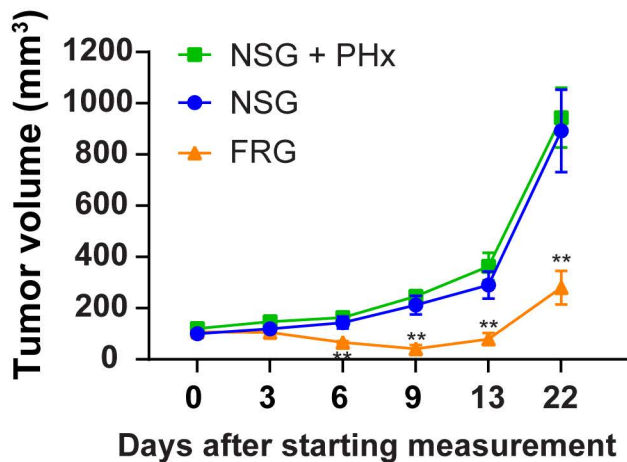
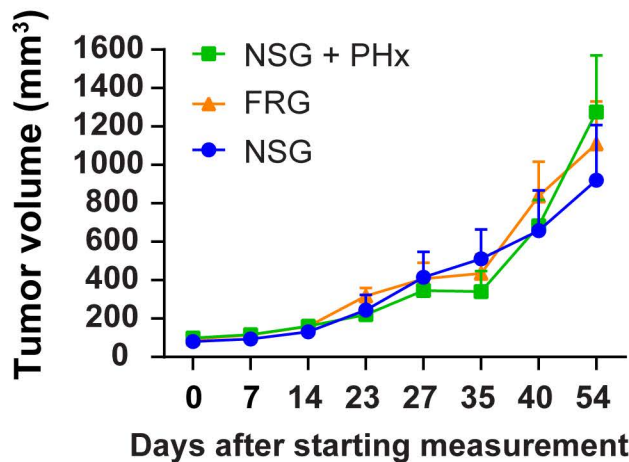
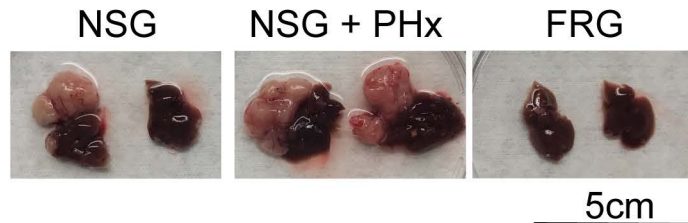
C. Pictures of CCA-HS131 PDX in the livers of NSG mice, NSG mice after PHx, and FRG mice with NTBC water cycling. Scale bar = 5 cm.

### **Supplementary Table 1. Clinical data and PDX engraftment of all samples.**

**Supplementary Table 2. Engraftment rate analysis of tumors of different grade and source (resection or biopsy; HCC or CCA). \***,  $p=0.02$  compared to moderately differentiated HCC surgical samples (Fisher's exact t test).

**A****Human gene expression****B****Mouse gene expression**



**A****HS131 SC implantation****B****HB163 SC implantation****C****HS131 Liver implantation**



**Supplementary Table 2. Engraftment rate analysis of tumors of different grade and source (resection or biopsy; HCC or CCA). \***, p=0.02 compared to moderately differentiated HCC surgical samples (Fisher's exact t test).

Type	Grade	Implanted	HCC-PDXs		Engraftment time	Passageable	Passageable
			Amount	Percentage	Weeks	HCC-PDX	Line ID
HCC Resection	N/A	3	0	0.0%	\	\	\
	well	1	1	100.0%	29.4	\	\
	well to moderate	1	1	100.0%	19.7	1	HCC-HS141
	moderate	43	9	20.9%	27.5	\	\
	moderate to poor	4	1	25.0%	19.4	1	HCC-HS157 HCC-HS84
	poor	17	5	29.4%	23.9	3*	HCC-HS119 HCC-HS125
<b>Total</b>		<b>69</b>	<b>17</b>	<b>24.6%</b>	<b>25.4</b>	<b>5</b>	

Type	Grade	Implanted	HCC-PDXs		Engraftment time	Passageable	Passageable
			Amount	Percentage	Weeks	HCC-PDX	Line ID
HCC Biopsy	N/A	9	1	11.1%	38.6	0	\
	well	1	0	0.0%	\	\	\
	moderate	11	2	18.2%	21.6	1	HCC-HB179
	moderate to poor	1	0	0.0%	\	\	\
	poor	2	0	0.0%	\	\	\
<b>total</b>		<b>24</b>	<b>3</b>	<b>12.5%</b>	<b>27.3</b>	<b>1</b>	

Type	Grade	Implanted	CCA-PDXs		Engraftment time	Passageable	Passageable
			Amount	Percentage	Weeks	CCA-PDX	Line ID
CCA Resection	well to moderate	2	0	\		\	\
	moderate	3	1	33.3%	7.0	1	CCA-HS127
	poor	1	1	100.0%	12.1	1	CCA-HS131
<b>total</b>		<b>6</b>	<b>2</b>	<b>33.3%</b>	<b>9.6</b>	<b>2</b>	

Type	Grade	Implanted	Amount	Percentage	Engraftment time	Passageable	Passageable
					Weeks	CCA-PDX	Line ID
CCA Biopsy	moderate	2	1	50.0%	19.1	1	CCA-HB163
<b>total</b>		<b>2</b>	<b>1</b>	<b>50.0%</b>	<b>19.1</b>	<b>1</b>	