

Supplementary Table S1. Clinical Characteristics of the Samples under Study

Variable	HCC		Sera (n=1688)				
	Tissues (n=144)	Healthy (n=366)	HBV (n=160)	Cirrhosis (n=147)	Lung Cancer (n=109)	Prostate Cancer (n=130)	HCC (n=776)
Gender							
Male	121 (84.0%)	180 (49.2%)	100 (62.5%)	77 (52.4%)	59 (54.1%)	130 (100.0%)	575 (74.1%)
Female	23 (16.0%)	186 (50.8%)	60 (37.5%)	70 (47.6%)	50 (45.9%)	0 (0.0%)	201 (25.9%)
Age (y)							
≤ 60	95 (66.0%)	256 (69.9%)	113 (70.6%)	90 (61.2%)	60 (55.1%)	70 (53.8%)	530 (68.3%)
> 60	49 (34.0%)	110 (30.1%)	47 (29.4%)	57 (38.8%)	49 (44.9%)	60 (46.2%)	246 (31.7%)
Viral infection							
HBV positive	78 (54.2%)	0 (0.0%)	160 (100.0%)	107 (72.8%)	0 (0.0%)	0 (0.0%)	358 (46.1%)
HBV negative	66 (45.8%)	366 (100.0%)	0 (0.0%)	40 (27.2%)	109 (100.0%)	130 (100.0%)	418 (53.9%)
Tumor size (cm)							
≤ 2	17 (11.8%)	NA	NA	NA	40 (36.7%)	40 (30.8%)	436 (56.2%)
> 2	40 (27.8%)				69 (63.3%)	90 (69.2%)	340 (43.8%)
Unknown	87 (60.4%)				0 (0.0%)	0 (0.0%)	0 (0.0%)
TNM staging ^a							
I	13 (9.1%)	NA	NA	NA	0 (0.0%)	0 (0.0%)	109 (14.0%)
II	12 (8.3%)				0 (0.0%)	0 (0.0%)	196 (25.3%)
III	12 (8.3%)				0 (0.0%)	0 (0.0%)	347 (44.7%)
IV	12 (8.3%)				0 (0.0%)	0 (0.0%)	124 (16.0%)
Unknown	95 (66.0%)				109 (100.0%)	130 (100.0%)	0 (0.0%)
HCC etiology							
Cirrhosis	19 (13.2%)	NA	NA	NA	NA	NA	297 (38.3%)
HBV	8 (5.6%)						358 (46.1%)
Cirrhosis-HBV	8 (5.6%)						269 (34.7%)
others	117 (81.2%)						121 (15.6%)
AFP (ng/ml)							
< 20	69 (47.9%)	239 (65.3%)	125 (78.1%)	101 (68.7%)	109 (100.0%)	130 (100.0%)	267 (34.4%)
≥ 20	75 (52.1%)	127 (34.7%)	35 (21.9%)	46 (31.3%)	0 (0.0%)	0 (0.0%)	509 (65.6%)

NA, not applicable.

^a Tumor staging was determined using the United Network of Organ Sharing-modified pathologic tumor-node-metastasis staging system for HCC.

Supplementary Table S2. Expression of CYP17A1 in HCC (T) and Matched Non-Tumor (N) Tissues

Sample	CYP17A1 Score	Ratio of T/N	Sample	CYP17A1 Score	Ratio of T/N	Sample	CYP17A1 Score	Ratio of T/N
1T	1.9	5.067	30T	0.9	0.947	59T	0.9	1.9
1N	0.375		30N	0.95		59N	0.475	
2T	2.125	10.625	31T	0.4	0.42	60T	1.4	0.875
2N	0.2		31N	0.95		60N	1.6	
3T	2.375	2.5	32T	2.375	3.375	61T	1.5	1.579
3N	0.95		32N	0.704		61N	0.95	
4T	1.9	2	33T	2.375	1.25	62T	0.425	0.472
4N	0.95		33N	1.9		62N	0.9	
5T	1.9	6.33	34T	2.125	2.656	63T	0.375	1.375
5N	0.3		34N	0.8		63N	0.273	
6T	1.9	1	35T	2.375	2.639	64T	1.7	1.89
6N	1.9		35N	0.9		64N	0.9	
7T	2.25	5.625	36T	0.95	7.6	65T	1.9	2.375
7N	0.4		36N	0.125		65N	0.8	
8T	2.375	2.5	37T	0.85	2.833	66T	0.075	0.083
8N	0.95		37N	0.3		66N	0.9	
9T	0.95	1.056	38T	0.9	1	67T	0.3	0.75
9N	0.9		38N	0.9		67N	0.4	
10T	1.9	76	39T	1.9	6.91	68T	1.3	2.167
10N	0.025		39N	0.275		68N	0.6	
11T	0.6	1.6	40T	1.8	4.5	69T	0.8	0.89
11N	0.375		40N	0.4		69N	0.9	
12T	1.8	1.895	41T	1.9	2	70T	1.8	2
12N	0.95		41N	0.95		70N	0.9	
13T	0.425	2.125	42T	1.8	1.895	71T	0.75	0.833
13N	0.2		42N	0.95		71N	0.9	
14T	0.9	2.77	43T	1.6	2	72T	0.9	0.948
14N	0.325		43N	0.8		72N	0.95	
15T	0.45	0.6	44T	1.9	2.235	73T	1.6	0.842
15N	0.75		44N	0.85		73N	1.9	
16T	2.85	3	45T	1.9	2	74T	1.8	2
16N	0.95		45N	0.95		74N	0.9	
17T	0.95	1.056	46T	1.9	4.75	75T	0.425	0.447
17N	0.9		46N	0.4		75N	0.95	
18T	1.8	2.25	47T	0.85	2.429	76T	0.8	0.842
18N	0.8		47N	0.35		76N	0.95	
19T	0.425	1	48T	1.7	2.429	77T	1.8	0.947
19N	0.425		48N	0.7		77N	1.9	
20T	1.9	4.75	49T	0.95	1	78T	0.225	0.265
20N	0.4		49N	0.95		78N	0.85	
21T	1.6	1.778	50T	0.85	4.857	79T	1.9	1
21N	0.9		50N	0.175		79N	1.9	
22T	0.4	0.667	51T	1.8	10.286	80T	1.9	1
22N	0.6		51N	0.175		80N	1.9	
23T	1.9	2.11	52T	1.8	2.118	81T	0.9	0.947
23N	0.9		52N	0.85		81N	0.9	
24T	1.9	2.11	53T	0.8	0.421	82T	0.4	0.21
24N	0.9		53N	1.9		82N	1.9	
25T	0.7	2.333	54T	0.9	2.571	83T	0.95	1
25N	0.3		54N	0.35		83N	0.95	
26T	1.9	2	55T	1.7	5.667	84T	0.4	0.444
26N	0.95		55N	0.3		84N	0.9	
27T	2.375	2.5	56T	0.35	0.513	85T	0.95	38
27N	0.95		56N	0.682		85N	0.025	
28T	1.7	1.79	57T	0.1	0.143	86T	1.35	2
28N	0.95		57N	0.7		86N	0.675	
29T	0.95	2.11	58T	0.9	1.125	87T	2.375	5.278
29N	0.45		58N	0.8		87N	0.45	

Supplementary Table S3. Analysis of CYP17A1 Expression with Clinico-Pathological Parameters

Variable	Patients	No. of Patients (%)		P value ^b
		CYP17A1 Weak	CYP17A1 Strong	
Age				
≤ 60 years	57	42 (73.7)	15 (26.3)	0.32
> 60 years	30	19 (63.4)	11 (36.6)	
Gender				
Male	80	54(67.5)	26 (32.5)	0.072
Female	7	7 (100)	0 (0)	
Tumor grade ^a				
I	18	8 (44.4)	10(55.6)	0.036
II	40	29(72.5)	11 (27.5)	
III	25	20 (80)	5 (20)	

^a Grade I, well-differentiated HCC; Grade II, moderately differentiated HCC; Grade III, poorly differentiated HCC.

^b P value was calculated using the Chi-squared test.

Supplementary Table S4. The Diagnostic Values of CYP17A1 and AFP in Patients with HCC (n=776) versus Healthy Controls (n=366)

Index	Sensitivity	Specificity	Accuracy	PPV	NPV	AUC (95%CI)
AFP	65.6%	65.6%	65.6%	80.2%	47.3%	0.78 (0.75–0.81)
CYP17A1	86.9%	76.8%	83.6%	88.8%	73.4%	0.91 (0.89–0.93)
Combined CYP17A1 and AFP	90.1%	80.3%	96%	97.8%	92.3%	0.94 (0.93–0.95)

Supplementary Table S5. The Diagnostic Values of CYP17A1 and AFP in Patients with Early HCC (Stages I-II, n=305) versus Healthy Controls (n=366)

Index	Sensitivity	Specificity	Accuracy	PPV	NPV	AUC (95%CI)
AFP	66.6%	65.6%	66%	61.7%	70.2%	0.78 (0.75–0.82)
CYP17A1	98.4%	76.8%	86.6%	77.9%	98.3%	0.97 (0.96–0.98)
Combined CYP17A1 and AFP	99.7%	83.1%	97.5%	94.7%	100%	0.99 (0.98–1.00)

Supplementary Table S6. The Diagnostic Values of CYP17A1 and AFP in Patients with HCC (n=776) versus Non-HCC Subjects (HBV and Cirrhosis, n=307)

Index	Sensitivity	Specificity	Accuracy	PPV	NPV	AUC (95%CI)
AFP	65.6%	49.9%	58.3%	60.2%	55.7%	0.66 (0.63–0.69)
CYP17A1	86.9%	73.1%	80.5%	78.8%	82.8%	0.89 (0.87–0.91)
Combined CYP17A1 and AFP	88.1%	88.9%	92.8%	90.9%	95.4%	0.90 (0.88–0.91)

Supplementary Table S7. The Diagnostic Values of CYP17A1 and AFP in Patients with Early HCC (Stages I-II, n=305) versus Non-HCC Subjects (HBV and Cirrhosis, n=307)

Index	Sensitivity	Specificity	Accuracy	PPV	NPV	AUC (95%CI)
AFP	66.6%	49.9%	55.1%	37.6%	76.7%	0.66 (0.63–0.70)
CYP17A1	98.4%	73.1%	81%	62.4%	99%	0.96 (0.95–0.97)
Combined CYP17A1 and AFP	98.4%	82%	92.3%	80.3%	100%	0.97 (0.96–0.98)

PPV, positive predictive value; NPV, negative predictive value; AUC, area under the ROC curve; CI, confidence intervals.