**Supplementary Figures**

Supplementary Figure 1. (A) and (B) are MAF summary plots of tumor tissue samples and ctDNA samples in our HCC patients, respectively. The combination plots include variant classification, variant type, SNV class with different colors and variants per sample as well as top 10 mutated genes in tumor tissues and ctDNA, respectively.
Supplementary Figure 2. (A) Top 20 mutant genes of hepatocellular carcinoma queried by tissue type and histology from the COSMIC database (as of July 24, 2021). (B) Mutation of TP53 gene is closely correlated with poorer DFS (log-rank test P value =1.365e-3) of hepatocellular carcinoma patients in cBioPortal database (Querying 1468 patients / 1488 samples in 7 studies).
Supplementary Figure 3. (A) and (B) illustrate enriched oncogenic pathways of mutant genes in tumor tissue samples and ctDNA samples, respectively.
Supplementary Figure 4. (A) Mutation of Rap1 signaling pathway mapped genes (FLT4, KDR, IGF1R, CSF1R, KIT, PIK3CB, FGF19, CTNNB1, GRIN2A) is closely correlated with poorer DFS (log-rank test P value =0.0858) of hepatocellular carcinoma patients in cBioPortal database (Querying 1468 patients / 1488 samples in 7 studies). (B) Mutation of Ras signaling pathway mapped genes (FLT4, KDR, IGF1R, CSF1R, KIT, PIK3CB, FGF19, NF1, GRIN2A) is closely correlated with poorer DFS (log-rank test P value =0.0378) of hepatocellular carcinoma patients in cBioPortal database (Querying 1468 patients / 1488 samples in 7 studies).
### 1.2 Supplementary Tables

**Supplementary Table 1.** Detailed information of sequencing samples

| Sample ID | Tumor tissue mutations | ctDNA mutations | Tumor diameter (cm) | Differentiation | Liver cirrhosis | MVI | MVI number | Early recurrence (≤12 months) | Recurrence area | RFS (months) | Postoperative adjuvant therapy |
|-----------|------------------------|-----------------|---------------------|-----------------|----------------|-----|------------|-------------------------------|----------------|---------------|-------------------------------|
| 1         | Yes                    | Yes             | 4.7                 | Moderate        | No             | No  | -          | No                            | No             | 23.27         | No                            |
| 2         | Yes                    | Yes             | 3.0                 | Moderate        | No             | No  | -          | No                            | No             | 23.23         | No                            |
| 4         | Yes                    | Yes             | 7.0                 | Moderate        | No             | No  | -          | No                            | No             | 15.70         | No                            |
| 5         | Yes                    | Yes             | 6.0                 | Moderate        | No             | Yes | ≤5         | No                            | No             | 22.73         | TACE after recurrence         |
| 6         | Yes                    | Yes             | 2.8                 | Moderate        | No             | No  | -          | No                            | No             | 22.53         | No                            |
| 7         | Yes                    | Yes             | 6.2                 | Moderate        | No             | Yes | ≤5         | No                            | No             | 22.07         | Hepatic resection after recurrence |
| 9         | Yes                    | Yes             | 3.5                 | Moderate        | No             | No  | -          | No                            | No             | 22.47         | No                            |
| 12        | Yes                    | Yes             | 3.5                 | Moderate        | Yes            | No  | -          | No                            | No             | 21.77         | No                            |
| 15        | Yes                    | Yes             | 2.2                 | Moderate        | Yes            | No  | -          | No                            | No             | 21.10         | No                            |
| 16        | Yes                    | Yes             | 8.5                 | Moderate        | Yes            | Yes | ≤5         | Yes                           | Intrahepatic   | 7.40          | No                            |
| 18        | Yes                    | Yes             | 2.4                 | Poor            | No             | No  | -          | No                            | No             | 18.37         | No                            |
| 19        | Yes                    | Yes             | 1.3                 | Moderate        | Yes            | Yes | ≤5         | Yes                           | Intrahepatic   | 12.03         | No                            |
| 20        | NA*                    | Yes             | 4.9                 | Moderate        | No             | Yes | >5         | Yes                           | Intrahepatic   | 4.00          | TACE after recurrence         |
| Sample ID | Tumor tissue mutations | ctDNA mutations | Tumor diameter (cm) | Differentiation | Liver cirrhosis | MVI | MVI number | Early recurrence (≤12 months) | Recurrence area | RFS (months) | Postoperative adjuvant therapy |
|-----------|-----------------------|-----------------|--------------------|-----------------|----------------|-----|------------|------------------------------|----------------|--------------|-------------------------------|
| 21        | Yes                   | Yes             | 8.0                | Moderate        | Yes            | Yes | ≤5         | No                           |                | 20.83        | TACE                          |
| 22        | NA*                   | NA*             | 1.8                | Poor            | Yes            | No  | -          | No                           |                | 16.07        | No                            |
| 24        | Yes                   | Yes             | 8.0                | Poor            | No             | No  | -          | No                           |                | 20.67        | No                            |
| 28        | Yes                   | Yes             | 4.3                | Poor            | No             | No  | -          | Yes                          | Intrahepatic   | 1.37         | Radiofrequency ablation after recurrence |
| 29        | Yes                   | Yes             | 2.0                | Moderate        | No             | No  | -          | No                           |                | 20.47        | No                            |
| 30        | Yes                   | Yes             | 3.5                | Moderate        | Yes            | No  | -          | Yes                          | Intrahepatic   | 10.20        | Radiofrequency ablation after recurrence |
| 31        | Yes                   | Yes             | 2.7                | Moderate        | No             | No  | -          | No                           |                | 20.43        | No                            |
| 32        | Yes                   | Yes             | 8.0                | Moderate        | No             | No  | -          | Yes                          | Extrahepatic   | 8.60         | Hepatic resection after recurrence |
| 33        | Yes                   | Yes             | 6.0                | Moderate        | No             | No  | -          | No                           |                | 20.37        | No                            |
| 34        | Yes                   | Yes             | 2.8                | Poor            | No             | No  | -          | Yes                          | Intrahepatic   | 8.67         | TACE after recurrence          |
| 35        | Yes                   | Yes             | 16.2               | Moderate        | Yes            | Yes | ≤5         | No                           |                | 20.07        | TACE                          |
| 36        | Yes                   | Yes             | 2.7                | Poor            | No             | No  | -          | No                           |                | 19.73        | No                            |
| 38        | Yes                   | Yes             | 8.0                | Moderate        | Yes            | No  | -          | NA                          | NA             | NA           | No                            |
| 39        | Yes                   | Yes             | 2.5                | Moderate        | Yes            | No  | -          | No                           |                | 19.70        | No                            |

Supplementary Material
| Sample ID | Tumor tissue mutations | ctDNA mutations | Tumor diameter (cm) | Differentiation | Liver cirrhosis | MVI | MVI number | Early recurrence (≤12 months) | Recurrence area | RFS (months) | Postoperative adjuvant therapy |
|-----------|------------------------|-----------------|---------------------|-----------------|-----------------|-----|------------|-------------------------------|----------------|-------------|-------------------------------|
| 40        | Yes                    | Yes             | 5.9                 | Moderate        | Yes             | No  | -          | No                            | No             | 19.50       | No                            |
| 41        | Yes                    | Yes             | 1.9                 | Poor            | Yes             | No  | -          | No                            | No             | 19.27       | No                            |
| 43        | Yes                    | NA*             | 2.5                 | Moderate        | Yes             | No  | -          | No                            | No             | 19.27       | No                            |
| 45        | Yes                    | NA*             | 2.5                 | Moderate        | No              | No  | -          | No                            | No             | 18.80       | NA                            |
| 46        | Yes                    | Yes             | 12.6                | Poor            | No              | Yes | >5         | Yes                           | Extrahepatic   | 3.13        | NA                            |
| 47        | Yes                    | Yes             | 3.0                 | Poor            | No              | No  | -          | No                            | No             | 18.70       | No                            |
| 52        | Yes                    | Yes             | 4.0                 | Moderate        | Yes             | No  | -          | No                            | No             | 18.03       | No                            |
| 54        | Yes                    | Yes             | 6.5                 | Poor            | Yes             | No  | -          | Yes                           | Intrahepatic   | 11.53       | Radiofrequency ablation after recurrence |
| 55        | Yes                    | NA*             | 6.5                 | Moderate        | No              | No  | -          | No                            | Intrahepatic   | 17.87       | No                            |
| 56        | Yes                    | Yes             | 16.0                | Poor            | No              | Yes | >5         | Yes                           | Intrahepatic   | 8.90        | Sorafenib; TACE after recurrence |
| 57        | Yes                    | NA*             | 5.5                 | Poor            | No              | Yes | >5         | Yes                           | Intrahepatic   | 3.43        | Sorafenib; TACE               |
| 58        | Yes                    | NA*             | 8.0                 | Poor            | Yes             | Yes | ≤5         | Yes                           | Extrahepatic   | 7.83        | No                            |
| 59        | Yes                    | NA*             | 4.0                 | Moderate        | No              | No  | -          | No                            | No             | 17.60       | No                            |
| 60        | Yes                    | NA*             | 5.5                 | Moderate        | Yes             | No  | -          | No                            | No             | 17.53       | No                            |
| 61        | Yes                    | NA*             | 7.5                 | Poor            | No              | Yes | ≤5         | No                            | No             | 17.43       | No                            |
## Supplementary Material

| Sample ID | Tumor tissue mutations | ctDNA mutations | Tumor diameter (cm) | Differentiation | Liver cirrhosis | MVI | MVI number | Early recurrence (≤12 months) | Recurrence area | RFS (months) | Postoperative adjuvant therapy |
|-----------|------------------------|-----------------|--------------------|-----------------|----------------|-----|-----------|-------------------------------|----------------|-------------|--------------------------------|
| 86        | Yes                    | NA*             | 5.8                | Moderate        | No             | Yes | -         | Yes                           | Intrahepatic    | 4.97        | Radiofrequency ablation and TACE after recurrence |
| 88        | Yes                    | NA*             | 15.0               | Poor            | No             | Yes | -         | Yes                           | Intrahepatic    | 2.77        | TACE after recurrence          |

*NA* indicates that the sequencing process was not performed or failed due to insufficient sample size.

NA indicates that the No.38 patient was lost to follow-up.

### Supplementary Table 2. List of human tumor-associated 1021-gene panel

**All 4847 exon regions of 312 genes**

| ABL1 | ACVR1B | AKT1 | AKT2 | AKT3 | ALK | APC | AR | ARAF | ARID1A |
|------|--------|------|------|------|-----|-----|----|-----|-------|
| ARID1B | ARID2 | ASXL1 | ATM | ATR | ATRX | AURKA | AURKB | AXIN1 | AXIN2 |
| AXL | B2M | BAP1 | BARD1 | BCL2 | BCL2L1 | BCOR | BLM | BMPR1A | BRAF |
| BRCA1 | BRCA2 | BRD4 | BRIP1 | BTK | CARD11 | CASP8 | CBFB | CBL | CCND1 |
| CCND2 | CCND3 | CCNE1 | CD274 | CDC73 | CDH1 | CDK12 | CDK4 | CDK6 | CDK8 |
| CDKN1A | CDKN1B | CDKN2A | CDKN2B | CDKN2C | CEBPA | CHEK1 | CHEK2 | CIC | CREBBP |
| CRKL | CSF1R | CTCF | CTNNA1 | CTNNB1 | CUL3 | CYLD | DAXX | DDR1 | DDR2 |
| DICER1 | DNMT3A | DOT1L | EGFR | EIF1AX | C11orf30 | EP300 | EPAS1 | EPCAM | EPHA2 |
| Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| EPHA3       | EPHA5       | EPHB1       | EPHB6       | ERBB2       | ERBB3       | ERBB4       | ERCC1       | ERCC3       | ERCC4       |
| ERCC5       | ERG         | ERRF11      | ESR1        | EXT1        | EXT2        | EZH2        | FAM123B     | FAM175A     | FANCA       |
| FANCC       | FANCD2      | FANCE       | FANCF       | FANCG       | FANCL       | FANCM       | FAS         | FAT1        | FAT2        |
| FBXW7       | FGF19       | FGF3        | FGF4        | FGFR1       | FGFR2       | FGFR3       | FGFR4       | FIGF         | FHCN         |
| FLT1        | FLT3        | FLT4        | FOXA1       | FOXL2       | FOXP1       | FUBP1       | GALNT12     | GATA3       | GNA11       |
| GNAQ        | GNAS        | GRIN2A      | GRM3        | HDAC1       | HGF         | HNF1A       | HOXB13      | HRAS        | IDH1        |
| IDH2        | IFNG        | IFNGR1      | IGF1R       | IKBKE       | IKZF1       | IL7R        | INPP4B      | IRF2        | IRS2        |
| JAK1        | JAK2        | JAK3        | JUN         | KDM5A       | KDM5C       | KDM6A       | KDR         | KEAP1       | KIT         |
| Kras        | LRP1B       | MAF         | MAP2K1      | MAP2K2      | MAP2K4      | MAP3K1      | MAPK1       | MAX         | MCL1        |
| MDM2        | MDM4        | MED12       | MEF2B       | MEN1        | MET         | MITF        | MLH1        | MLH3        | MLL         |
| MLL2        | MLL3        | MPL         | MRE11A      | MS4A1       | MSH2        | MSH3        | MSH6        | MST1R       | MTOR        |
| MUTYH       | MYC         | MYCL1       | MYCN        | MYD88       | NBN         | NCOR1       | NF1         | NF2         | NFE2L2      |
| NFKBIA      | NKKX2-1     | NOTCH1      | NOTCH2      | NOTCH3      | NPM1        | NRAS        | NSD1        | NTHL1       | NTRK1       |
| NTRK2       | NTRK3       | PALB2       | PARK2       | PARP1       | PAX5        | PBRM1       | PCK1        | PDCD1       | PDCD1LG2     |
| PDGFRB      | PDGFRB      | PDK1        | PIK3CA      | PIK3CB      | PIK3CG      | PIK3R1      | PIK3R2      | PMS1        | PMS2        |
| POLD1       | POLE        | POT1        | PPP2R1A     | PRDM1       | PRKAR1A     | PTCH1       | PTCH2       | PTEN        | PTPN11      |
| PTPRD       | RAC1        | RAD50       | RAD51       | RAD51B      | RAD51C      | RAD51D      | RAD52       | RAD54L      | RAF1        |
Introns, promoters, and fusion breakpoint regions of 38 genes

| ALK  | BCL2L11 | BRAF  | BRCA1 | BRD4  | CD74  | EGFR  | EML4  | ERG   | ETV6  |
|------|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| EZR  | FGFR1   | FGFR2 | FGFR3 | KIF5B | KIT   | MAML2 | MET   | MSH2  | MYC   |
| MYCL1| NCOA4   | NOTCH2| NTRK1 | NTRK2 | NTRK3 | PDGFR | RAF1  | RET   | ROS1  |
| RSPO2| SDC4    | SLC34A2| TERT  | TFE3  | TMPRSS2| TPM3  | PMS2  |       |       |

1778 coding regions of 709 other related genes

| ABCA13| ABCB1 | ABCC1 | ABCC11| ABCC2 | ABCG2  | ABL2 | ACACA | ACIN1 | ACTB |
|-------|-------|-------|-------|-------|--------|------|-------|-------|------|
| ACTG1 | ACTG2 | ACVR2A| ACVRL1| ADAM29| ADAMTS5| ADCY1| AFF1  | AFF2  | AFF3 |
| AHNAK | AKAP9 | ALB   | AMOT  | ANGPT1| ANK3   | ANKRD11| ANKRD30A| ANKRD30B| APEX1|
| APOBEC3B| ARAP3| ARFGEF1| ARFGEF2| ARHGAP29| ARHGAP35| ARID4B| ARID5B| ARNT  | ASCL4 |
| ETS1 | ETV1 | ETV5 | ETV6 | EWSR1 | EZR | F8 | FAM131B | FAM135B | FAM157B |
|------|------|------|------|--------|-----|----|--------|--------|--------|
| FAM46C | FAM5C | FAP | FASLG | FAT3 | FAT4 | FCGR1A | FCGR2A | FCGR2B | FCGR3A |
| FCRL4 | FGF10 | FGF12 | FGF14 | FGF23 | FGF6 | FLG | FLJ1 | FLNC | FMN2 |
| FN1 | FNDC4 | FOXA2 | FOXO1 | FOXO3 | FOXQ1 | FRMPD4 | FUS | FXR1 | FYN |
| FZD1 | G3BP1 | G3BP2 | GAB2 | GABRA6 | GATA1 | GATA2 | GFRAL | GIGYF1 | GKN2 |
| GLB1L3 | GLI1 | GLI2 | GLI3 | GMPS | GNA13 | GNG2 | GPC3 | GPR124 | GPS2 |
| GPX1 | GRB7 | GSK3B | GSTM5 | GSTP1 | GUSB | H3F3A | H3F3B | H3F3C | HCLS1 |
| HCN1 | HDAC4 | HDAC9 | HECW1 | HEY1 | HIST1H1C | HIST1H1D | HIST1H1E | HIST1H2AC | HIST1H2AG |
| HIST1H2AL | HIST1H2AM | HIST1H2BC | HIST1H2BD | HIST1H2BJ | HIST1H2BK | HIST1H2BO | HIST1H3B | HIST1H3C | HIST1H3D |
| HIST1H3F | HIST1H3G | HIST1H3H | HIST1H3I | HIST1H4I | HIST3H3 | HLA-A | HLA-B | HLA-C | HLF |
| HMCN1 | HNF1B | HRNPDL | HOXA11 | HOXA13 | HOXA3 | HOXA9 | HOXC13 | HOXD11 | HOXD13 |
| HSD3B1 | HSP90AA1 | HSP90AB1 | HSPA8 | HSPD1 | HSPH1 | ICK | ICOSLG | ID3 | IFFM3 |
| IGF1 | IGF2 | IGF2R | IGLL5 | IKZF2 | IKZF3 | IL10 | IL1RAPL1 | IL21R | IL6 |
| IL6ST | IMPG1 | ING1 | INHBA | INPP4A | INPPL1 | INS | IRF4 | IRF6 | IRF7 |
| ITGB3 | ITK | ITSN1 | JARID2 | KALRN | KAT6A | KAT6B | KCNJ5 | KCNQ2 | KDM2B |
| KEL | KIF5B | KL4F4 | KL6L6 | KLK1 | KRTAP5-5 | L3MBTL1 | LAMA2 | LATS1 | LATS2 |
| LCP1 | LEF1 | LGALS8 | LIFR | LPHN2 | LPP | LRP2 | LRP4 | LRP5 | LRP6 |
| Gene   | Gene   | Gene   | Gene   | Gene   | Gene   | Gene   | Gene   | Gene   | Gene   |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| LRRC7  | LRRK2  | LYN    | LZTS1  | MACF1  | MAD1L1 | MAGI2  | MAML2  | MAML3  | MAP3K13 |
| MAPK3  | MCC    | MCM3   | MDC1   | MECOM  | MEF2C  | MGA    | MIB1   | MIOS   | MKL1   |
| MLL4   | MLLT3  | MMP11  | MMP2   | MNI    | MNDA   | MNX1   | MSH4   | MSN    | MSR1   |
| MTHFR  | MTRR   | MUC5B  | MYH11  | MYH14  | MYH9   | MYO3A  | MYOD1  | NAP1L1 | NAV3    |
| NCAM2  | NCF2   | NCF4   | NCK1   | NCOA3  | NCOA4  | NCOR2  | NCSTN  | NDUF13 | NFATC4 |
| NFE2L3 | NKX3-1 | NLRC3  | NOD1   | NOS3   | NOTCH4 | NQO1   | NR1H2  | NR2F2  | NR4A2  |
| NRG1   | NRP2   | NRXN1  | NTM    | NUMA1  | NUP107 | NUP210 | NUP93  | NUP98  | OBSCN  |
| OGDH   | OMD    | OPCML  | OR11G2 | OR2T4  | OR4A15 | OR4C6  | OR5L2  | OR6F1  | P2RY8  |
| P4HB   | PABPC1 | PABPC3 | PAG1   | PAK1   | PAK3   | PASK   | PAX3   | PAX7   | PC     |
| PCDH18 | PCSK6  | PCSK7  | PDCD11 | PDE4DIP| PDGFB  | PDILT  | PER1   | PGR    | PHF1   |
| PHF6   | PIK3C2A| PIK3C2B| PIK3C2G| PIK3C3 | PIM1   | PKD1L2 | PKHD1  | PLAG1  | PLCB1  |
| PLCG1  | PLCG2  | PLK1   | PLXNA1 | PLXNB2 | PNRC1  | POLQ   | POM121 | POM121L12| POU2AF1|
| PLCM1  | PPP1R17| PPP6C  | PRDM16 | PREX2  | PRF1   | PRKAA1 | PRKCB  | PRKCI  | PRKDC  |
| PRRX1  | PRX    | PSG2   | PSIP1  | PSMB1  | PSMB5  | PTGS1  | PTGS2  | PTPN13 | PTPN2  |
| PTB    | PTB    | PTBB   | PTBB   | PTB    | PTB    | PTB    | PTB    | PTB    | PTB    |
| RANBP2 | RASA1  | RASGRP1| RBL1   | REL    | RELN   | RFC1   | RGS3   | RHEB   | ROH    |
| RHOT1  | RIT1   | RNASEL | ROBO1  | ROBO2  | ROBO3  | ROCK1  | RGGR   | RPS6KB1| RPS6KB2 |
|        |        |        |        |        |        |        |        |        |        |
| Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  | Gene  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| RSPO2 | RSPO3 | RUNX1T1 | RUNX2 | RXRA | RYR1 | RYR2 | SBDS | SCUBE2 | SDC4 | SEC31A | SEMA3A | SEMA3E | SEMA6A | SERPINA7 | SETBP1 | SETDB1 | SF1 | SF3A1 | SFPQ | SGCZ | SGK1 | SH2B3 | SH2D1A | SH3PXD2A | SHH | SI | SIN3A | SLC16A1 | SLC1A2 | SLC22A16 | SLC22A18 | SLC22A2 | SLC22A3 | SLC34A2 | SLCO1B3 | SLIT1 | SLIT2 | SMARCD1 | SMARCE1 | SMC1A | SMC1B | SNCAIP | SNTG1 | SNX29 | SOD2 | SOS1 | SOX10 | SOX17 | STAG1 | STAT1 | SUCLG1 | SUCLG2 | SULT1A1 | SUZ12 | SVEP1 | SYNE1 | TAF1 | TAF15 | TAF1L | SMC1A | SMC1B | SNCAIP | SNTG1 | SNX29 | SOD2 | SOS1 | SOX10 | SOX17 | STAG1 | STAT1 | TENM3 | TERT | TET1 | TFDP1 | TFDP2 | TFE3 | TGFB1 | THBS2 | TJP1 | TLE1 | TLL2 | TLR4 | TLX3 | TMEM132D | TNFSF11 | TNN | TP53BP1 | TP63 | TP73 | TPM3 | TPR | TRAF2 | TRAF7 | TRIM24 | TRIM58 | TRIO | TRPC5 | TRRAP | TSHZ2 | TSHZ3 | TTF1 | TUBA3C | TUBB3 | TUSC3 | TXNIP | TYMS | TYR | UBE2D2 | UBR5 | UGT1A1 | UMP5 | UPF3B | USH2A | USP6 | USP8 | VEZF1 | VIM | VTCN1 | WASF3 | WDR90 | WDTC1 | WHSC1 | WHSC1L1 | WIPF1 | WNK1 | WNT5A | WSCD2 | WWOX | WWP1 | WWP2 | XIAP | XPC | XRCC1 | XRCC3 | YAP1 | YY1AP1 | ZBTB16 | ZC3H11A | ZFHX3 | ZFP36L1 | ZFP36L2 | ZFPM2 | ZIC3 | ZNF217 | ZNF384 | ZNF521 | ZNF638 | ZNF750 | ZNF804B |
**Supplementary Table 3. Surgical details of HCC patients**

| Variables                          | HCC patients (N=44) |
|------------------------------------|---------------------|
| **Type of resection**              |                     |
| Anatomical tumorectomy: n (%)      | 17 (38.64%)         |
| Laparoscopic tumorectomy: n (%)    | 27 (61.36%)         |
| Blood loss (ml): mean ± SD (Minimum-Maximum) | 330 ± 386.86 (30-2000) |
| Blood transfusion: n (%)           | 4 (9.09%)           |
| **Operative time (hour)**          |                     |
| >3: n (%)                          | 32 (72.73%)         |
| 3: n (%)                           | 7 (15.91%)          |
| 2: n (%)                           | 5 (11.36%)          |