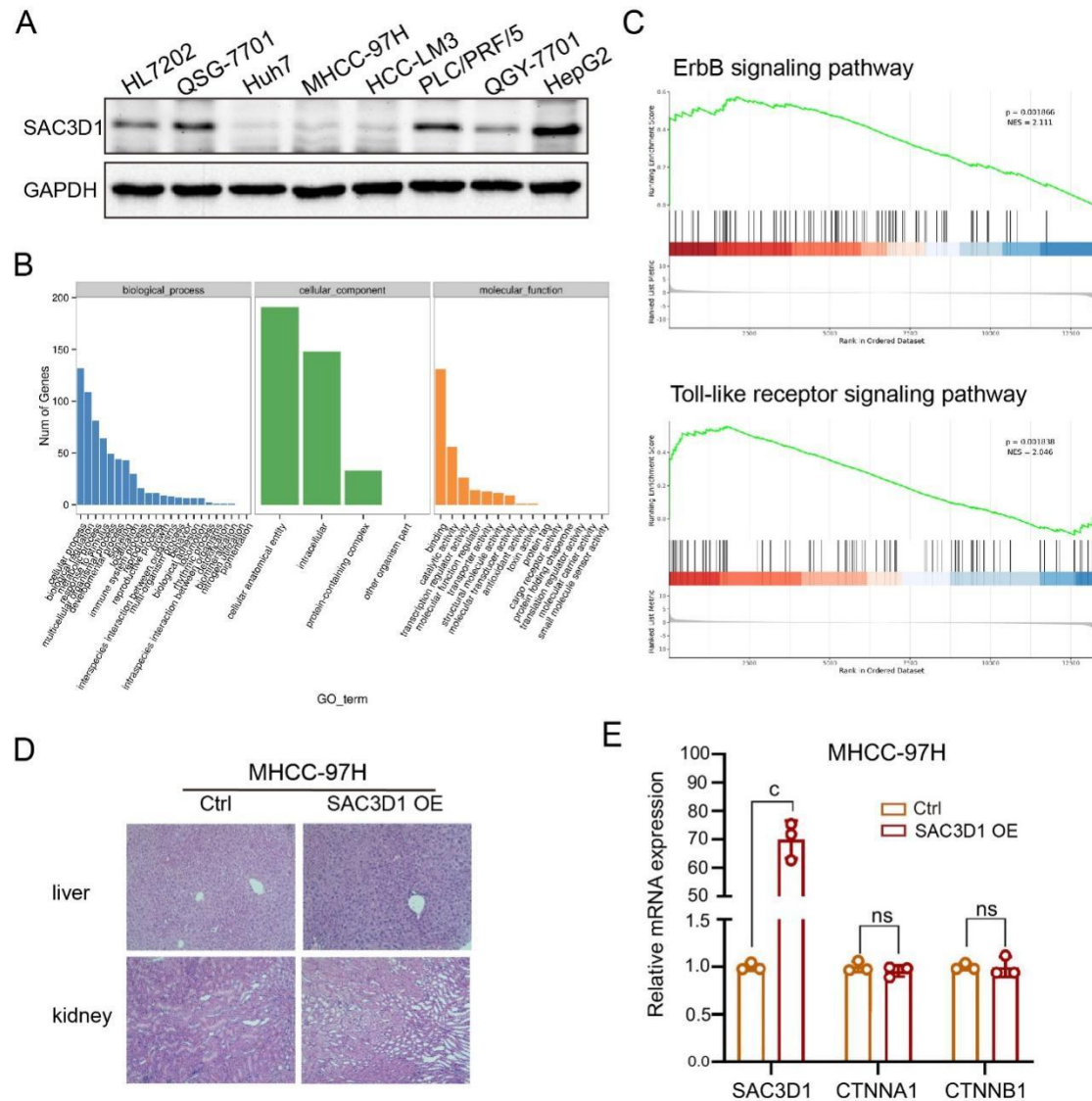**Supplementary Figure 1 The correlation between SAC3D1 expression levels and prognosis in different populations of liver hepatocellular carcinoma patients.** A: Kaplan-Meier curve analysis indicates that in liver hepatocellular carcinoma (LIHC) patient groups with varying tumor grades, the overall survival rate of the high SAC3D1 expression group is lower than that of the low expression group; B: Kaplan-Meier curve analysis shows that among LIHC patients of different genders, lower SAC3D1 expression is associated with a higher survival rate in LIHC patients; C: Western blotting was performed to assess the relative expression of SAC3D1 in HCC and adjacent non-tumor tissue samples.

Supplementary Figure 2 Expression of SAC3D1 in different HCC cell lines and its impact on signaling pathways. A: Western blotting analysis of SAC3D1 protein levels in various HCC cell lines; B: GO analysis of the effects of upregulated SAC3D1 expression on cellular composition, biological processes, and molecular functions; C: GSEA analysis of the signaling pathways affected by upregulated SAC3D1 expression; D: The metastatic tumor nodules in liver and kidney of nude mice by HE staining; E: Quantitative real-time PCR (qPCR) was carried out to clarify the effect of SAC3D1 overexpression (OE) on the transcriptional level of *β-Catenin*. [a]P < 0.05, [b]P < 0.01, [c]P < 0.001.

Supplementary Table 1 The sequences of shRNA targeting SAC3D1 and negative control

shRNA names	Sequences
pLKO	Scramble_shRNA
SAC3D1 shRNA1	GAAGCCCTGCATGAGGTTCTACTCG
	AGTAGAACCTCATGCAGGGCTTC
SAC3D1 shRNA2	CCAGTACGTGCAAGGTGTTAGCTCG
	AGCTAACACCTTGCACGTACTGG

Supplementary Table 2 The primer sequences used for real-time quantitative reverse transcription PCR assay

Primer	Sequences（5'- 3'）
β-Actin	Foward: GAGCTACGAGCTGCCTGACG
	Reverse: CCTAGAAGCATTTGCGGTGG
β-Catenin (CTNNB1)	Foward: CACAAGCAGAGTGCTGAAGGTG
	Reverse: GATTCCTGAGAGTCCAAAGACAG
a-Catenin (CTNNA1)	Foward: GGACCTGCTTTCGGAGTACATG
	Reverse: CTGAAACGTGGTCCATGACAGC
SAC3D1	Foward: CCTCTTTCTGCTCTATAACCTGG
	Reverse: CCTCTCGGAAGGCAGCATCTAC
GLUT1	Foward: ATTGGCTCCGGTATCGTCAAC
	Reverse: GCTCAGATAGGACATCCAGGGTA
HK2	Foward: AGGAAGAGCAAAGACCCTTGGGTG
	Reverse: GCCACTCACCCTCACAGCCAGTC
PKM2	Foward: ATGTCGAAGCCCCATAGTGAA
	Reverse: TGGGTGGTGAATCAATGTCCA
LDHA	Foward: ATGGCAACTCTAAAGGATCAGC
	Reverse: CCAACCCCAACAACTGTAATCT

Supplementary Table 3 Detailed information of antibodies and reagents

Antibodies	Catalog No.	Manufacturer	IHC dilution ratio	WB dilution ratio
SAC3D1	25857-1-AP	Proteintech	1:100	1:1000
β-Catenin	AB32572	Abcam	1:500	1:5000
c-Myc	67447-1-Ig	Proteintech	1:500	1:5000
GLUT1	21829-1-AP	Proteintech	1:1000	1:1000
HK2	22029-1-AP	Proteintech	1:1000	1:5000
PKM2	15822-1-AP	Proteintech	1:100	1:1000
LDHA	19987-1-AP	Proteintech	1:50	1:2000
E-cadherin	60335-1-Ig	Proteintech	-	1:4000
N-cadherin	66219-1-Ig	Proteintech	-	1:10000
Vimentin	80232-1-RR	Proteintech	-	1:10000
SNAI1	13099-1-AP	Proteintech	-	1:500
HRP-conjugated Beta Actin	HRP-60008	Proteintech	-	1:5000
HRP Goat Anti-Rabbit IgG (H+L)	ab6721	Abcam	-	1:2000