

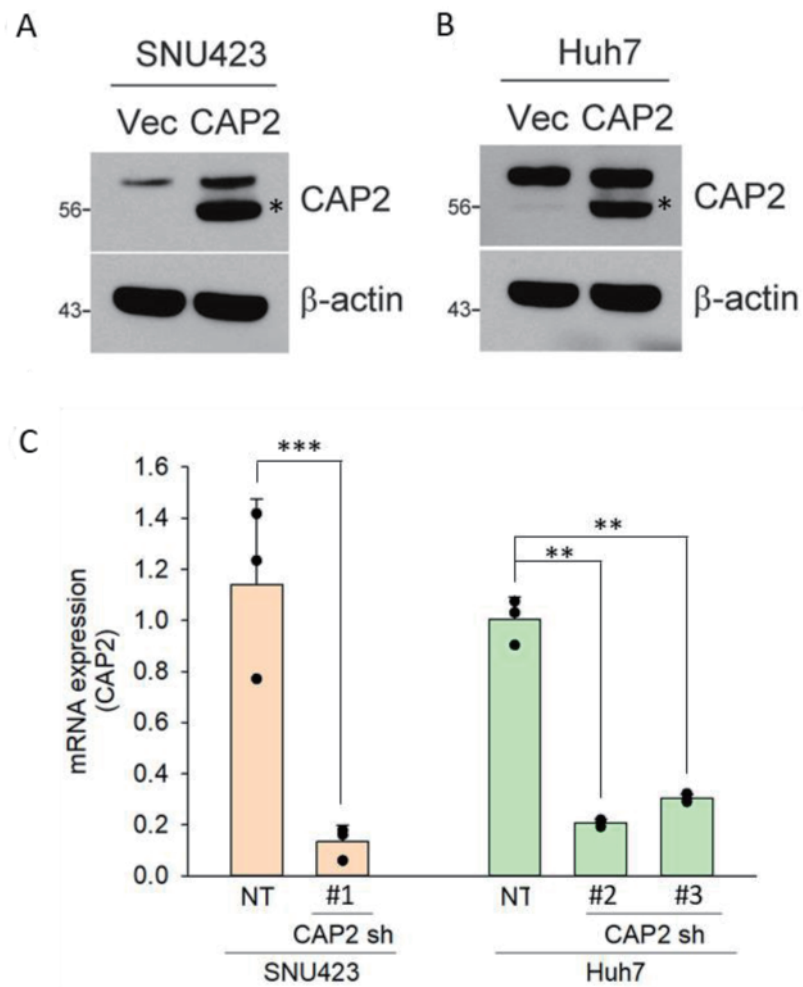


Supplementary Table S1. Target lists of *CAP2* shRNA

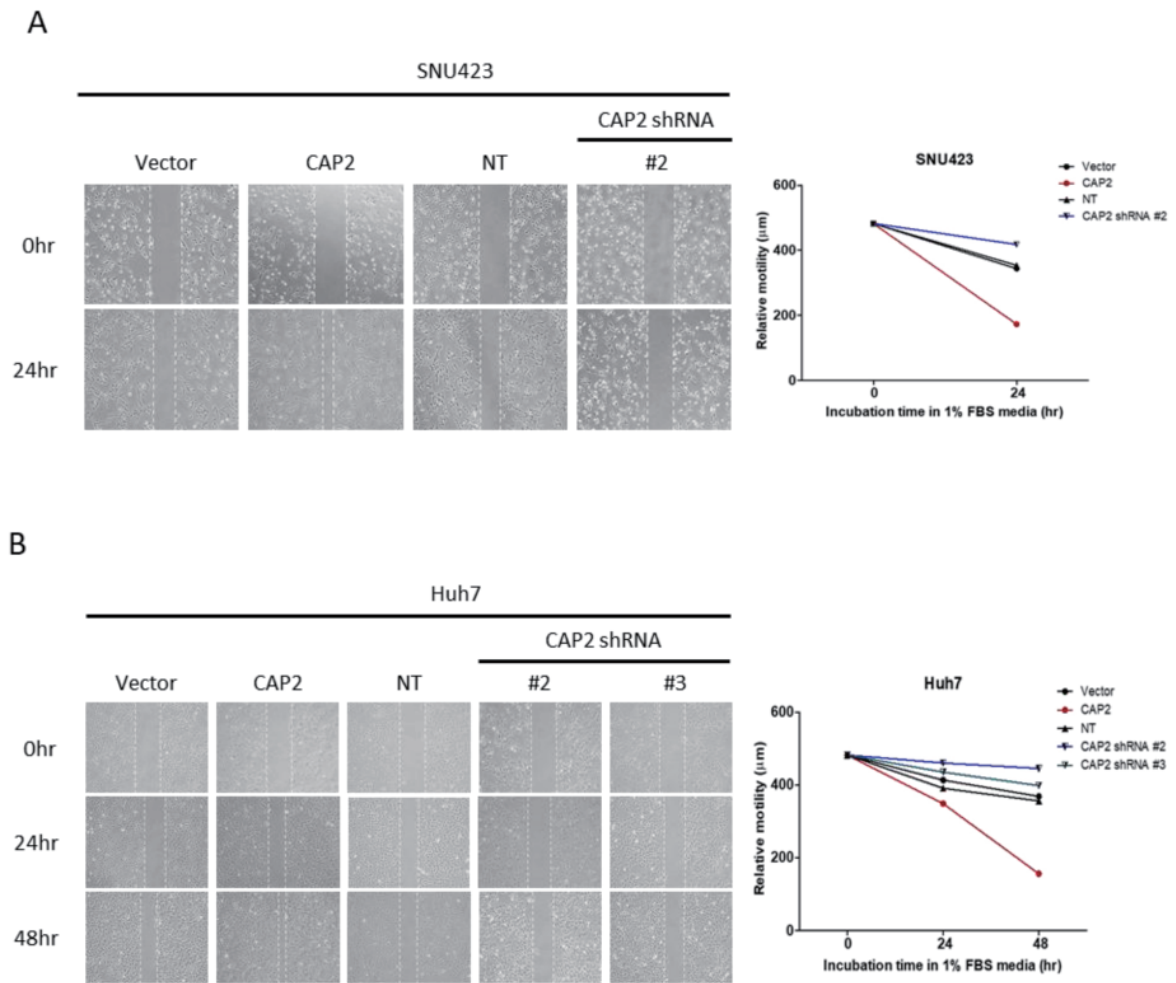
CAP2 shRNA	Target site	Mature Antisense
#1	3' UTR	5'-TACATCTTAGATTCTCAAAGG-3'
#2	ORF	5'-TTGAGAAGGATAAGATTTAGG-3'
#3	ORF	5'-TTGGGCAAATAAAGCTGAGCG-3'

Supplementary Table S2. Primer lists

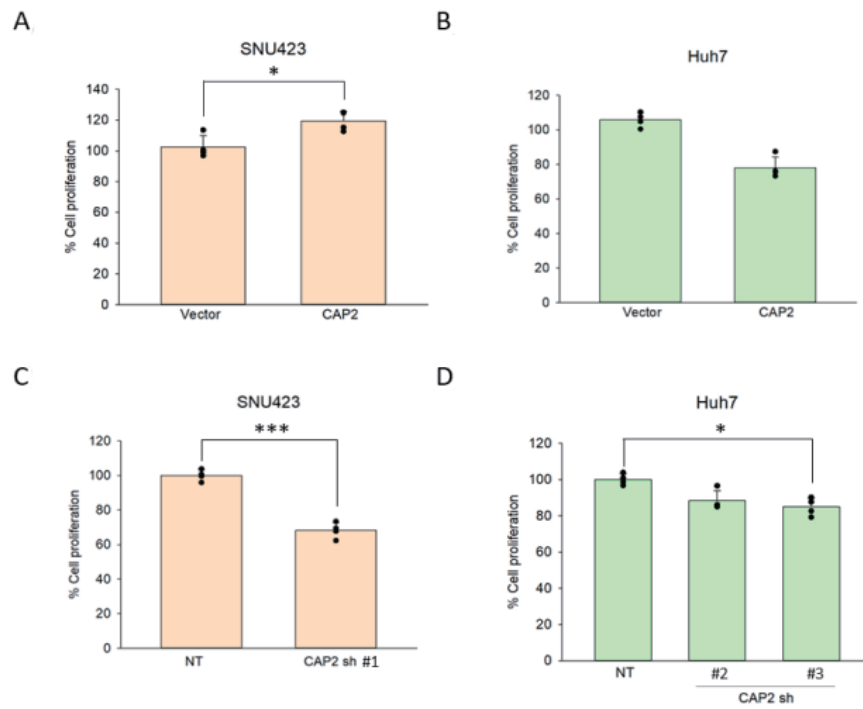
Gene	5' primer	3' primer
-2,500/+100	5'-TCTTACGCGTGCTAGCCCAGACAAAGGGAAGCA AAGACT -3'	5'- TCTTACGCGTGCTAGCTAGGACCTTTGGTTTTATA GTTATGGAAATGC -3'
-2,000/+100	5'-TCTTACGCGTGCTAGCTGTTTATAAAATACTTTTAA AAATGTCATCACACGC -3'	
-1,500/+100	5'-TCTTACGCGTGCTAGCGCGACTCTCCCCTGGA GC-3'	
-1,000/+100	5'-TCTTACGCGTGCTAGCGCGCCGCCGCC -3'	
-500/+100	5'- TCTTACGCGTGCTAGCTAGGACCTTTGGTTTTATA GTTATGGAAATGC -3'	
<i>ATF2-Mut</i>	5'-CAATGCTTTCCTTCTAGAACGAGAAGAGAAAAGC CTCC -3'	5'- GGAGGCTTTTCTTCTCGTTCTAGAAGGAAAGC ATTG -3'
<i>CAP2</i> for cloning	5'-CATAGAAGATTCTAGAATGGCCAACATGCAGGG AC-3'	5'-CAGATCCTTGCGGCCGCTTAGGCCATAATTTCTGC AGGTTCAAGT-3'
<i>Rac1-WT</i> for cloning	5'-CATAGAAGATTCTAGAATGCAGGCCATCAAGTGT GT-3'	5'-CAGATCCTTGCGGCCGCTTACAACAGCAGGCATT TTCTTCTCCT-3'
<i>Rac1-Q61L</i> for cloning	5'-TGGGATACAGCTGGACTAGAAGATTATGACAG-3'	5'-CTGTCATAATCTTCTAGTCCAGCTGTATCCCA-3'
<i>Rac1-N17</i> for cloning	5'-GAGCTGTAGGTAAAAATTGCCTACTGATCAG-3'	5'-CTGATCAGTAGGCAATTTTACCTACAGCTC-3'
ChIP-1 PCR	5'-CTGGCATTCAATCAATAAAGAGCTTC-3	5'-GCATATTTGTGGCCACT -3'
ChIP-2 PCR	5'-TGGTAGTTCCTACGGCACCAA -3'	5'-TGGAGAAGTCGCCTTTCCTTGC -3'
<i>CAP2</i> for RT-PCR	5'- TTGCCCAACTTAACCAGGGA -3'	5'- GGTGGGAGATTGAGTTTGCC -3'
<i>GRP78</i> for RT-PCR	5'- GTGGTAGTGCAAGCTGAAGG -3'	5'- TTCAGCCAGTTGCCCATCTA -3'
<i>Luc</i> for RT-PCR	5'- AGCTGTTTCTGAGGAGCCTT -3'	5'- GATGGAACCTCTTGGCAACC -3'
<i>GFP</i> for RT-PCR	5'- AGAGGGTGAAGGTGATGCAA -3'	5'- GTACATAACCTTCGGGCATGG -3'
<i>β-actin</i> For RT-PCR	5'- TGGCACCCAGCACCAATGAA -3'	5'- CTAAGTCATAGTCCGCCTAGAAGCA -3'



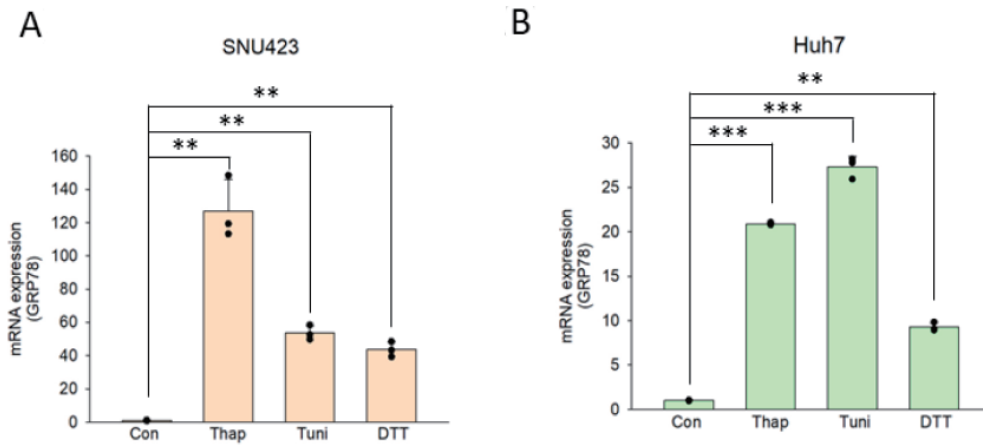
Supplementary Fig. S1. Expression of CAP2 in liver cancer cell lines. (A and B) SNU423 (A) or Huh7 cells (B) stably expressing empty vector (Vec), or CAP2 (CAP2) were western blotted with anti-CAP2 (53 kDa) and anti- β -actin (42 kDa) antibodies. Asterisks (*) indicated CAP2. (C) SNU423 or Huh7 cells stably expressing non-targeting (NT) shRNA or CAP2 shRNA were established. qRT-PCR for CAP2 was performed. Values were means \pm SEM of three independent experiments. ** $P < 0.01$ and *** $P < 0.001$.



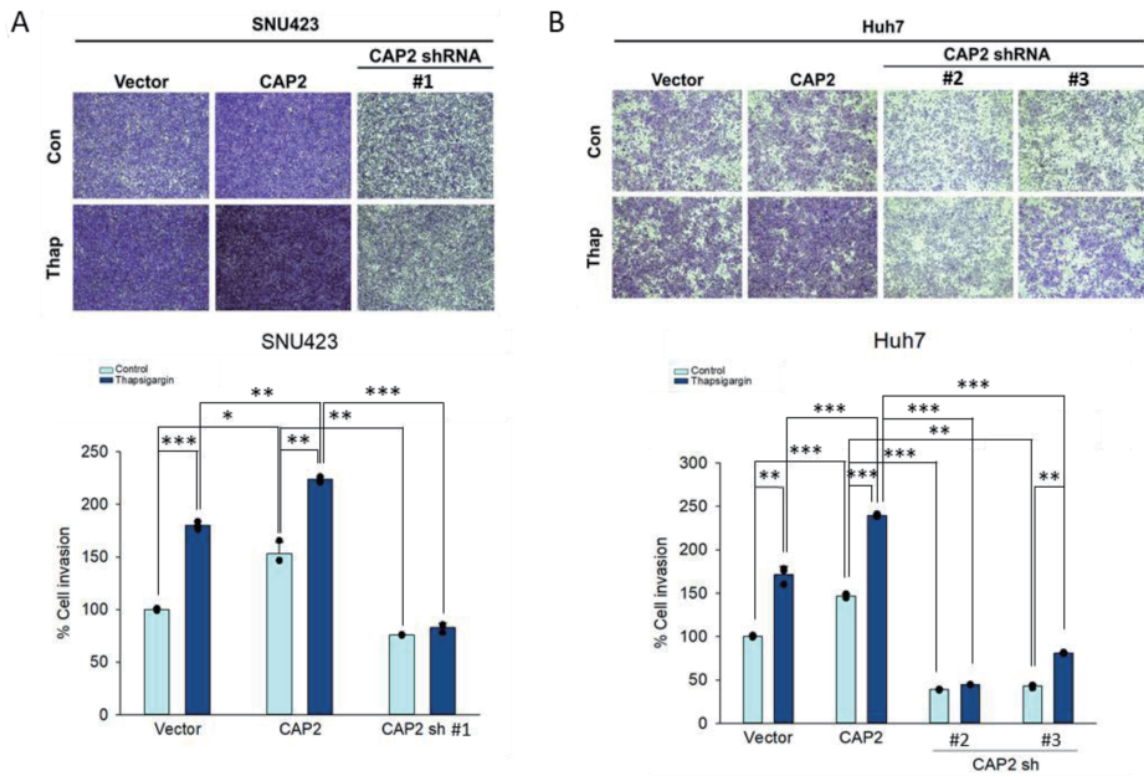
Supplementary Fig. S2. The effect of CAP2 on cell migration. (A and B) Motility of cells was measured by wound healing assay. 8×10^5 cells of SNU423 (A) or Huh7 (B) were cultured into 60 mm dishes until forming a monolayer. The cells were scratched with 200 μl tip and changed media containing 1% FBS. Wound area was captured (magnification, $\times 4$) from 0 h to indicated time. The wound width was measured average distance between edges of the gap and all experiments were performed at least three times for reproducible results.



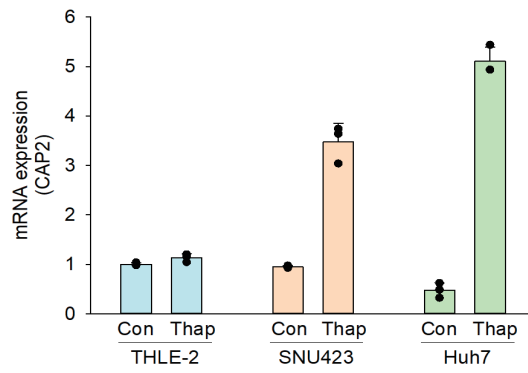
Supplementary Fig. S3. The effect of CAP2 on cell proliferation. (A-D) Indicated cells (5×10^3) were split into 96-well plates and incubated in media containing 10% FBS for 48 h. Cell proliferation was measured by WST-1 assay. Values were means \pm SEM of three independent experiments. * $P < 0.05$ and *** $P < 0.001$.



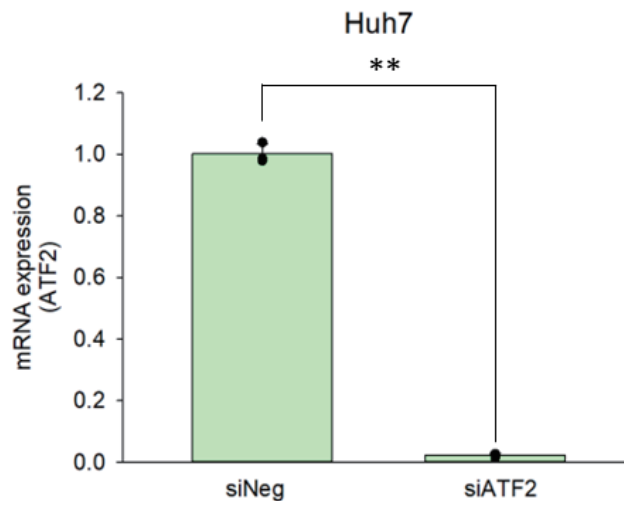
Supplementary Fig. S4. Effect of ER stress on *GRP78* mRNA expression in liver cancer cells. (A and B) SNU423 (A) and Huh7 cells (B) were treated with or without thapsigargin (50 nM and 100 nM, respectively), tunicamycin (50 ng/ml), DTT (1 mM) for 24 h. The *GRP78* mRNA expression levels were measured by qRT-PCR. Values were means \pm SEM of three independent experiments. ** $P < 0.01$ and *** $P < 0.001$.



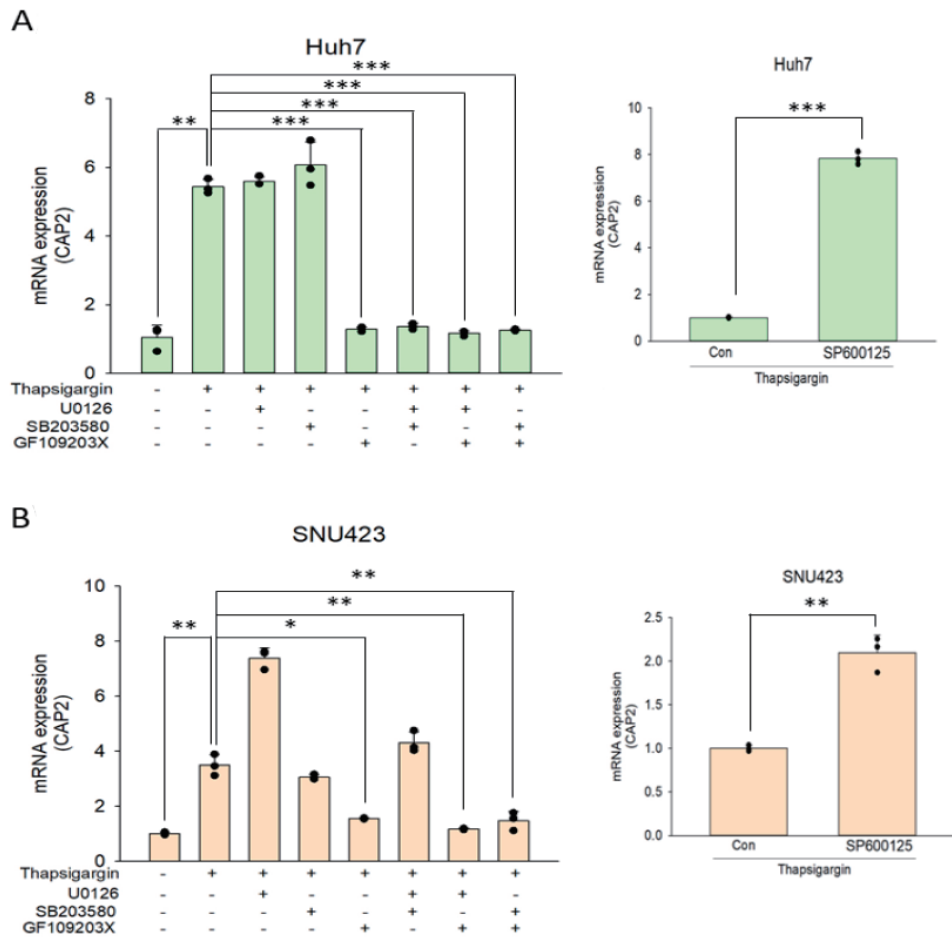
Supplementary Fig. S5. Effect of ER stress on cell invasion ability in HCC cells. (A and B) SNU423 (A) and Huh7 (B) cells were treated with or without thapsigargin (50 nM for SNU423 and 100 nM for Huh7 cells) for 24 h. Invasion was measured in Transwell invasion assay. Invaded cells were fixed with 10% formaldehyde and stained with 1% crystal violet. Images were captured under a light microscope (magnification, $\times 5$). The data are presented as mean \pm SEM for triplicate determinations. * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$.



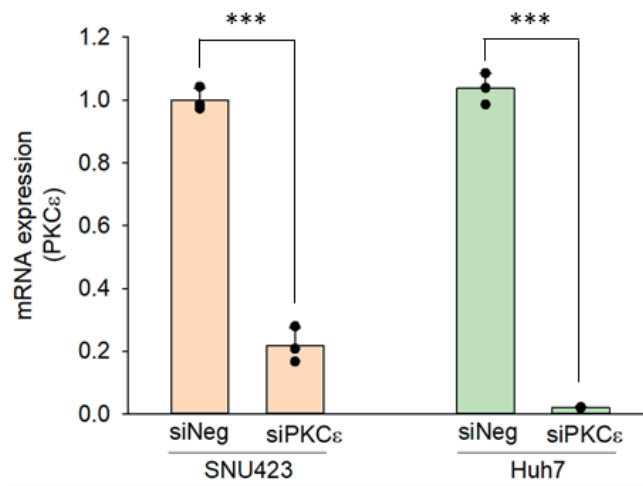
Supplementary Fig. S6. Expression of CAP2 in normal liver cell and HCC cells. Normal liver cell (THLE-2) and HCC cells (SNU423 and Huh7) were treated with or without thapsigargin (10 nM for THLE-2, 50 nM for SNU423, and 100 nM for Huh7, respectively) for 24 h. The CAP2 mRNA expression levels were measured by qRT-PCR. Values were means \pm SEM of three independent experiments. * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$.



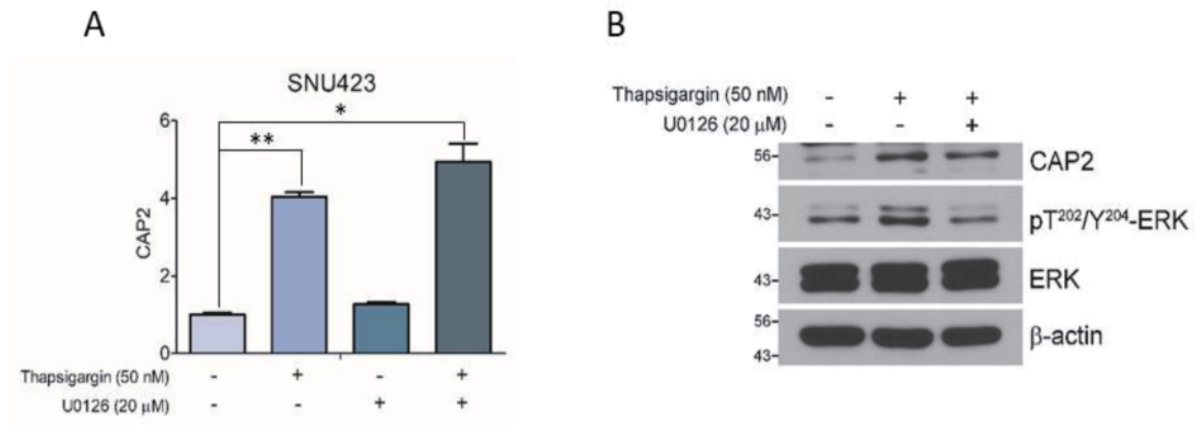
Supplementary Fig. S7. Expression of *ATF2* in HCC cells. Huh7 cells were transiently transfected with 100 nM siNegative control (siNeg) or *siATF2*. After 48 h post-transfection, the cells were harvested. The *ATF2* mRNA expression levels were measured by qRT-PCR. Values were means \pm SEM of three independent experiments. $**P < 0.01$.



Supplementary Fig. S8. Effect of inhibitors of stress-activated protein kinases on CAP2 mRNA expression. (A and B) SNU423 (A) and Huh7 cells (B) were treated with thapsigargin (50 nM and 100 nM, respectively) alone, or with of ERK1 inhibitor (U0126, 20 μ M), JNK inhibitor (SP600125, 25 μ M), p38 inhibitor (SB203580, 10 μ M), or PKC ϵ inhibitor GF109203X (GF, 20 μ M) for 24 h. Relative mRNA expression levels of CAP2 were measured by qRT-PCR. Values were means \pm SEM of three independent experiments. * P < 0.05, ** P < 0.01, and *** P < 0.001.



Supplementary Fig. S9. Expression of *PKC ϵ* in HCC cells. SNU423 and Huh7 cells were transfected with 100 nM siNegative control (siNeg) or *siPKC ϵ* . After 48 h post-transfection, the cells were harvested. The *PKC ϵ* mRNA levels were measured by qRT-PCR. Values were means \pm SEM of three independent experiments. *** $P < 0.001$.



Supplementary Fig. S10. Effect of ERK inhibitor on CAP2 expression. SNU423 cells were treated with thapsigargin (50 nM) alone, or with of U0126 (20 μM). After 24 h, the cells were harvested. (A) The CAP2 mRNA levels were measured by qRT-PCR. Values were means ± SEM of three independent experiments. (B) Western blot analyses using anti-CAP2, anti-pT202/Y204-ERK, anti-ERK, and anti-β-actin were shown in the cells. * $P < 0.05$ and ** $P < 0.01$.