Supplementary Table S1. The primary antibodies

Primary antibodies	Company (NO.)
STC1	Abcam (ab229477); Abcam (ab124891); Santa Cruz Biotechnology (sc-293435) ; Proteintech(20621-1-AP)
FOXC2	Abcam (ab5060); Abcam (ab245510); Proteintech (23066-1-AP); R&D (AF6989-SP)
ITGB6	Abcam (ab187155); Proteintech (19695-1-AP)
GAPDH	Proteintech (10494-1-AP)
PI3K	Proteintech (13329-1-AP)
FAK	Proteintech (12636-1-AP)
AKT	Proteintech (10176-2-AP)
ITGAV	Proteintech (27096-1-AP)
ITGB7	Abclonal (A5873)
UCP1	Proteintech (23673-1-AP); Beyotime (AF8292)
TOM20	Proteintech (11802-1-AP)
perilipin1	Abcam (ab172907)
p-FAK	CST (8556s)
p-AKT	Proteintech (86444-1-Ig)
p-PI3K	CST (17366s)

Supplementary Table S2. The primer sequences of qRT-PCR assay

Gene	Number	Primer
STC1	F	GTGGCGGCTCAAAACTCAG
	R	GTGGAGCACCTCCGAATGG
FOXC2	F	CCTCCTGGTATCTCAACCACA
	R	GAGGGTCGAGTTCTCAATCCC
ITGB6	F	TCCATCTGGAGTTGGCGAAAG
	R	TCTGTCTGCCTACACTGAGAG
GAPDH	F	GGAGCGAGATCCCTCCAAAAT
	R	GGCTGTTGTCATACTTCTCATGG

Supplementary Table S3. Association of STC1 expression with clinicopathological characteristics in 114 patients of EOC

	No. of patients (n = 114)	STC1 expression Low no. (%)	High no. (%)	P value
Characteristics				
Age (years)				> 0.05
<55	53	25(47.17%)	28(52.83%)	
≧55	61	24(46.15%)	37(53.85%)	
FIGO stage				< 0.05
I/II	42	38(90.48%)	4(9.52%)	
III/IV	72	19(26.39%)	53(73.61%)	
Grade				
1	34	30(88.24%)	4(11.76%)	
2	30	14(46.67%)	16(53.33%)	
3	50	11(22%)	39(78%)	
		Grade 2–3 versus 1		< 0.05
Lymph node				> 0.05
Positive	58	21(36.21%)	37(63.79%)	
Negative	56	32(57.14%)	24(42.86%)	

Supplementary Figure Legends

Supplementary Figure S1. STC1 is related to lipid metabolism in OC tissues. A Enrichment analysis of STC1 in different types of cell subgroups through single-cell sequencing. **B** GO analysis of tumor tissues and peritoneal metastasis tissues of OC patients. **C** GSEA of peritoneal metastasis tissues and tumor tissues of OC patients.

Supplementary Figure S2. STC1 promotes cell proliferation and cell migration *in vitro*. A Cell proliferation assays in Skov3-ip1 and Hey cell lines transfected with the NC groups, STC1-sh1 and STC1-sh2 groups. **B-C** Colony formation assays in Skov3-ip1 and Hey cell lines and statistical analysis. **D-F** Cell migration and invasion assays in Skov3-ip1 and Hey cell lines and statistical analysis. **G** Wound healing assays in Skov3-ip1 and Hey cell lines and statistical analysis. (Data are shown as the means ± SD. Significance was calculated using Student's t test. *, $P < 0.05$, **, $P < 0.01$, ***, $P < 0.001$, ****, $P < 0.0001$.)

Supplementary Figure S3. STC1 promotes lipid metabolism *in vitro*. A A total of 1412 lipid species from 30 lipid class were identified. **B** 70 significantly changed lipids from 10 lipid classes were presented. **C** IF assays detected the relationship between STC1 and TOM20 in Skov3-ip1 and Hey cell lines. **D** IF assays detected the relationship between STC1 and perilipin1 in Skov3-ip1 and Hey cell lines.

Supplementary Figure S4. ITGB6 rescues the promotion effect of STC1 *in vitro*. A Mass spectrometry analysis of the SDS-PAGE above. The detected peptides spectra of ITGB6 were listed. **B** The knockdown of STC1 expression level in the STC1-sh1 groups were rescued by ITGB6 OE plasmid in Skov3-ip1 and Hey cell lines. **C** Cell

proliferation assays in Skov3-ip1 and Hey cell lines in the NC groups, STC1-sh1 groups and STC1-sh1/ITGB6 OE groups. **D-F** Cell migration and invasion assays in Skov3-ip1 and Hey cell lines in the NC groups, STC1-sh1 groups and STC1-sh1/ITGB6 OE groups. **G** ORO staining in Skov3-ip1 and Hey cell lines in the NC groups, STC1-sh1 groups and STC1-sh1/ITGB6 OE groups (red arrow: TGs). **H** 11 significantly changed lipids from 5 lipid classes were identified in the ITGB6-sh1/sh2 groups compared with the NC group. **I** A heat map of significant differences in the variables among the NC group, ITGB6-sh1 and ITGB6-sh2 groups of Hey cells. The variables were ranked by ANOVA. (Data are shown as the means ± SD. Significance was calculated using Student's t test. *, $P < 0.05$, **, $P < 0.01$, ***, $P < 0.001$, ****, $P < 0.0001$.)

Supplementary Figure S5. STC1 rescues the promotion effect of FOXC2 *in vitro*. **A** FOXC2 has interaction with STC1 ($p=4.909e^{-5}$). **B** The knockdown of FOXC2 expression level in the FOXC2-sh1 groups were rescued by STC1 OE plasmid in Skov3-ip1 and Hey cell lines. **C** Cell proliferation assays in Skov3-ip1 and Hey cell lines in the NC groups, FOXC2-sh1 groups and FOXC2-sh1/STC1 OE groups. **D-F** Cell migration and invasion in Skov3-ip1 and Hey cell lines in the NC groups, FOXC2-sh1 groups and FOXC2-sh1/STC1 OE groups. **G** 87 significantly changed lipids from 12 lipid classes were identified in the FOXC2-sh1/sh2 groups compared with the NC group. **H** A heat map of significant differences in the variables among the NC group, FOXC2-sh1 groups and FOXC2-sh2 groups of Hey cells. The variables were ranked by ANOVA. (Data are shown as the means ± SD. Significance was

calculated using Student's t test. *, P < 0.05, **, P < 0.01, ***, P < 0.001, ****, P < 0.0001.)

Supplementary Figure S6. STC1 promotes metastasis and lipid metabolism *in vivo*. **A** The NC groups showed significantly more ascites than the STC1-sh1 groups. **B** H&E staining of tumor tissues in four groups. **C** IHC assays of STC1 in OC tissues. **D** The NC groups showed higher level of blood TG compared with the STC1-sh1 groups. **E** IF assay detected the relationship between STC1, TOM20 and perilipin1 in two cell lines in mouse tumor tissues. **F** IHC assays of proteins in PI3K signaling pathway in mouse tumor tissues. **G** STC1 influenced the protein expression levels of members in the integrin family in mouse tumor tissues by WB assays. (Data are shown as the means ± SD. Significance was calculated using Student's t test. *, P < 0.05, **, P < 0.01, ***, P < 0.001, ****, P < 0.0001.)

Supplementary Figure S7. The expression of FOXC2, STC1 and ITGB6 in mouse tumor tissues. A-B IF assay detected the relationship of STC1 and FOXC2, STC1 and ITGB6 in mouse tumor tissues in two cell lines.

Supplementary Figure S8. Targeting the FOXC2/ITGB6 signaling axis is related to DDP chemoresistance *in vitro*. **A** Cell apoptosis results in the NC, FOXC2-OE, NC+DDP and FOXC2-OE+DDP groups in Skov3-ip1 cell lines. **B** The results of cell proliferation assays in the NC, NC+DDP, FOXC2-sh1 and FOXC2-sh1+DDP groups in Skov3-ip1 cells. **C** The results of cell proliferation assays in the NC, FOXC2-OE, NC+DDP and FOXC2-OE+DDP groups in Skov3-ip1 cell lines. **D** Cell apoptosis results in the NC, ITGB6-OE, NC+DDP and ITGB6-OE+DDP groups in Skov3-ip1

cell lines. **E** The results of cell proliferation assays in the NC, NC+DDP, ITGB6-sh1 and ITGB6-sh1+DDP groups in Skov3-ip1 cells. **F** The results of cell proliferation assays in the NC, ITGB6-OE, NC+DDP and ITGB6-OE+DDP groups in Skov3-ip1 cell lines. (Data are shown as the means ± SD. Significance was calculated using Student's t test. *, $P < 0.05$, **, $P < 0.01$, ***, $P < 0.001$, ****, $P < 0.0001$.)

Supplementary Figure S9. H&E staining of the TMAs of FOXC2, STC1 and ITGB6 in OC tissues. A H&E staining of the TMAs of FOXC2, STC1 and ITGB6 in OC tissues.