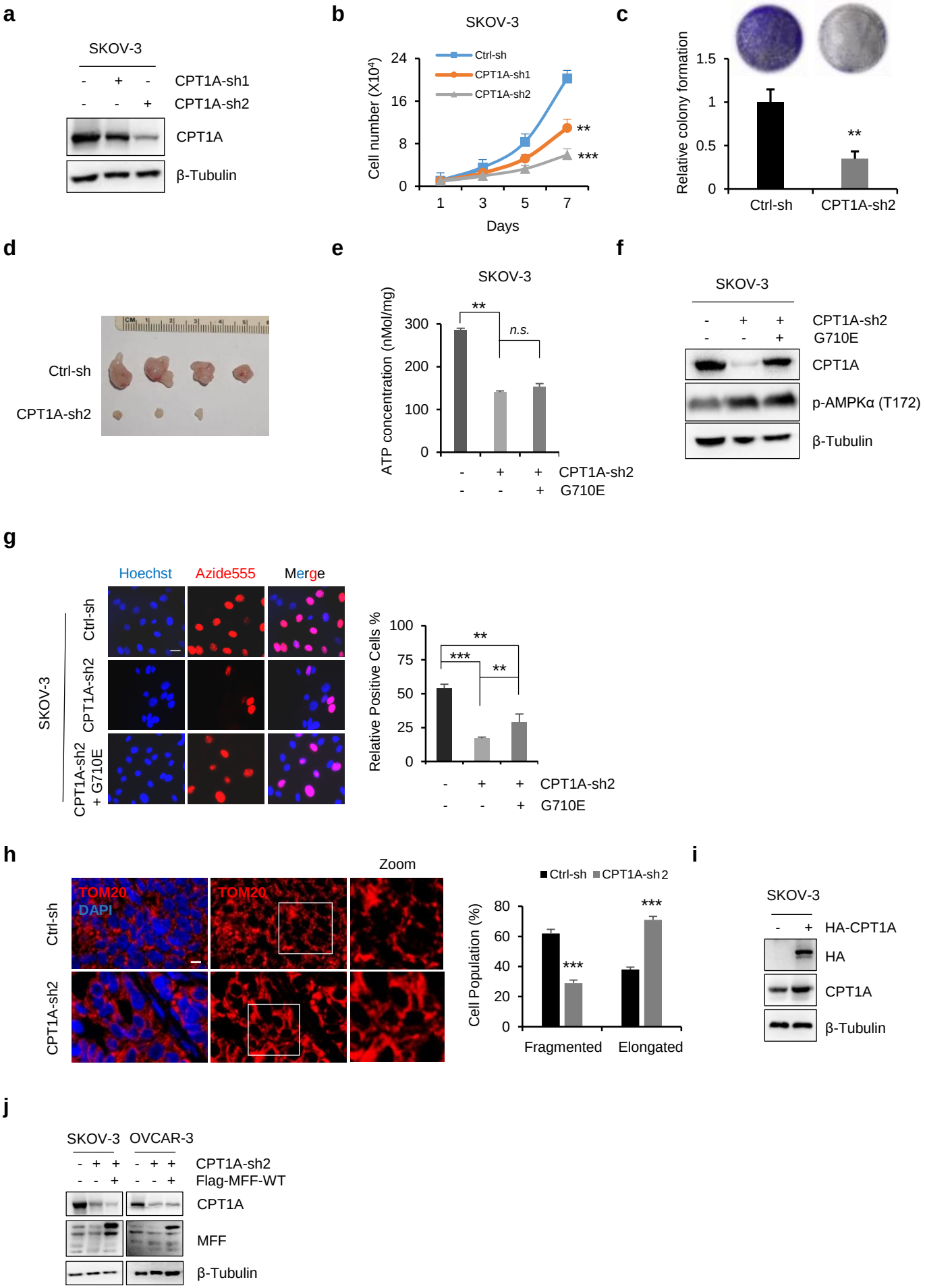
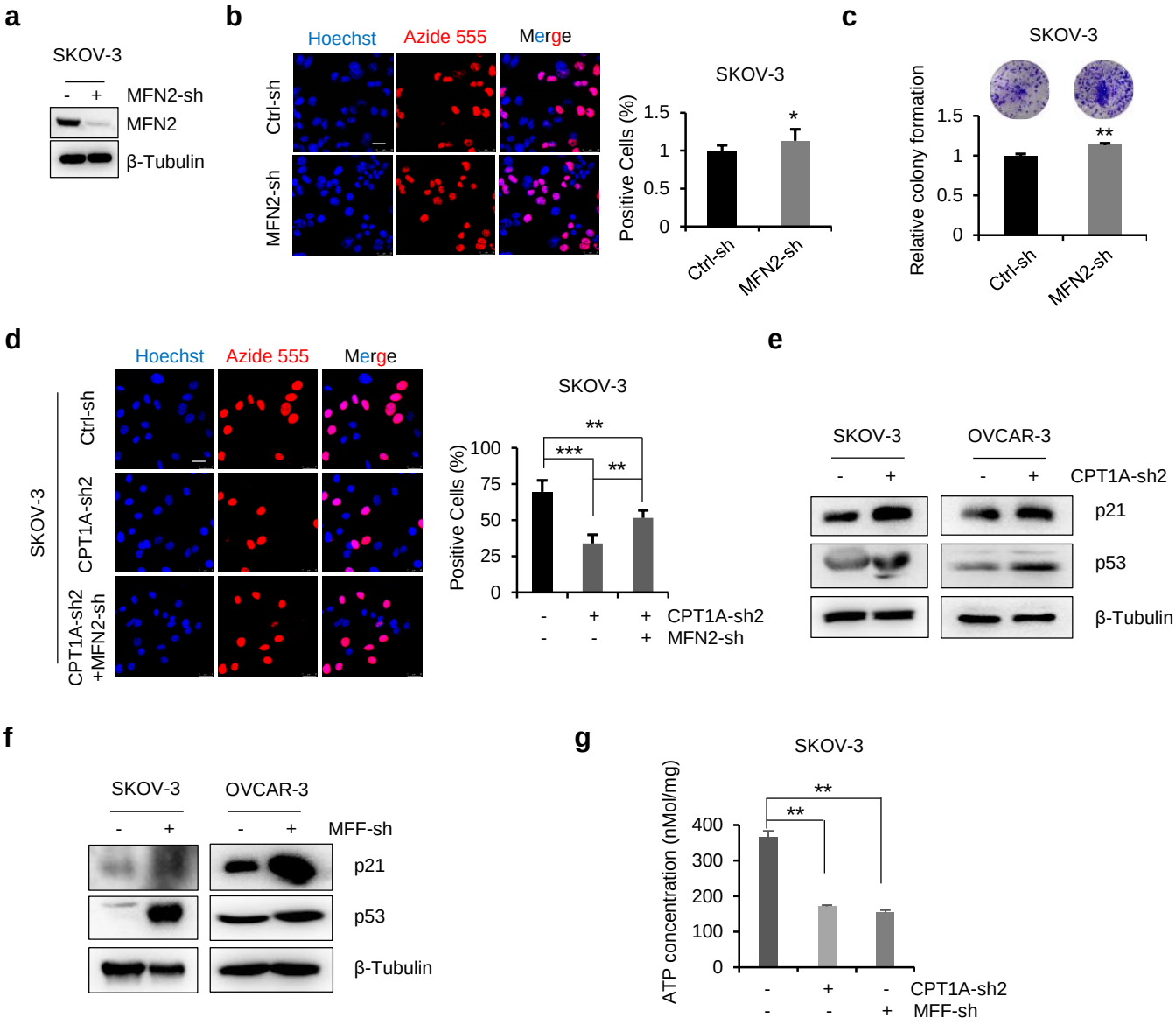
Supplementary Fig. 1



Supplementary Fig. 1. Knocking down CPT1A significantly inhibited the growth of ovarian cancer cells.

a CPT1A was knocked down by shRNA in SKOV-3 cells. The CPT1A expression was examined by western blotting. **b** Growth curves of SKOV-3 cells with control or CPT1A knockdown, seeded in 24-well plates, were constructed from counting by the trypan blue assay for up to 7 days after seeding. **c** Colony formation assay was performed in SKOV-3 cells with control and CPT1A knockdown. Microphotographs covering representative areas of each treatment were shown (upper). Numbers of colonies in each well of six-well plates were analyzed (lower). **d** CPT1A knockdown and control SKOV-3 cells (5×10^6)were injected subcutaneously on the right flank of nude mice. Xenograft tumors were harvested 3 weeks after inoculation (n=4). **e** ATP content detection in SKOV-3 cells with control, CPT1A knockdown, G710E overexpression on the basis of CPT1A knockdown. **f** p-AMPKα were analyzed by western blotting in SKOV-3 cells with control, CPT1A knockdown, G710E overexpression on the basis of CPT1A knockdown. **g** The EdU proliferation assay was performed in SKOV-3 cells with control, CPT1A knockdown or exogenous overexpression of G710E on the basis of CPT1A knockdown. Representative image (left) and ratio of EdU-positive SKOV-3 cells (right) were showed. **h** Immunofluorescent staining of TOM20 in xenograft tumor cells revealed that CPT1A knockdown promotes mitochondrial fusion in vivo (left, Scale bar=10 μm). The proportion of cells (n=100 cells for each sample) with fragmented, or elongated mitochondria was quantified (right). **i** Western blot analysis of HA-tagged CPT1A exogenous overexpression in SKOV-3 cells. **j** Western blot analysis of CPT1A and MFF in SKOV-3 and OVCAR-3 cells with exogenously overexpressed MFF in the background of CPT1A knockdown. *$p < 0.05$, **$p < 0.01$ and ***$p < 0.001$, *n.s.* means no significant, as compared with control groups. Scale bar = 25 μm.

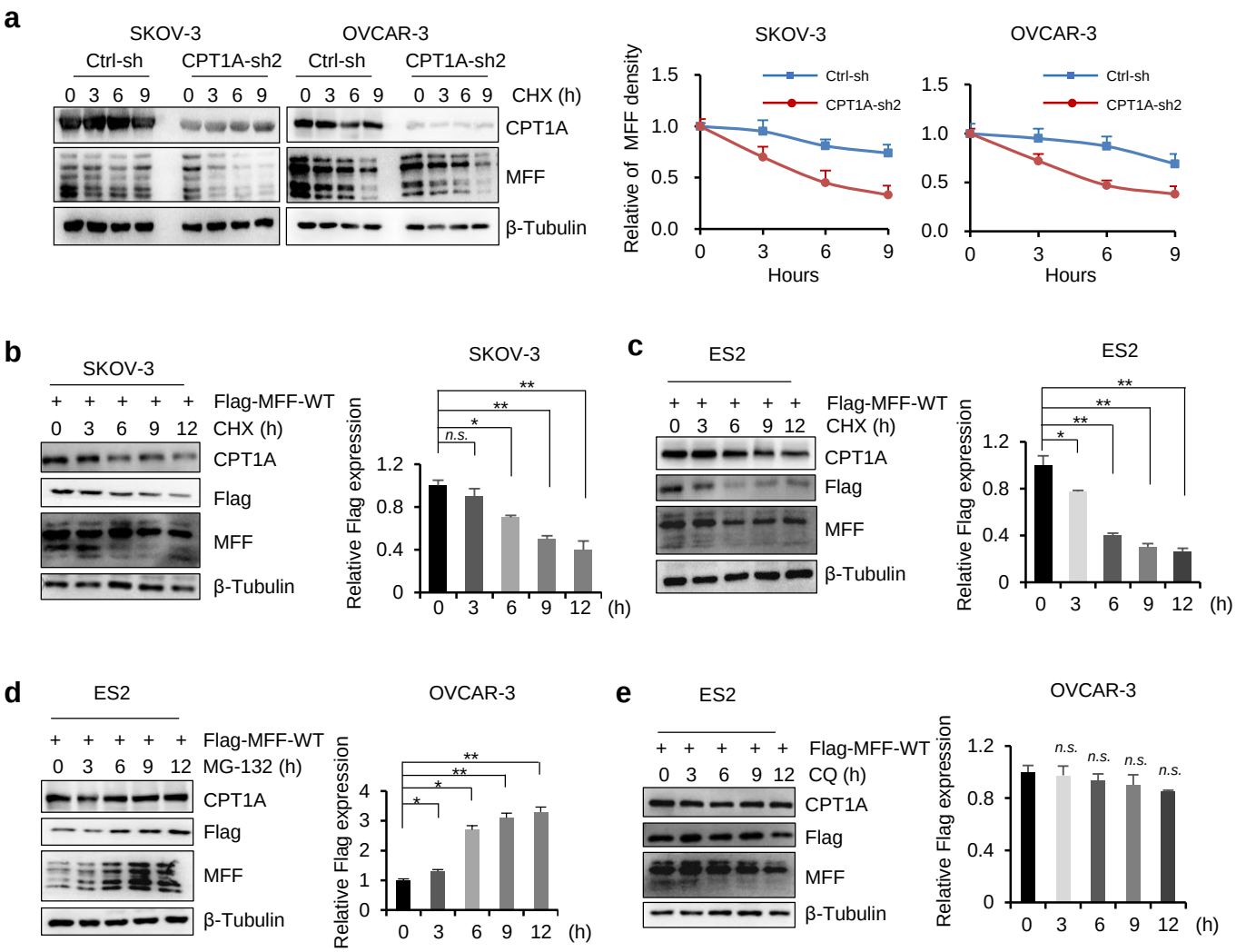
Supplementary Fig. 2



Supplementary Fig. 2. Mitochondrial dynamics affects the proliferation of ovarian cancer cells.

a MFN2 was knocked down and the knocked efficiency was examined by western blotting in SKOV-3 cells. **b** The EdU proliferation assay was performed in SKOV-3 cells of control or MFN2 kockdown. Representative image (left) and ratio of EdU-positive cells (right) were presented. **c** Colony formation assay was performed in SKOV-3 cells with control and MFN2 knockdown. Microphotographs covering representative areas of each treatment were shown (upper). Relative colony formation in each treatment was analyzed (lower). **d** Cell proliferation assay was performed by EdU assy in SKOV-3 cell with control, CPT1A knockdown or CPT1A and MFN2 double knockdown. **e** Induction of p21 and p53 protein by CPT1A knockdown was confirmed by immunoblotting. **f** Induction of p21 and p53 protein by MFF knockdown was confirmed by immunoblotting. **g** ATP concentration was analyzed in SKOV-3 cells with control, CPT1A knockdown or MFF knockdown. *p < 0.05, **p < 0.01 and ***p < 0.001, as compared with control groups. Scale bar = 25 μm.

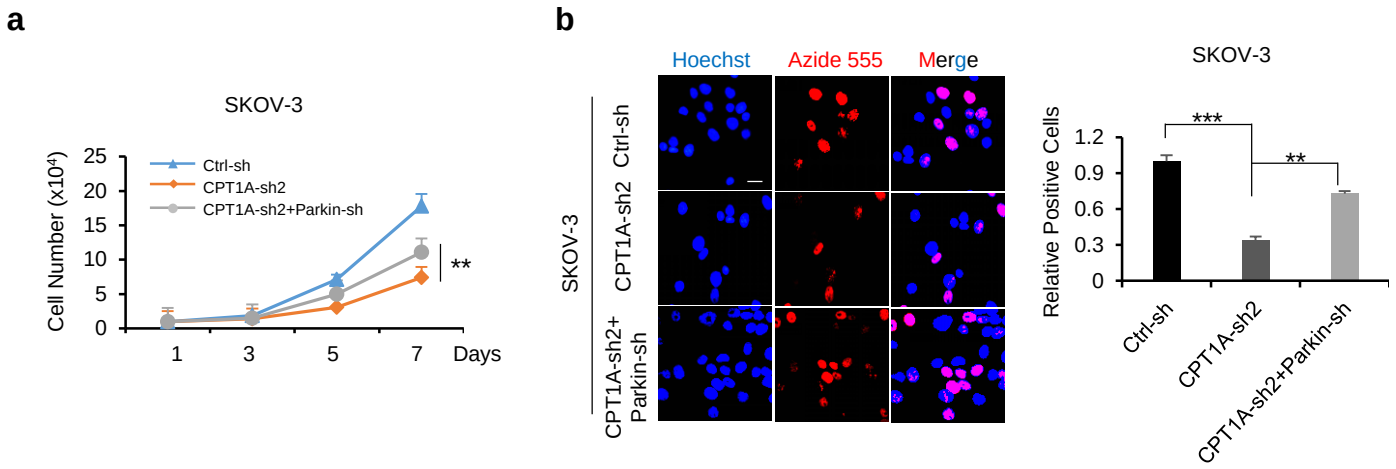
Supplementary Fig. 3



Supplementary Fig. 3. CPT1A knockdown leads to MFF degradation.

a SKOV-3 and OVCAR-3 cells with or without CPT1A-sh2 were treated with 10 μM cycloheximide (CHX) for up to 9 hours. Whole cell lysates were prepared and detected against CPT1A and MFF antibodies (left). And densitometric analysis of MFF immunoblot band was performed with ImageJ (right). **b, c** SKOV-3 (**b**) and ES2 (**c**) cells transfected with Flag-MFF-WT plasmid were treated with 10 μM cycloheximide (CHX) for up to 12 hours. Cells were harvested at the indicated time point and the expression of CPT1A and Flag-MFF were analyzed by western blotting (left). And densitometry of Flag immunoblot was performed with ImageJ and normalized to their Tubulin. The relative expression of Flag-MFF was presented (right). **d, e** ES2 cells with Flag tagged MFF-WT were treated with 10 μM MG-132(**d**) or 5 μM chloroquine (CQ, **e**) for indicated periods. The expression of CPT1A and Flag-MFF were analyzed (left) and the relative expression of Flag-MFF was analyzed (right). *p < 0.05, **p < 0.01 and ***p < 0.001, n.s. means no significant, as compared with control groups.

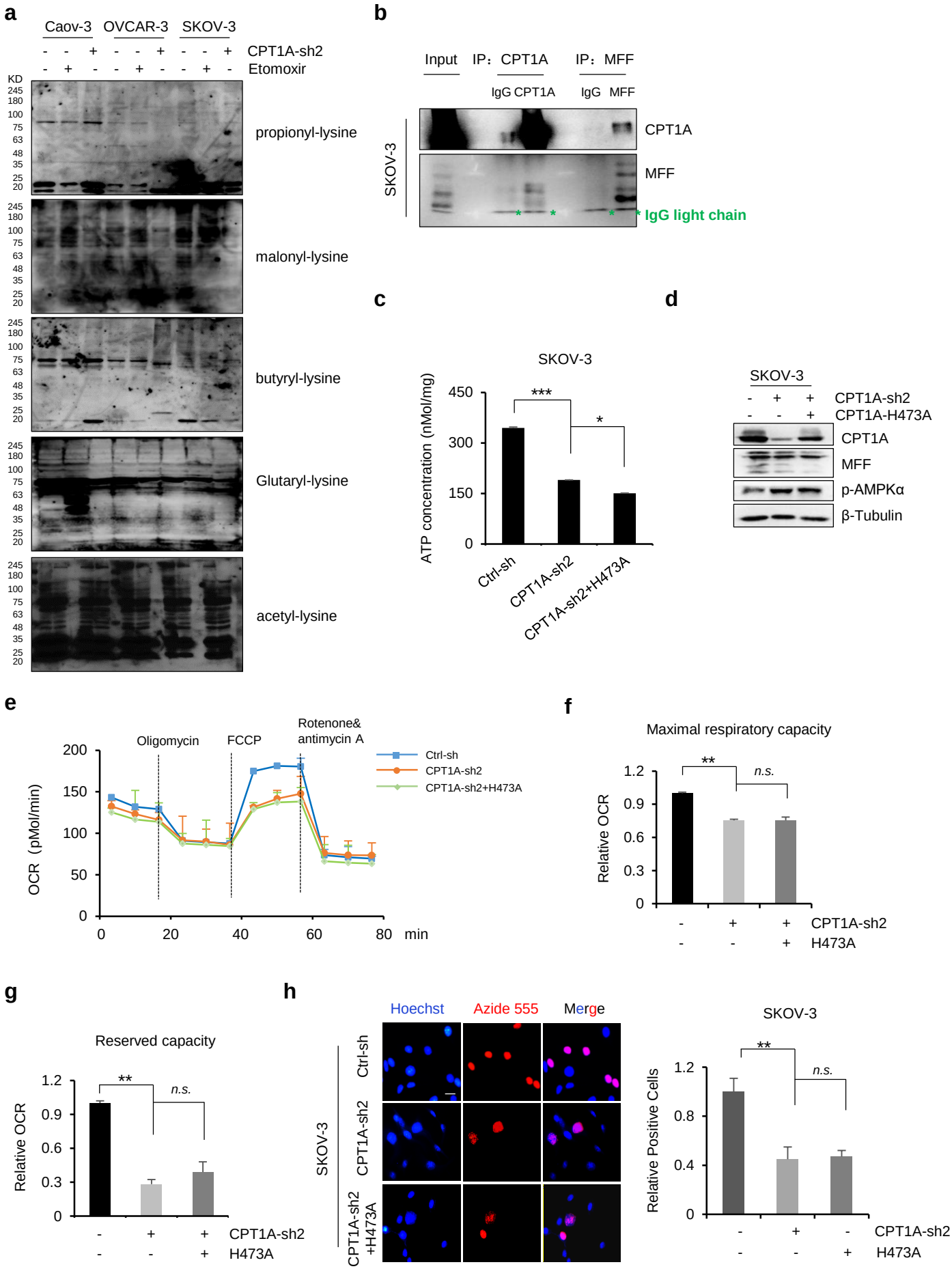
Supplementary Fig. 4



Supplementary Fig. 4. Parkin affects the proliferation of ovarian cancer cells.

a SKOV-3 cells with control, CPT1A knockdown, or CPT1A and Parkin double knockdown were seeded in 24-well plates. Growth curves were constructed from counting by the trypan blue assay for up to 7 days after seeding. **b** The EdU proliferation assay was performed in SKOV-3 cells with control, CPT1A knockdown, or CPT1A and Parkin double knockdown. Representative image (left) and ratio of EdU-positive cells (right) were presented. *p < 0.05, **p < 0.01 and ***p < 0.001, as compared with control groups. Scale bars, 25 μm.

Supplementary Fig. 5



Supplementary Fig. 5. CPT1A promotes succinylation of MFF.

a CAOV-3, OVCAR-3 and SKOV-3 cells with CPT1A knockdown or cells treated with etomoxir (10uM) for 24 hours were harvested for acylation modifications by western blotting. **b** SKOV-3 cells were collected, co-immunoprecipitated with CPT1A and MFF antibodies, respectively, followed by immunoblotting with anti-MFF or anti-CPT1A antibodies. **c** ATP content was detected in SKOV-3 cells with control, CPT1A knockdown, and CPT1A knockdown combined with CPT1A-H473A overexpression. **d** CPT1A, MFF and p-AMPKα were examined by Western blotting in cells of (**c**). Tubulin was involved as protein loading control. **e** The oxygen consumption rate (OCR) assay was performed in in SKOV-3 cell with control, CPT1A knockdown, or CPT1A knockdown combined with CPT1A-H473A exogenous overexpression. **f** The quantification of Maximal respiratory capacity. **g** The quantification of Reserved capacity. **h** The EdU proliferation assay was performed in SKOV-3 cells with control, CPT1A knockdown, or CPT1A knockdown combined with H473A exogenous overexpression. Representative image (left) and ratio of EdU-positive cells (right) were presented. *$p < 0.05$, **$p < 0.01$ and ***$p < 0.001$, *n.s.* means no significant, as compared with CPT1A-sh groups. Scale bars=25 μm.