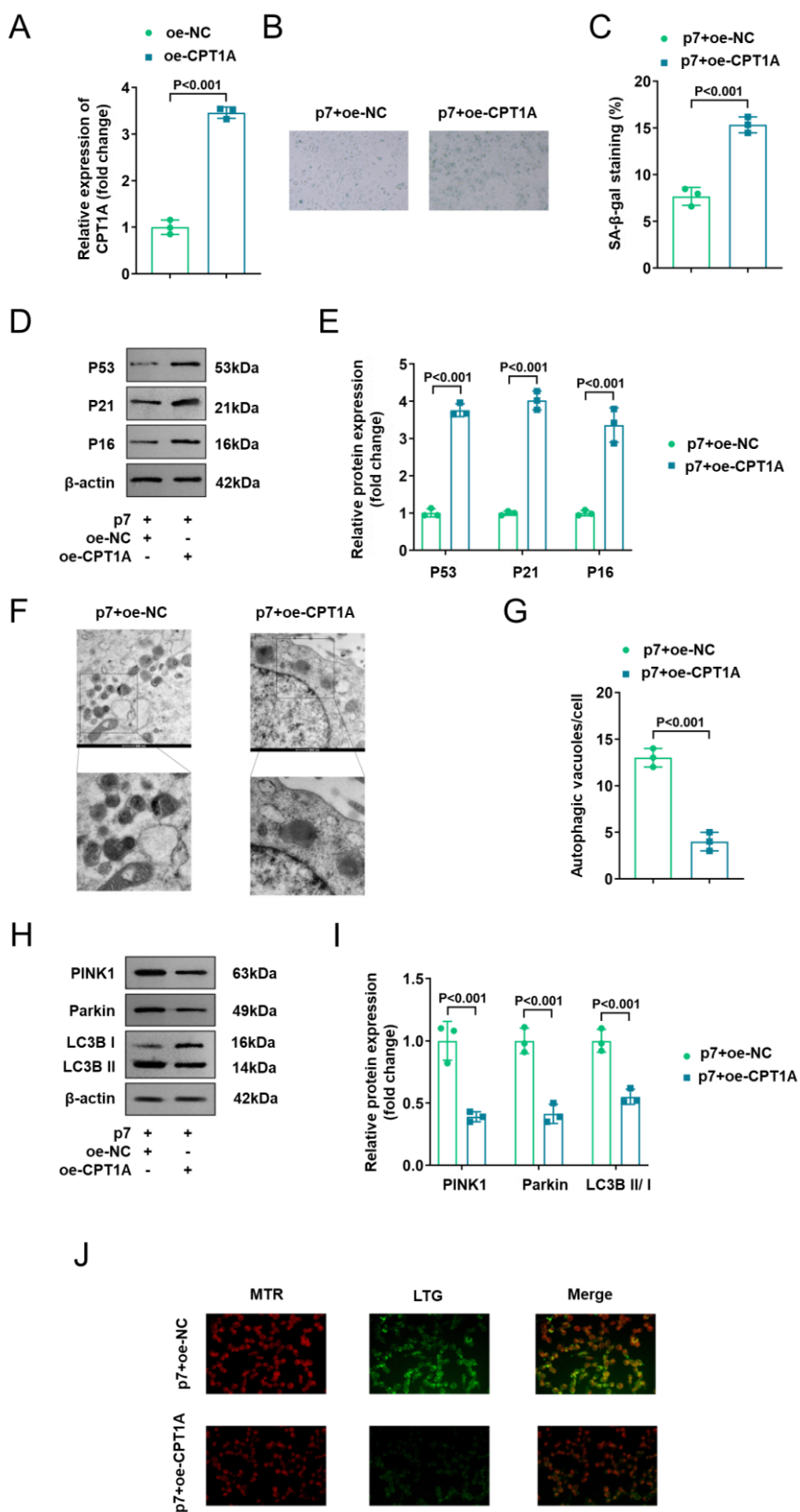
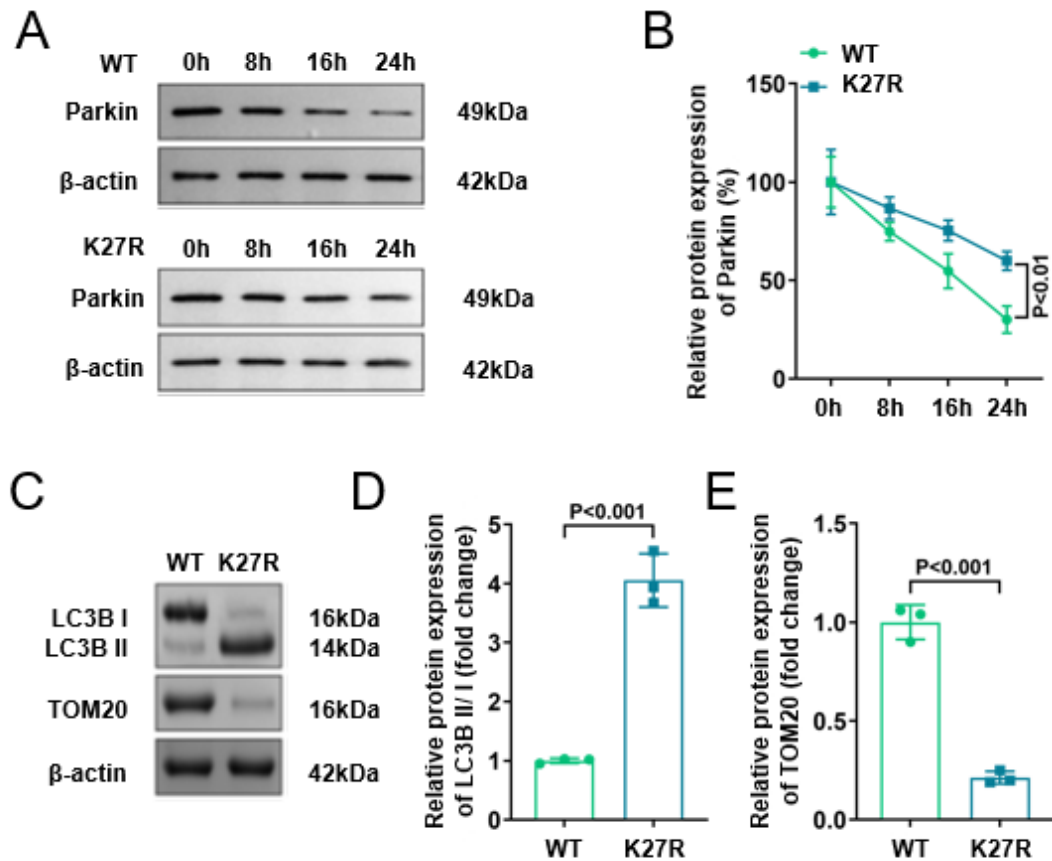


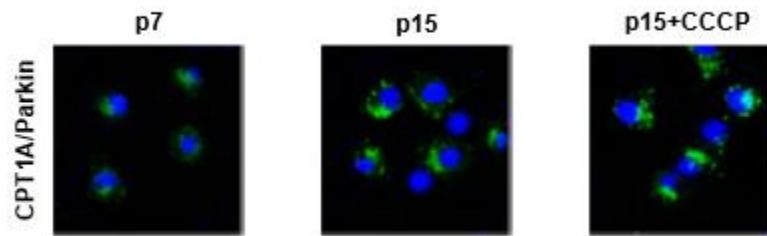


Supplementary Figure 1 Overexpression of CPT1A promotes DPSC senescence and inhibits mitophagy. (A) DPSCs at p7 were transfected with oe-NC and oe-CPT1A, and

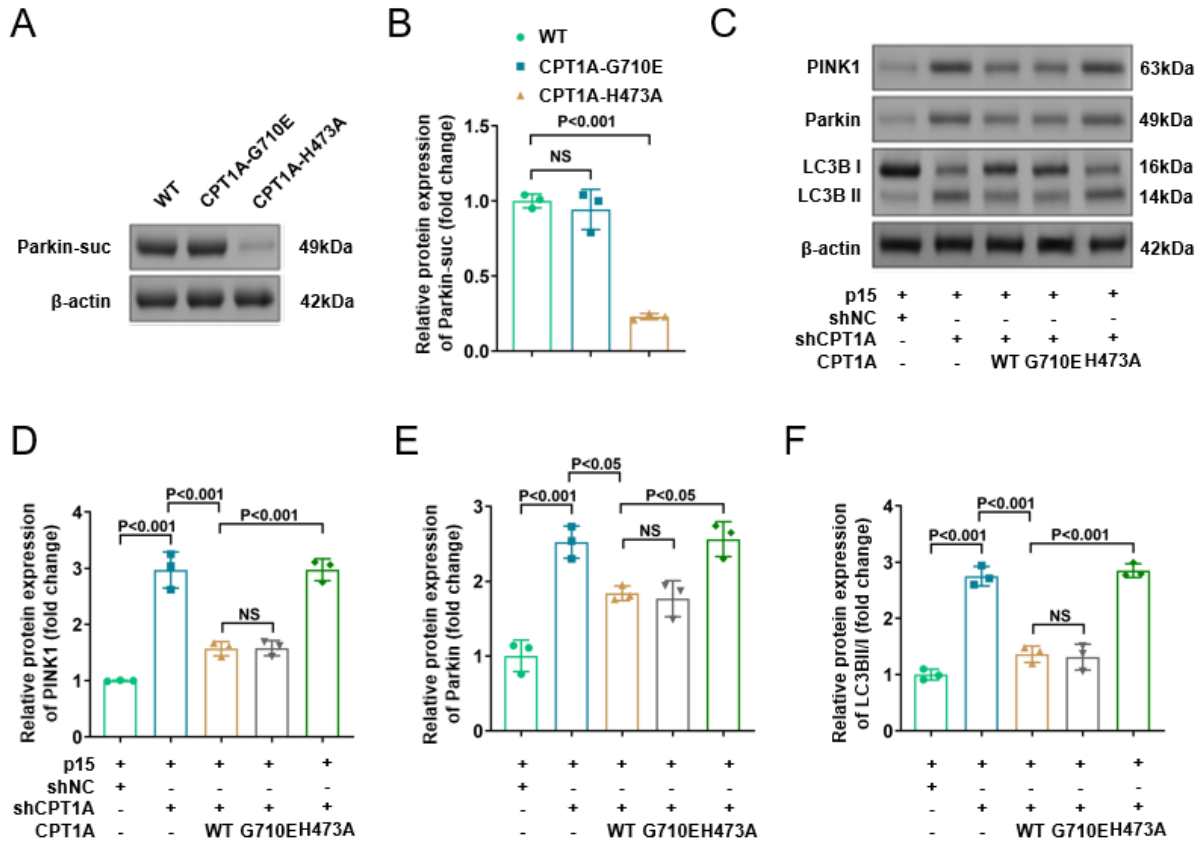
qPCR was conducted to measure CPT1A expression. After transfection, (B, C) senescence in DPSCs was observed using SA- β -gal staining; (D, E) the levels of aging markers (p53, p21, and p16) were examined using immunoblotting; (F) TEM evaluation of mitophagy; (G) quantification of autophagic vacuoles per cell; (H, I) the levels of mitophagy markers (PINK1, Parkin, and LC3B) were measured using immunoblotting. (J) mitochondria (red dots) and lysosomes (green dots) colocalization was evaluated using double immunofluorescent assay. $n = 3/\text{group}$. $P < 0.001$ indicates statistically significant.



Supplementary Figure 2 Mutation of Parkin at K27 site enhances Parkin stability and regulate mitophagy marker expression. (A, B) DPSCs were transfected with WT or K27R Parkin plasmids and then treated with CHX for 0, 8, 16, and 24 h, and Parkin protein levels were detected using immunoblotting. (C-E) DPSCs were transfected with WT or K27R Parkin plasmids, and LC3B and TOM20 Levels were measured by immunoblotting. $n = 3/\text{group}$. $P < 0.001$ and $P < 0.01$ indicate statistically significant.



Supplementary Figure 3 CPT1A physically interacts with Parkin in a mitophagy-activating context. Representative PLA images of DPSCs at p7, p15, or p15 treated with CCCP. n = 3/group.



Supplementary Figure 4 CPT1A succinylates Parkin and suppresses mitophagy through its lysine succinyltransferase activity. (A, B) The effect of CPT1A-WT, CPT1A-G710E, or CPT1A-H473A on the succinylation levels of Parkin were detected by immunoblotting after IP. (C-F) DPSCs at p15 were transfected with shCPT1A and CPT1A-WT, CPT1A-G710E, or CPT1A-H473A, and the levels of mitophagy markers (PINK1, Parkin, and LC3B-II/I ratio) were measured by immunoblotting. $n = 3/\text{group}$. $P < 0.001$ and $P < 0.05$ indicate statistically significant. NS: no significance.