

Title: Supplementary Movies 1.

Description: Inducible mitochondrial deformation using PLAAT3-FL. COS-7 cells were transfected with mCherry-FKBP-PLAAT3-FL and CFP-FRB-MoA. The upper panels of **Fig. 1** were extracted as representative images based on this movie. Rapamycin was added at $t = 5$ mins. Scale bar = 10 μm .

Title: Supplementary Movies 2.

Description: A lipase dead mutant of PLAAT3 did not induce mitochondrial deformation. COS-7 cells were transfected with mCherry-FKBP-PLAAT3-FL-LD and CFP-FRB-MoA. The lower panels of **Fig. 1** were extracted as representative images based on this movie. Rapamycin was added at $t = 5$ mins. Scale bar = 10 μm .

Title: Supplementary Movies 3.

Description: More detailed morphological changes of mitochondria upon a CID-18TM recruitment. COS-7 cells were transfected with mCherry-FKBP-18TM and CFP-FRB-MoA. The images of **Fig. 2a** were extracted as representative images based on this movie. Rapamycin was added at $t = 1$ min. Scale bar = 10 μm .

Title: Supplementary Movies 4.

Description: Loss of membrane potential following the 18TM-mediated deformation. COS-7 cells were transfected with YFP-FKBP-18TM and CFP-FRB-MoA. The images of **Fig. 3a** were extracted as representative images based on this movie. Rapamycin was added at $t = 9$ mins. Scale bar = 10 μm .

Title: Supplementary Movies 5.

Description: Su9-CFP leakage following the 18TM-mediated deformation. COS-7 cells were transfected with YFP-FKBP-18TM, Su9-CFP, and mCherry-FRB-MoA. The images of **Fig. 4a** were extracted as representative images based on this movie. This movie shows only CFP (blue) and mCherry (red) channels. Scale bar = 10 μm .

Title: Supplementary Movies 6.

Description: Su9-CFP did not leak out of mitochondria in 18TM-LD-expressing cells. COS-7 cells were transfected with YFP-FKBP-18TM-LD, Su9-CFP, and mCherry-FRB-MoA. The images of **Fig. 6c** were extracted as representative images based on this movie. This movie shows only CFP (blue) and mCherry (red) channels. Scale bar = 10 μm .

Title: Supplementary Movies 7.

Description: Dissipation of matrix-resident proteins of peroxisomes following the 18TM recruitment. HeLa cells were transfected with YFP-FKBP-18TM, PEX3-CFP-FRB, and mSca-Peroxi. The images of **Fig. 6a** were extracted as representative images based on this movie. Rapamycin was added at $t = 1$ min. Scale bar = 10 μm .

Title: Supplementary Movies 8.

Description: mSca-Peroxi proteins were not dissipated following the 18TM-LD recruitment. HeLa cells were transfected with YFP-FKBP-18TM-LD, PEX3-CFP-FRB, and mSca-peroxi. The images of **Fig. 6b** were extracted as representative images based on this movie. Rapamycin was added at $t = 1$ min. Scale bar = 10 μm .