

**Caspase inhibition rescues F1Fo ATP synthase dysfunction-mediated  
dendritic spine elimination**

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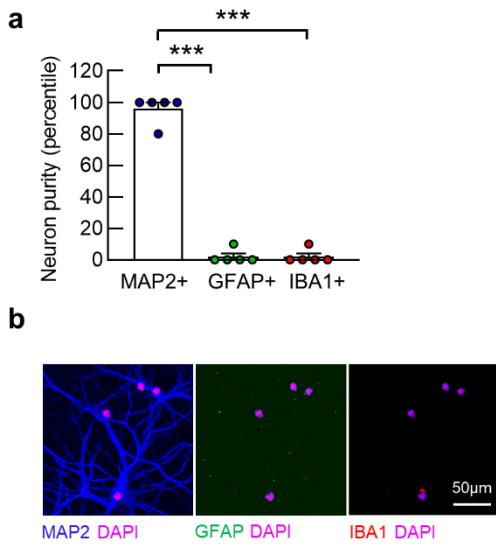
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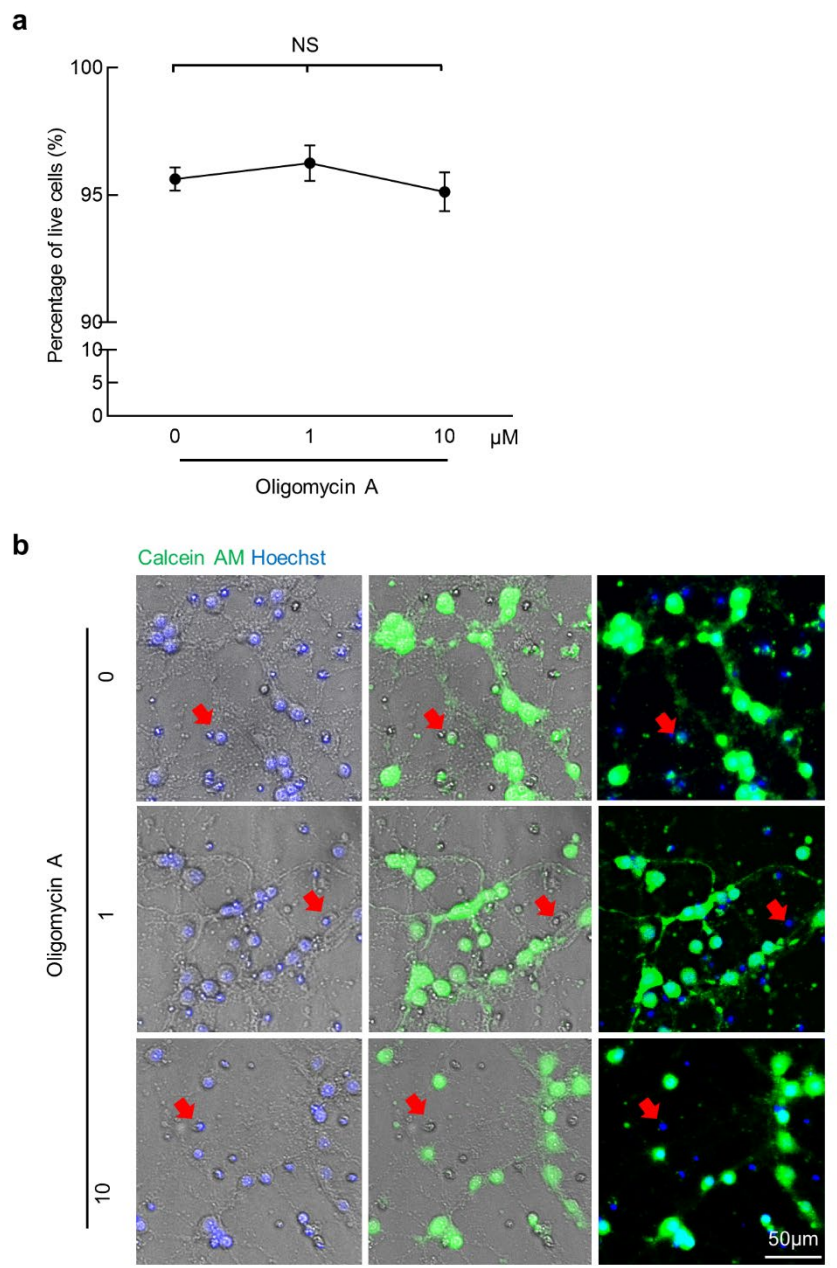
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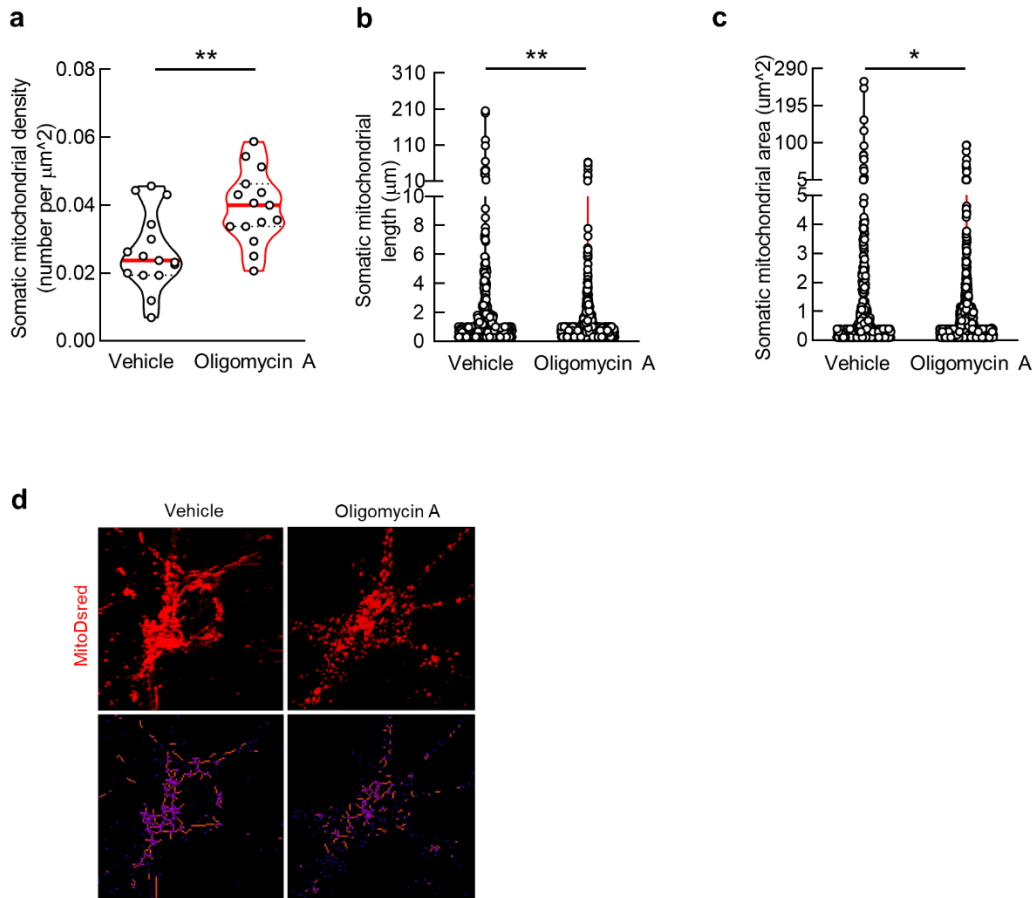
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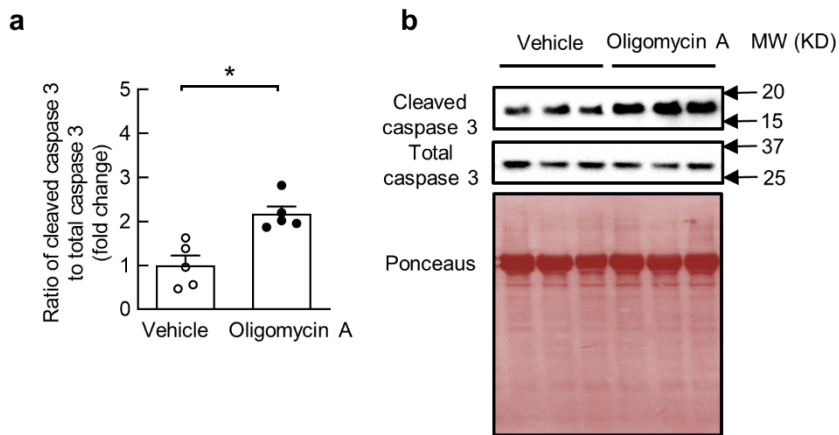
**Fig.S1. Characterization of cultured cells. (a)** Quantitative analysis of the percentages of MAP2 (Blue, a marker for neurons) positive, GFAP (Green, a marker for astrocytes) positive, IBA1 (Red, a marker for microglia) positive cells in the culture. Unpaired student's t-test; NS, not significant.  $n = 100\sim 120$  cells per group. **(b)** Representative images of MAP2 (Blue), GFAP (Green), IBA1 (Red) and DAPI (Purple) staining. Scale bar = 50µm.



**Fig.S2. Oligomycin A treatment does not affect neuron viability.** (a) Quantitative analysis of Calcein AM (Green) positive neurons were compared under different doses of oligomycin A treatments. Unpaired student's t-test; *NS*, not significant.  $n = 250\sim 300$  cells per group. (b) Representative images of Calcein AM (Green) and Hoechst (Blue), red arrows indicates Calcein negative staining. Scale bar = 50 $\mu$ m.

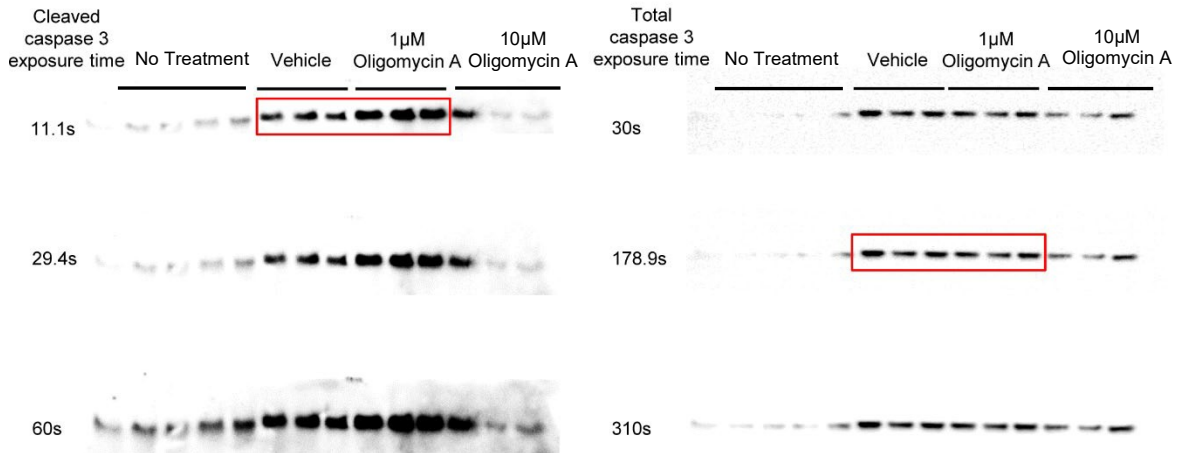
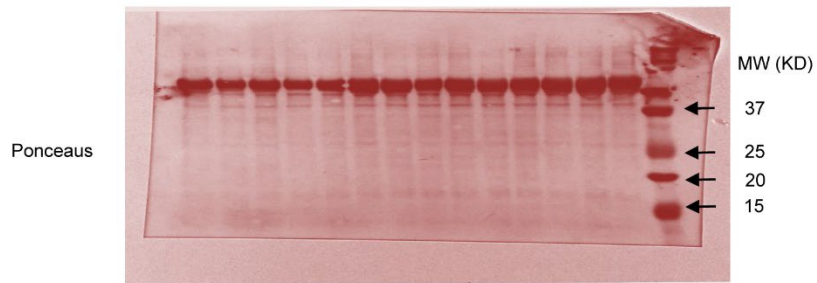


**Fig.S3. Oligomycin A treatment upregulates somatic mitochondrial fragmentation.** (a) Somatic mitochondrial density of cultured hippocampal neurons with vehicle or 1 $\mu$ M oligomycin A treatment. Unpaired student's *t*-test; \*\*  $P < 0.01$ .  $n = 15$  neurons. (b) Somatic mitochondrial length of cultured hippocampal neurons with vehicle or 1 $\mu$ M oligomycin A treatment. Unpaired student's *t*-test; \*\*  $P < 0.01$ .  $n = 15$  neurons. (c) Somatic mitochondrial area of cultured hippocampal neurons with vehicle or 1 $\mu$ M oligomycin A treatment. Unpaired student's *t*-test; \*  $P < 0.01$ .  $n = 196$  and 208 mitochondria, respectively. (d) Representative images of mitochondria in the soma of hippocampal neurons, lower panels are reconstructed mitochondrial network by Image J. Scale bar = 5 $\mu$ m.



**Fig.S4. Oligomycin A treatment elevates cleavage of caspase 3 in neurons. (a)** Immunoblotting analysis of caspase 3 cleavage levels in vehicle or 1 $\mu$ M oligomycin A treated neurons. Unpaired student's t-test; \*  $P < 0.05$ .  $n = 5$  samples per group. **(b)** Representative bands of cleaved and total caspase 3.

**a**



**Fig.S5. Original images of Fig.S3. (a)**The images are cropped from same gel, red boxes stand for where the representative images cropped from.