

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: In vivo two-photon imaging of $[Ca^{2+}]_{mito}$ and $[Ca^{2+}]_{cyto}$ transients in L1 dendrites. The region of image was at $\sim 30 \mu m$ below the pia in primary motor cortex. The white arrow indicates a $[Ca^{2+}]_{mito}$ -to- $[Ca^{2+}]_{cyto}$ coupling event.

File Name: Supplementary Movie 2

Description: In vivo two-photon imaging of $[Ca^{2+}]_{mito}$ and $[Ca^{2+}]_{cyto}$ transients in L2/3 somas. The region of image was at $\sim 300 \mu m$ below the pia in primary motor cortex. The time window that mouse was running on the treadmill was labeled as "RUN" on upper left corner. The white arrows indicate representative $[Ca^{2+}]_{mito}$ -to- $[Ca^{2+}]_{cyto}$ coupling events.

File Name: Supplementary Movie 3

Description: No pH change detected by mito-pHtomato either at rest or during running. The region of image was at $\sim 30 \mu m$ below the pia in primary motor cortex