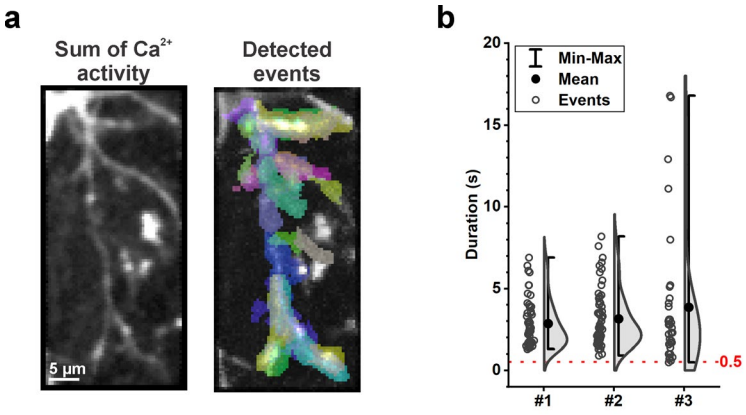
Supplementary Figure and Figure Legend



Supplementary Figure 1. OPC Ca^{2+} events last a minimum of 0.5 seconds. a, Images indicating summed fluorescence (left) and AQuA detected events (right) of Ca^{2+} events in OPC processes recorded at 10 Hz. **b,** Distribution and quantification of Ca^{2+} event duration, detected using 20 Hz (animal #1, 52 events from 1 OPC) or 10 Hz (animal #2, 61 events from 1 OPC, and animal #3, 35 events from 1 OPC) of 2P Ti:Sapphire lasers at 920 nm. Note that every event detected is at least equal to or longer than 0.5 s. Data collection from animal #1, #2 and #3 were performed independently.

Supplementary Video Legends

Supplementary Video 1. Cytosolic OPC Ca^{2+} activity in the visual cortex *in vivo*. Left: OPC Ca^{2+} activity detected by 2P microscopy; Right: Output video from AQuA with randomly-pseudocolored Ca^{2+} events (5x speed).

Supplementary Video 2. Membrane OPC Ca^{2+} activity in the visual cortex *in vivo*. Left: OPC Ca^{2+} activity detected by 2P microscopy; Right: Output video from AQuA with randomly-pseudocolored Ca^{2+} events (5x speed).

Supplementary Video 3. Enforced locomotion stimulates OPC Ca^{2+} activity in the mouse visual cortex. The red dot indicates when the platter began to rotate (movie played at 5x speed).

Supplementary Video 4. PE evokes Ca^{2+} influx in OPCs in acute cortical slices. PE was superfused ~3 min after the recording begins (movie shown at 50x speed).

Supplementary Video 5. Myelinating oligodendrocytes exhibit infrequent Ca^{2+} activity in the visual cortex *in vivo*. Left: Oligodendrocyte near membrane Ca^{2+} activity detected by 2P microscopy; Right: Output video from AQuA with randomly-pseudocolored Ca^{2+} events (5x speed).