

Supplemental Material

Supplemental Videos

Supplemental videos 1–6 are available in the repository at <https://github.com/dtabuena/FunctionalStates/tree/main/SupplementalVideos>.

Video Captions

Video 1 - Spontaneous Ca activity under in the Persistently Active state recorded in adult mouse cortex.

Video 2 - Spontaneous Ca activity under in the Slow Wave state recorded in adult mouse cortex.

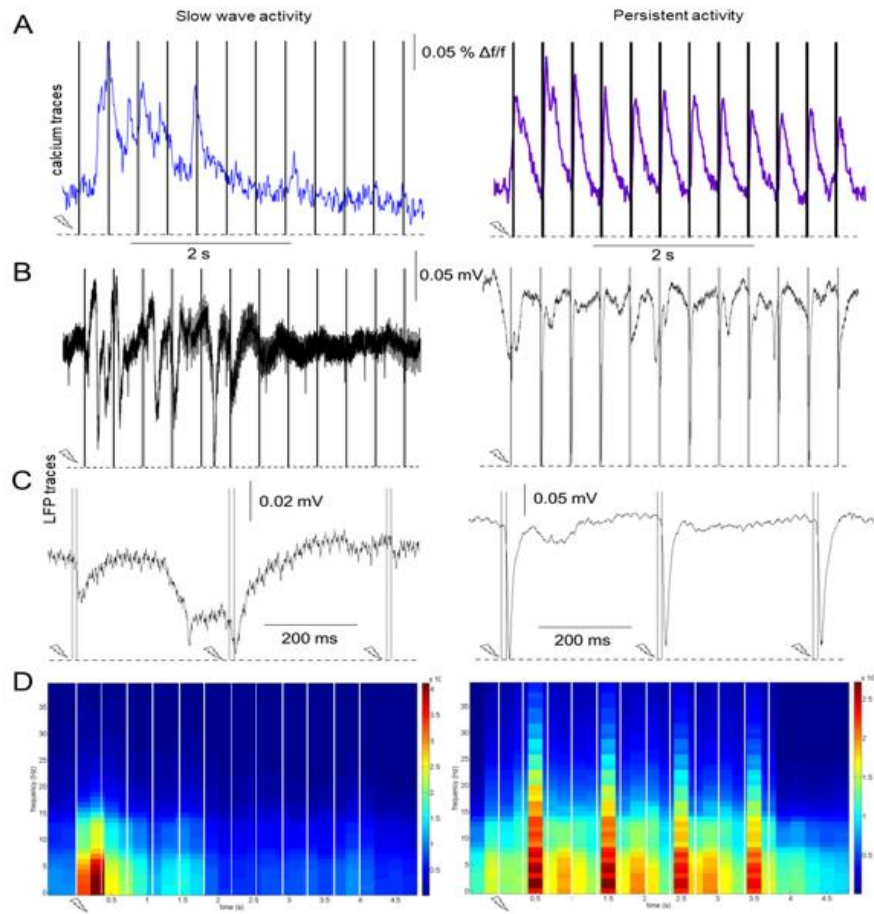
Video 3 - Triggered average of the Ca responses after visual stimulation with and LED flash in the persistently active state.

Video 4 - Triggered average of the Ca responses after visual stimulation with and LED flash in the the slow wave state.

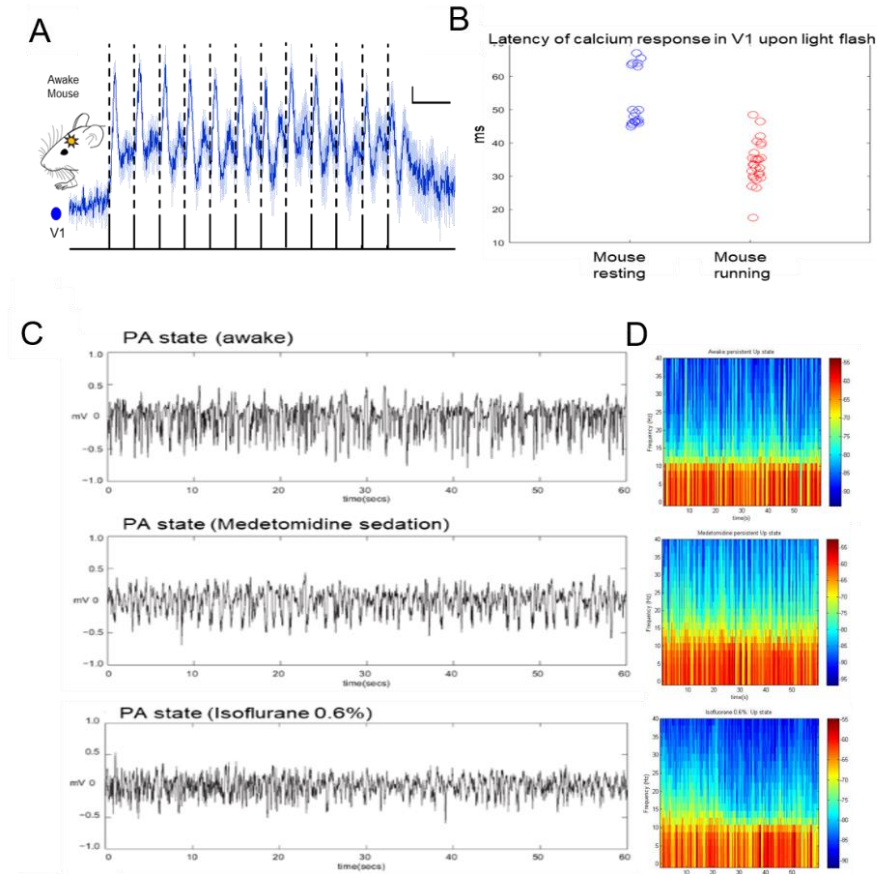
Video 5 - Triggered average of the Ca responses after somatic electrical stimulation of the hind paw in the persistently active state.

Video 6 - Triggered average of the Ca responses after somatic electrical stimulation of the hind paw in the slow wave state.

Supplemental Figures



Supplementary Figure 1. Local dynamics of functional states during sensory-evoked activity (stimulus trains). (A) During slow wave activity (blue, left trace) stimulus trains of 3 Hz, 4 s lead to calcium waves comparable to the ones evoked by single pulses (cp. Figure 3.3 B). During persistent activity (purple, right trace) short-latency responses are elicited by every stimulus pulse of the train upon the same stimulation paradigm. (B) LFP recordings reveal similar signal characteristics upon 3 Hz 4 s stimulation as in above calcium, a stereotypic slow wave event is elicited during slow wave activity (left) whereas persistent activity is characterized by short-latency LFP spikes upon every pulse of the stimulus train (right). (C) A magnification of pulse 3-5 of the stimulus train in (B) shows that during slow wave activity a stereotypical wave event was elicited upon the stimulation, which is not responsive upon consecutive stimulus pulses, whereas during persistent activity every stimulus pulse was encoded by stimulus-locked LFP spike (right). (D) Stimulus-locked spectrograms reveal different response types upon 3 Hz 4 s stimulation paradigm for slow wave activity (left) and persistent activity (right) in their time-frequency profile.



Supplementary Figure 2. Spatiotemporal dynamics in awake and sedated condition. (A) Responses occur locally in the area of respective sensory afferents in the awake mouse. Similar to the calcium responses in medetomidine sedated animals, visual stimulation leads to short-latency primary responses in the calcium signal of V1 (mean latency $25 \text{ ms} \pm 3 \text{ ms}$; 10 events) recorded in an awake mouse (averages of 10 stimulus trains of 3 Hz for 4 s events; line = mean, shading = SEM of 10 evoked events; vertical scale bars = 1 % $\Delta f/f$, horizontal scale bars = 500 ms). (B) Latency distributions of V1 calcium responses upon visual stimulation during rest and running. In this animal during a prolonged period of rest ($> 30 \text{ s}$), visually evoked calcium responses in V1 (blue circles) occurred with a mean latency of 53 ms ($\pm 2 \text{ ms}$; 18 events). When the animal was running on the tracking ball, visual stimulation evoked calcium responses in V1 with a mean latency of 34 ms ($\pm 1 \text{ ms}$; 26 events). The medians of the distributions are statistically different (rank sum test, $p < 0.0001$). (C) and (D) different examples for PA state.