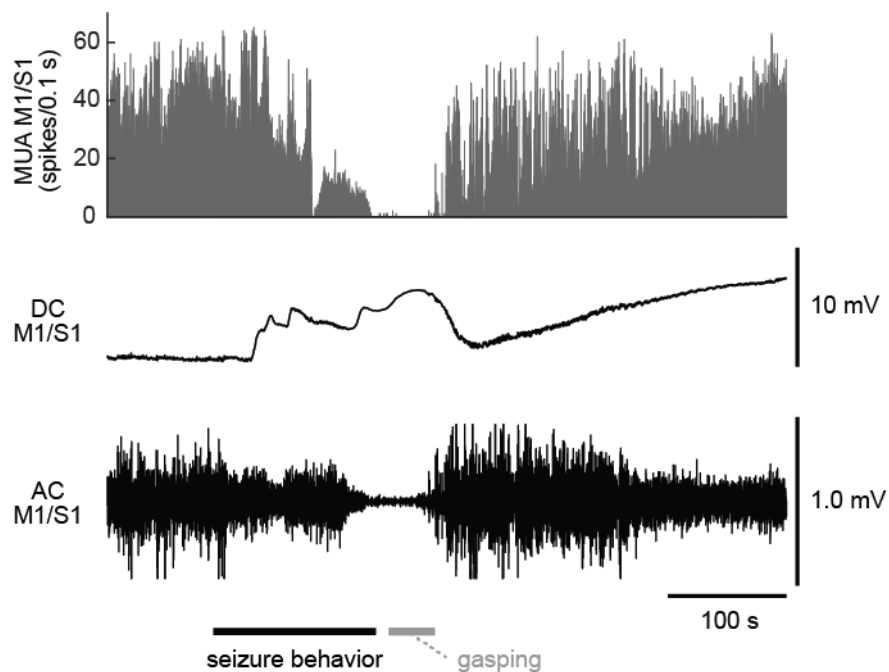
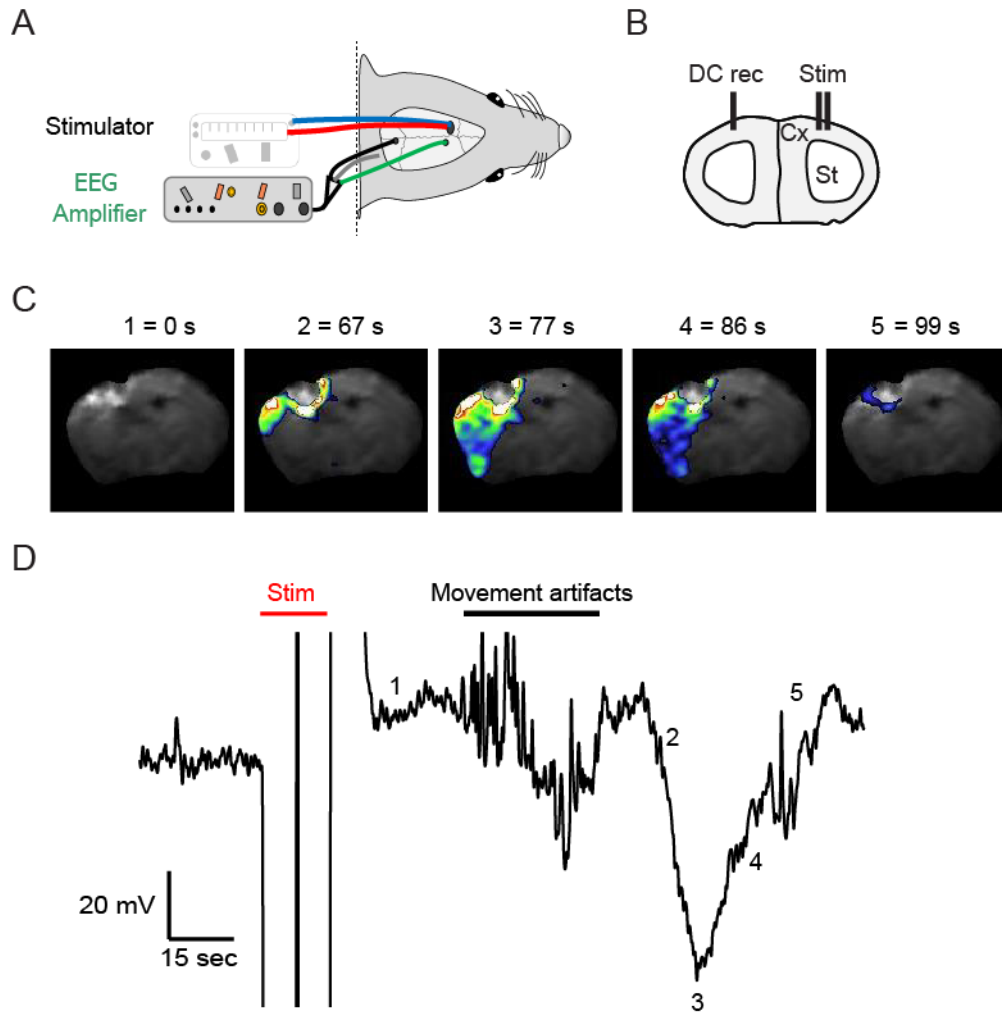


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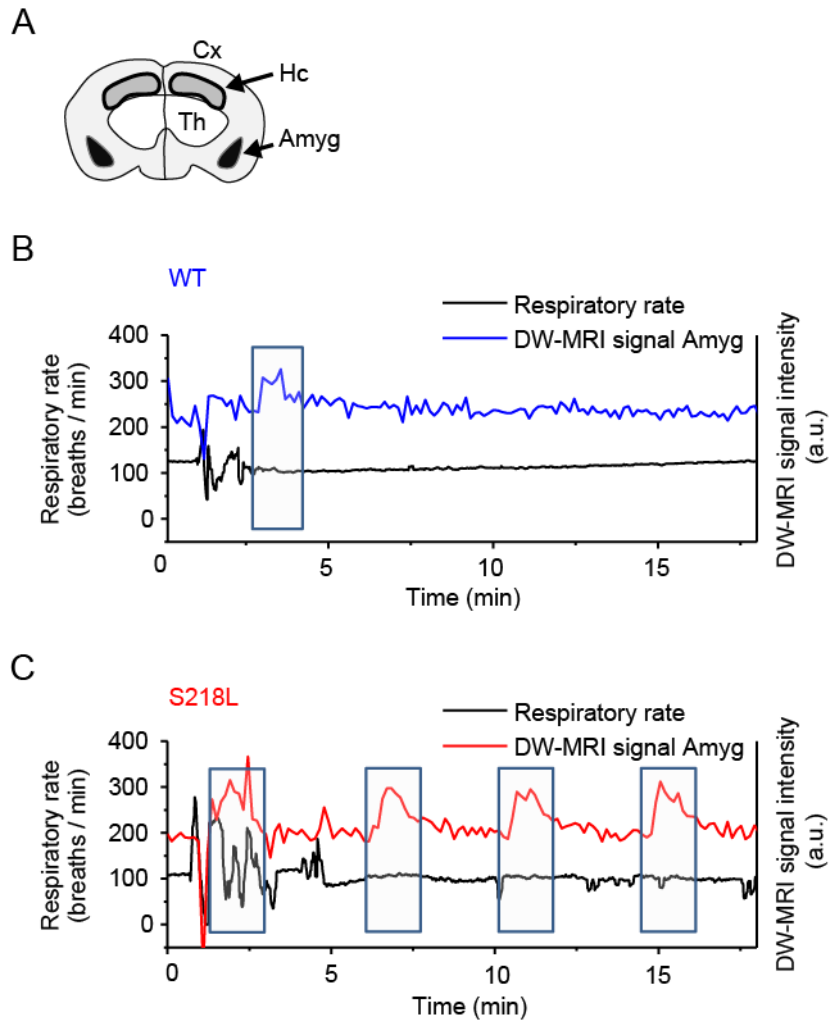
**Supplementary Figure S1 Example of a non-fatal seizure associated with MUA and ECoG suppression in a freely behaving homozygous *Cacna1a*<sup>S218L</sup> mouse.** Late ictal and post-ictal suppression of cortical multi-unit activity (MUA) and ECoG lasted approximately 1 min. Local DC recording confirmed that suppression was not due to cortical spreading depolarization (SD), showing only movement-related DC-shifts during seizure behavior. Video recordings showed gasping behavior during recovery of MUA and ECoG activity, indicating successful autoresuscitation.

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**Supplementary Figure S2 Cortical SD correlates with increased cortical DW-MRI signal intensity.** (A,B) Schematics showing placement of ECoG and stimulation electrodes in the contralateral cortex during simultaneous DW-MRI acquisition. (C) DW-MRI data showing spread of a single SD event, as measured by increased cell swelling, following seizure induction by electrical stimulation (Stim) of the cortex. Numbers denote the timing of the SD event as measured by DW-MRI relative to (D) the same SD event measured by ECoG. Note seizure-related movement artifacts prior to the cortical SD event. Cx = cortex; St = striatum.

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**Supplementary Figure S3 Amygdala SD does not induce respiratory changes.** (A) Schematic map of coronal brain slice containing amygdala. (B,C) Representative traces of amygdala SD overlaid with respiratory rate for wild-type (WT) (B) and homozygous *Cacna1a*<sup>S218L</sup> (S218L) (C) mice. SD events are outlined in blue rectangles. Note that for both the WT (panel B) and *Cacna1a*<sup>S218L</sup> animal (panel C) SD is observed in the amygdala without any corresponding effect on respiration. A.u. = arbitrary units. Amyg = amygdala; Cx = cortex; Hc = hippocampus; Th = thalamus.