THE CORTICAL EVOKED POTENTIAL CORRESPONDS WITH DEEP BRAIN STIMULATION EFFICACY IN RATS

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Supplemental Data

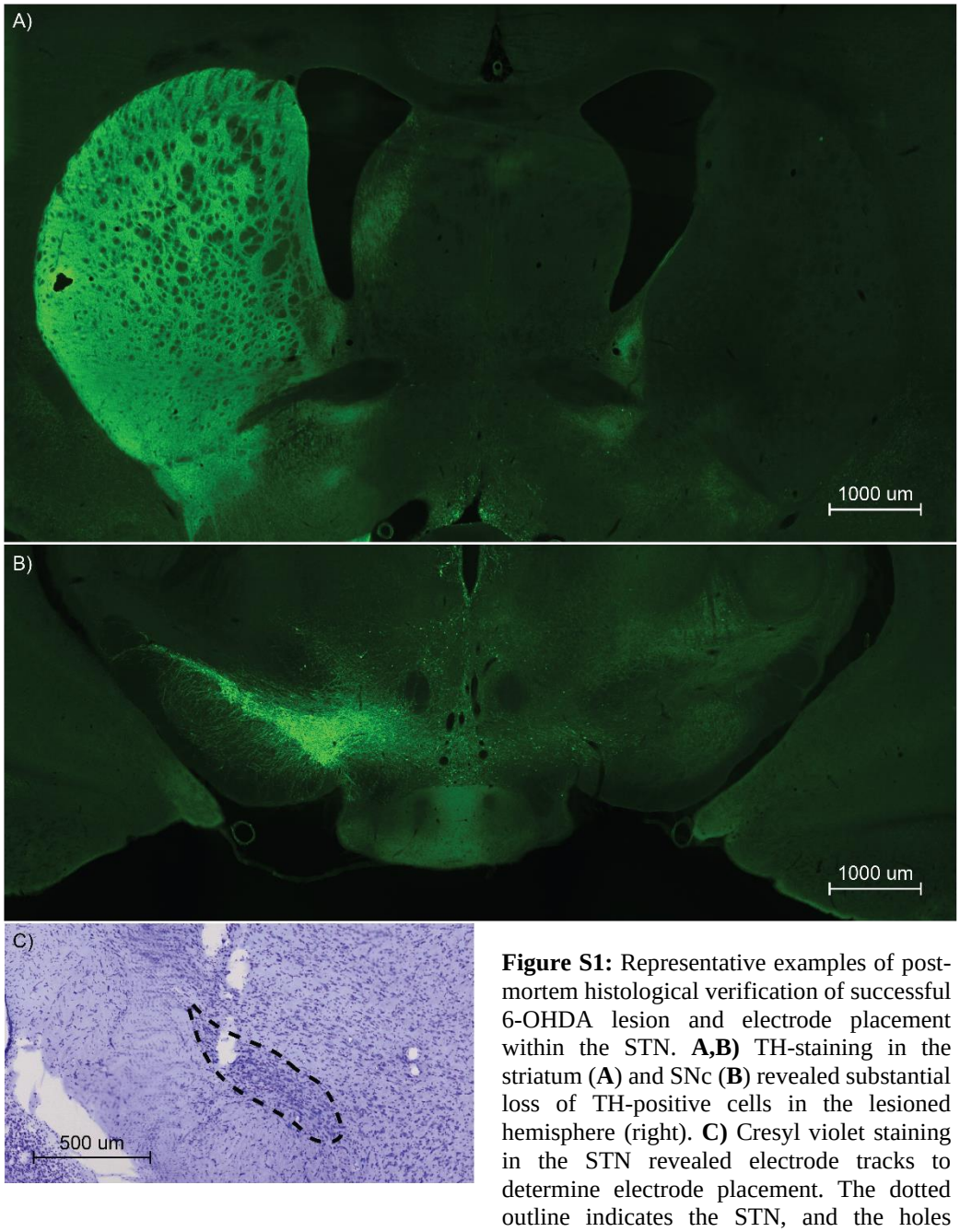


Figure S1: Representative examples of post-mortem histological verification of successful 6-OHDA lesion and electrode placement within the STN. **A,B)** TH-staining in the striatum (**A**) and SNc (**B**) revealed substantial loss of TH-positive cells in the lesioned hemisphere (right). **C)** Cresyl violet staining in the STN revealed electrode tracks to determine electrode placement. The dotted outline indicates the STN, and the holes indicate the locations of electrode tips.

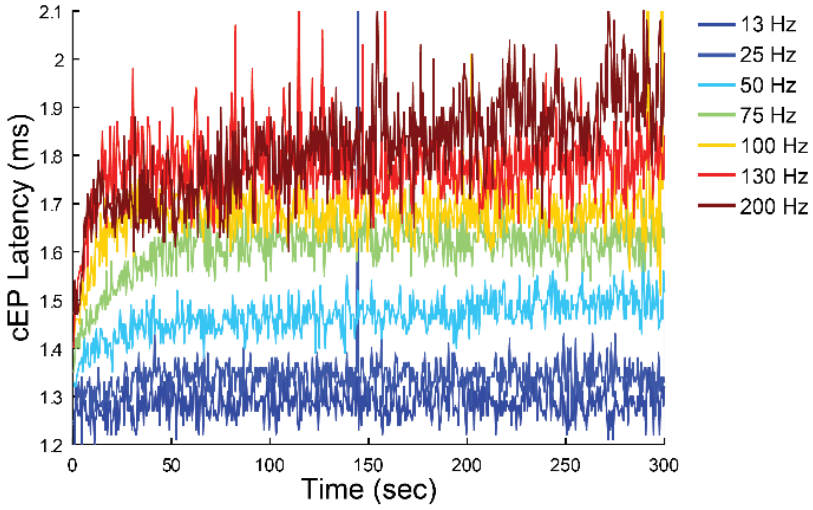


Figure S2: The cEP latency over five minute trials at seven different stimulation frequencies [13, 25, 50, 75, 100, 130, 200 Hz] from a representative animal. The cEP is averaged over 500 ms windows. Note that there is only an observable change over time for stimulation frequencies ≥ 50 Hz.

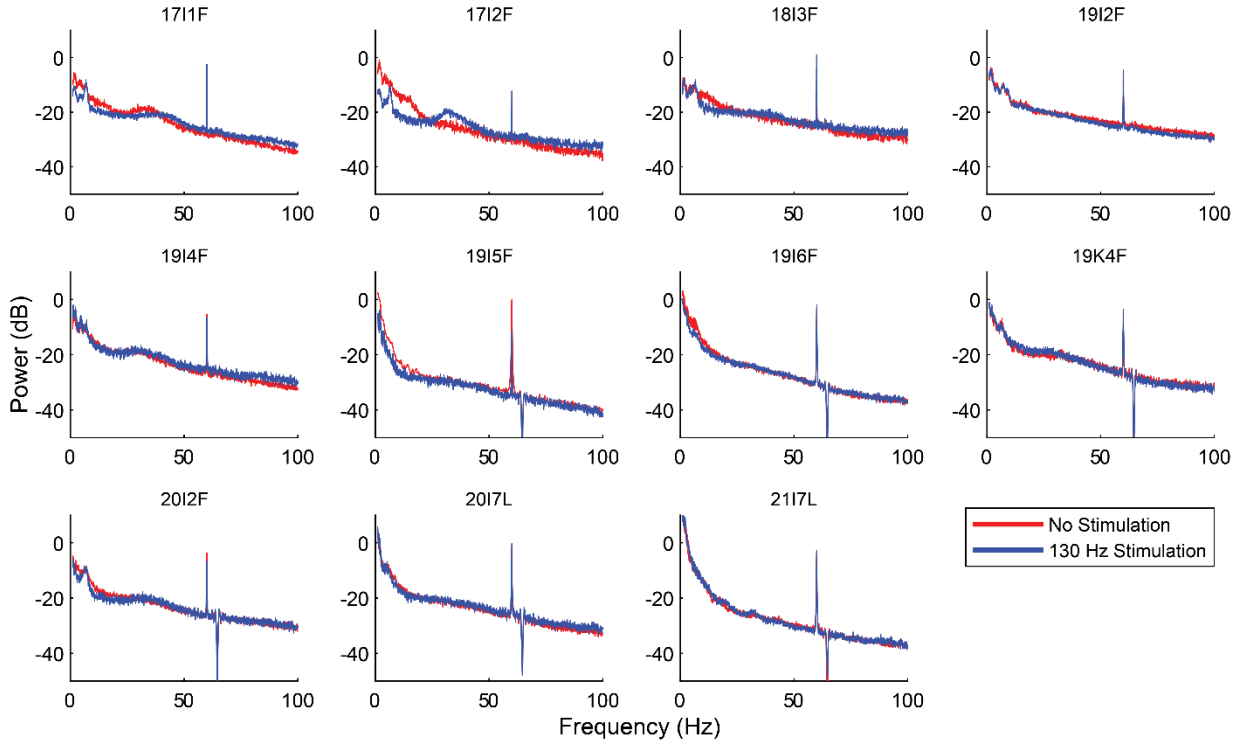
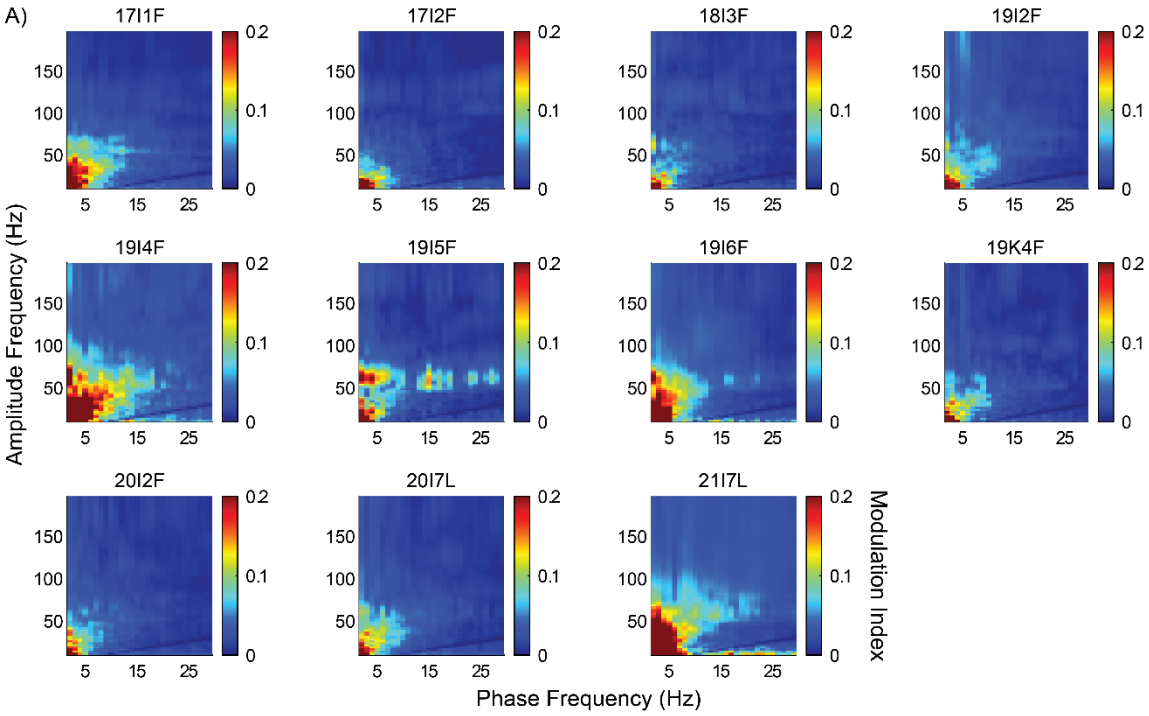
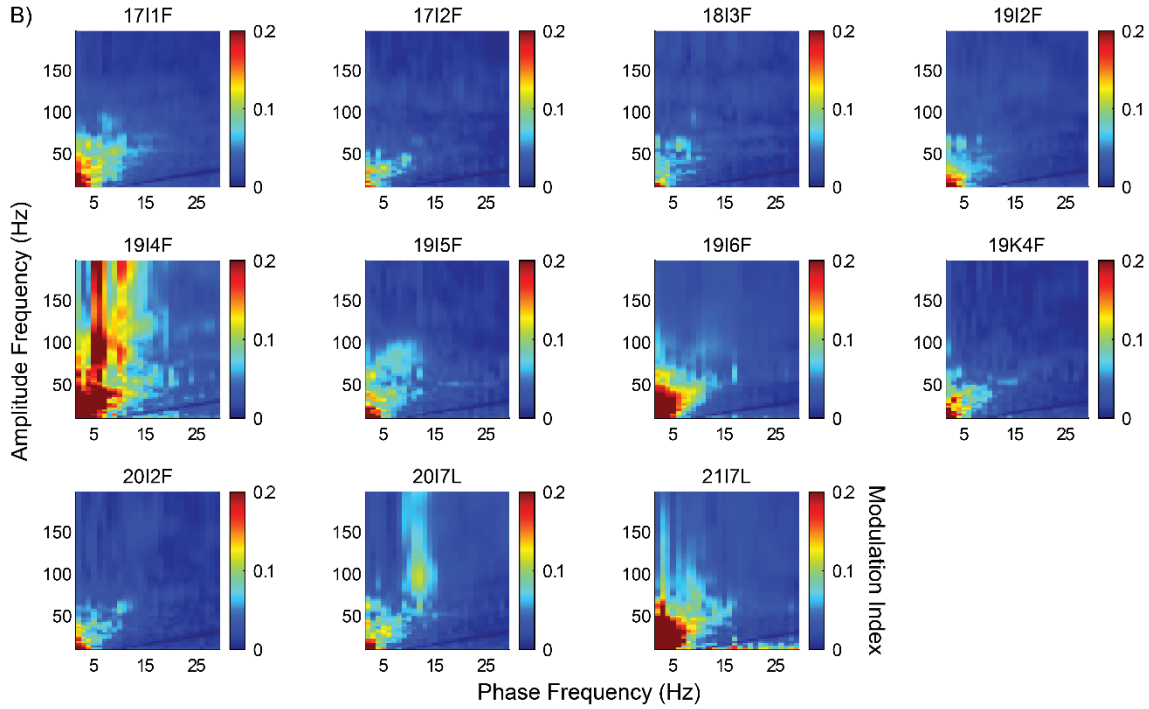


Figure S3: Power spectra of individual rats during five-minute recordings while rats were in an awake, freely moving state (n=11) either with no stimulation (red) or with 130 Hz stimulation (blue).


A)
17I1F
17I2F
18I3F
19I2F
19I4F
19I5F
19I6F
19K4F
20I2F
20I7L
21I7L
Amplitude Frequency (Hz)
Phase Frequency (Hz)
Modulation Index
150
100
50
5
15
25
0.2
0.1
0


B)
17I1F
17I2F
18I3F
19I2F
19I4F
19I5F
19I6F
19K4F
20I2F
20I7L
21I7L
Amplitude Frequency (Hz)
Phase Frequency (Hz)
Modulation Index
150
100
50
5
15
25
0.2
0.1
0

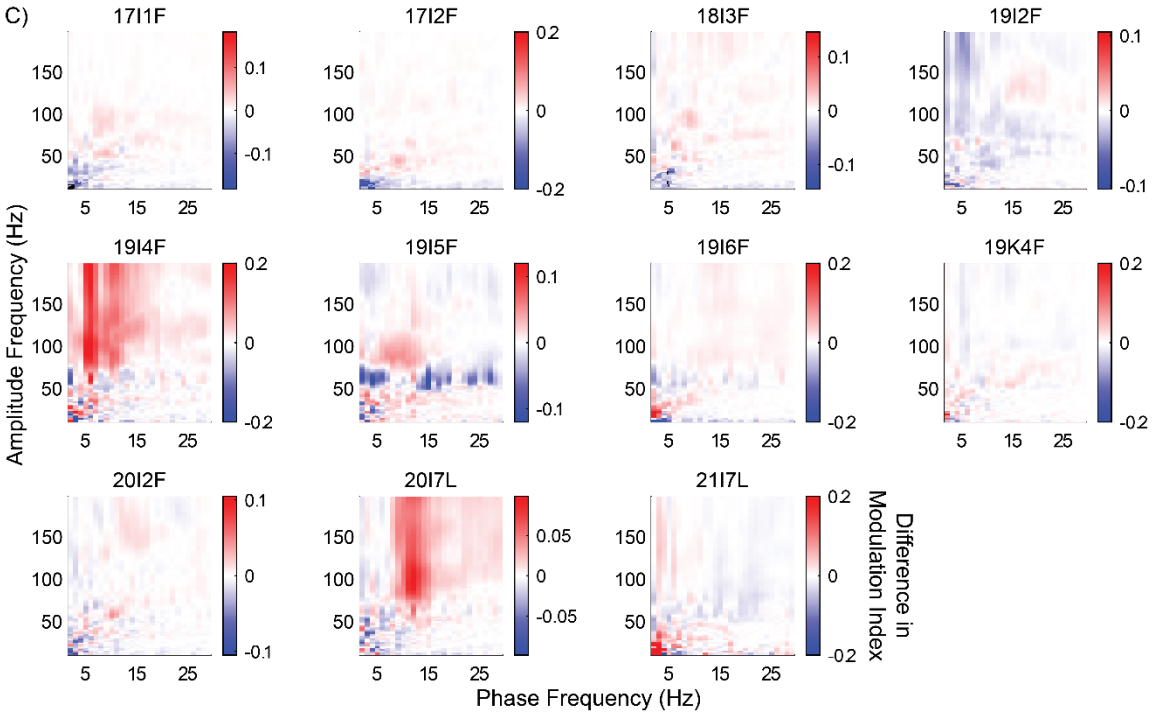
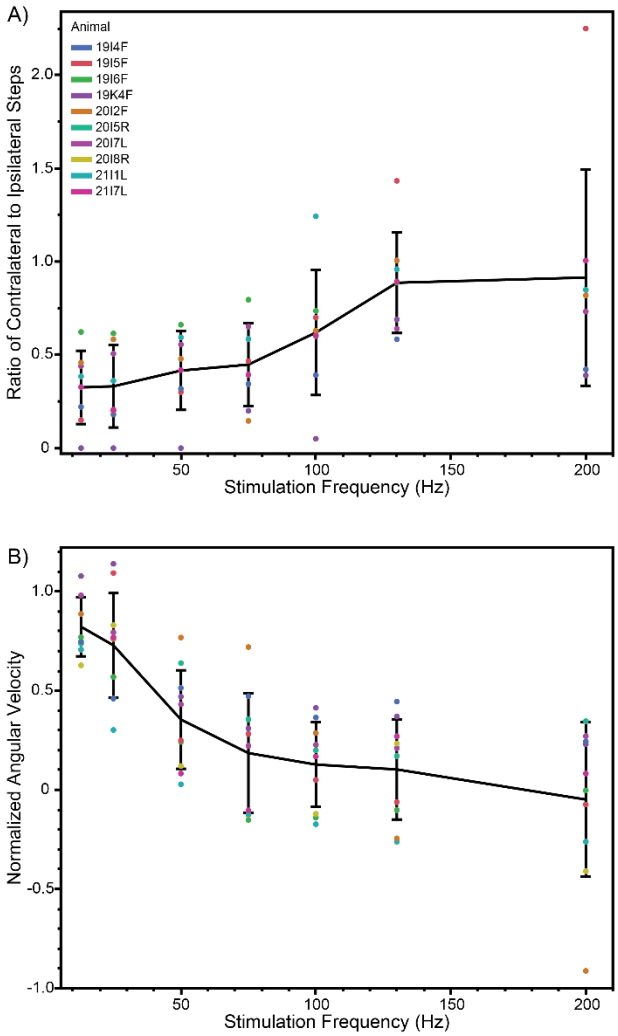


Figure S4: Phase-amplitude coupling (PAC) of individual animals during five-minute recordings while rats were in an awake, freely moving state (n=11) either with no stimulation **(A)** or with 130 Hz DBS **(B)**. The color bar represents the average modulation index for each phase/amplitude pair across all animals. In **C)** is plotted the average difference in modulation index between no stimulation and 130 Hz stimulation across animals.

Figure S5: Raw behavioral scores for the adjusting steps task (**A**) and methamphetamine induced circling (**B**) across stimulation frequencies. Colors indicate each animal's score at each stimulation frequency and error bars indicate mean ± SD. Note that a higher score in the adjusting steps task and a lower score in methamphetamine-induced circling indicate improvement in motor behaviors.



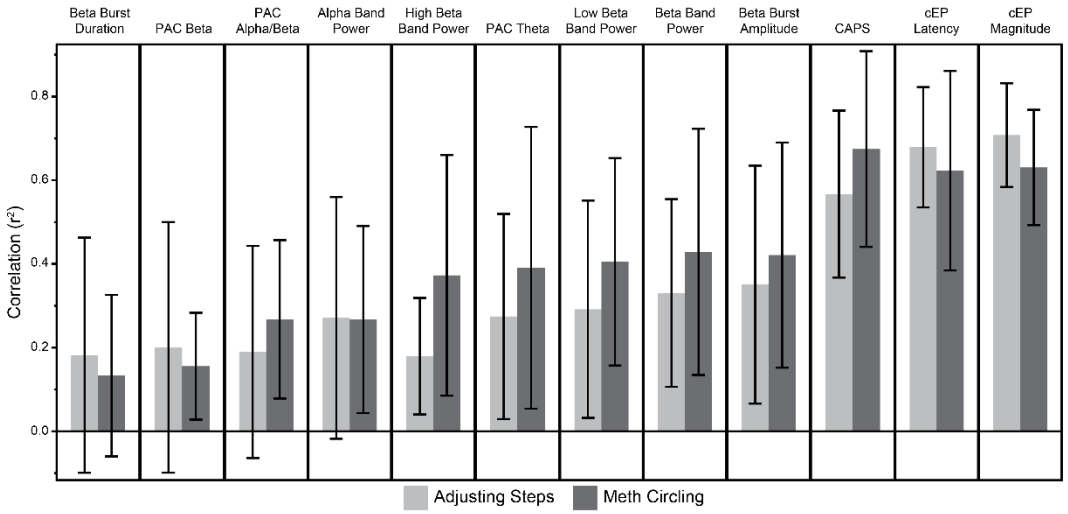


Figure S6: Correlation of biomarkers with symptom reduction for the adjusting steps task (n=9) and methamphetamine-induced circling (n=11). PAC is the phase-amplitude coupling modulation index, with the subregions being Beta (phase 13-30 Hz, amplitude 50-200 Hz), Alpha/Beta (phase 8-20 Hz, amplitude 50-200 Hz), and Theta (phase 1-8 Hz, amplitude 10-50 Hz). Power is the average spectral power within the spectral bands: Alpha (8-13 Hz), Low Beta (13-20 Hz), High Beta (20-30 Hz), and Beta (13-30 Hz). The Beta Burst Duration and Amplitude are the average duration and amplitude, respectively, of the low beta band (13-20 Hz) bursts. CAPS is the cortical activation per second, which is the cEP Magnitude multiplied by the stimulation frequency. The metric for each biomarker category with the strongest average correlations was used for subsequent analysis. Error bars indicate ± SD.

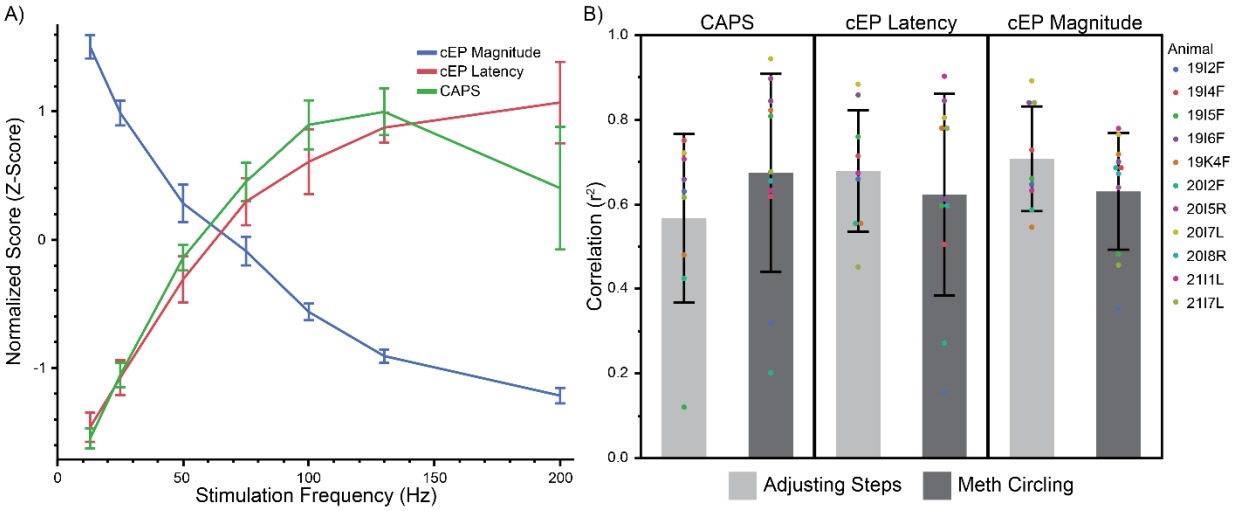


Figure S7: Comparison of the cortical activation per second (CAPS) with the cEP latency and cEP magnitude. **A)** The average per-animal normalized (z-score) values across animals (N=9) for the three cEP biomarkers, with error bars indicating the SD. The CAPS follows a near-identical trend to the cEP latency, and a similar, albeit opposite, trend as the cEP magnitude. **B)** Correlation of the three cEP biomarkers with symptom reduction for the adjusting steps task (n=9) and methamphetamine-induced circling (n=11).