Amygdala theta band power

Gill et al. recorded intracranial electroencephalographic data longitudinally (over one year) in two male individuals with amygdala electrodes implanted for the management of treatment-resistant posttraumatic stress disorder (TR-PTSD) under clinical trial NCT04152993. https://clinicaltrials.gov/study/NCT04152993

To determine electrophysiological signatures related to emotionally aversive and clinically relevant states (trial primary endpoint), they characterized neural activity during unpleasant portions of three separate paradigms (negative emotional image viewing, listening to recordings of participant-specific trauma-related memories, and at-home-periods of symptom exacerbation). They found selective increases in amygdala theta band power (5-9 Hz) across all three negative experiences. Subsequent use of elevations in low-frequency amygdala band power as a trigger for closed-loop neuromodulation led to significant reductions in TR-PTSD symptoms (trial secondary endpoint) following one year of treatment as well as reductions in aversive-related amygdala theta activity. Altogether, the findings provide early evidence that elevated amygdala theta activity across a range of negative-related behavioral states may be a promising target for future closed-loop neuromodulation therapies in PTSD [1].

1)
Gill JL, Schneiders JA, Stangl M, Aghajan ZM, Vallejo M, Hiller S, Topalovic U, Inman CS, Villaroman D, Bari A, Adhikari A, Rao VR, Fanselow MS, Craske MG, Krahl SE, Chen JWY, Vick M, Hasulak NR, Kao JC, Koek RJ, Suthana N, Langevin JP. A pilot study of closed-loop neuromodulation for treatment-resistant post-traumatic stress disorder. Nat Commun. 2023 May 24;14(1):2997. doi: 10.1038/s41467-023-38712-1. PMID: 37225710; PMCID: PMC10209131.