Washington University in St. Louis
Office of Technology Management

METHOD TO PERFORM SPECTRAL BIOPSY OF ELECTROPHYSIOLOGICAL BRAIN FUNCTION FOR USE IN MONITORING AND DIAGNOSING NEUROLOGICAL CONDITIONS

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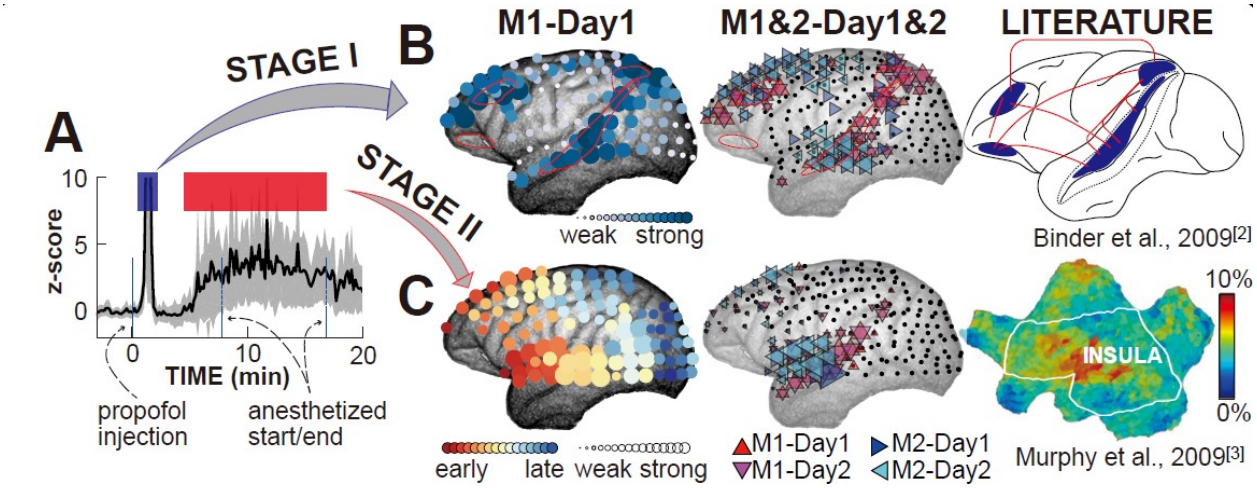
Value Proposition: *New process used to detect/measure the intrinsic neuronal brain activity to diagnose neurological and psychiatric diseases.*

Technology Description

Researchers at Washington University in St. Louis have developed a method called Tau-Modulation to assess intrinsic neuronal activity, providing a spectral biopsy of brain function. Traditional methods based on the Hilbert transform require assumptions that neuronal activity is narrow-band, sinusoidal and sustained, while Tau-Modulation does not.

Because this new method can characterize wideband low-frequency and broadband gamma activity, it can be applied more broadly to brain electrophysiology. Tau-Modulation could be used in intraoperative brain mapping, more accurate anesthesia monitoring, and diagnosis of a variety of neurological conditions.



(A) The temporal dynamics of signal-to-noise ratio in primate brains receiving propofol. The spatial dynamics of both Stage I (B) and Stage II (C), calculated using Tau-Modulation, match functional networks that were reported previously.

Stage of Research

The researchers have developed and refined the Tau Modulation method. They have recently validated the method in primates while analyzing the effect of propofol on primate brains.

Publications

- Xie T, Wu Z, Chen L, Zhu X, Sheng X, & Brunner P. (2021). Phase-amplitude coupling between neuronal wideband low-frequency oscillations and broadband gamma activity. *10th International IEEE/EMBS Conference on Neural Engineering (NER),* 20677618.

Applications

- Intraoperative brain mapping
- Anesthesia monitoring
- Diagnosis and monitoring of neurological conditions

Key Advantages

- Observes intrinsic neuronal activity
- Not subject to same limitations as Hilbert transform:
  - Narrow frequency band
  - Sinusoidal and sustained signal

Patents: Patent application filed

Related Web Links: Leuthardt Profile & Lab; Brunner Profile