講師

何淳寧 Chun-Ning Ho

授課主題

EEG in Cardiac vs. Non-Cardiac Anesthesia: From Physiological Drive to Cognitive Regulation

摘要

This lecture explores the clinical application of intraoperative electroencephalogram (EEG) monitoring in both cardiac and non-cardiac anesthesia, reframing the EEG not merely as a processed depth-of-anesthesia surrogate but as a real-time window into the brain's overall physiological state.

This paradigm manifests with unmatched clarity during cardiac surgery under cardiopulmonary bypass (CPB), where patients routinely undergo profound physiological perturbations—such as hypothermia, non-pulsatile pressure fluctuations, and cerebral oxygenation changes—each leaving a distinct, recognizable signature on the EEG frequency spectrum.

The presentation systematically details the landmark "Physiologic EEG Signatures" framework established by Guay and Brown (2025), illustrating how hypothermia suppresses cerebral metabolic rate and drives frequency downshifts, how hypotension below the lower limit of autoregulation causes ischemic delta activity or global suppression, and how hypoxia and metabolic derangements alter spectral composition. A phase-by-phase account of CPB demonstrates how temperature, mean arterial pressure (MAP), and regional oxygen saturation (rSO_2) dynamically shift density spectral array (DSA) characteristics from initiation to post-bypass separation.

Furthermore, drawing lessons from the ENGAGES trial and recent evidence on multimodal neuromonitoring (integrating NIRS and raw EEG/DSA), the lecture underscores the clinically critical need to

differentiate drug-induced from physiologically driven EEG alterations. Mastering these spectral patterns serves as an essential safety imperative to identify early biomarkers of neurocognitive risk, mitigate postoperative delirium (POD) and cognitive dysfunction (POCD), and precisely protect the perioperative brain.