Mixing stochastic modeling and EEG spectral analysis to predict in real time the depth of anesthesia

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Résumé

Anticipating patient sensitivity to General Anesthesia, remains a difficult task due to the lack of predictive tools to interpret the random oscillatory ElectroEncephaloGram (EEG) signal. We will summarize here our approach to predict brain depth using: 1-Network modeling approaches based on two-dimensional Ornstein-Ulhenbeck processes, to generate transient spindles, thus revealing key statistical parameters. 2-Signal processing based on wavelets, EMD, spectrogram, spectral decomposition, EEG segmentation to extract time-frequency statistics in real time. 3-Statistical approaches and Machine-Learning to reduce the number of useful parameters and classify patients into sensitive and non-sensitive classes. These parameters allow to generate a state-chart like Markov state to quantify brain depth.