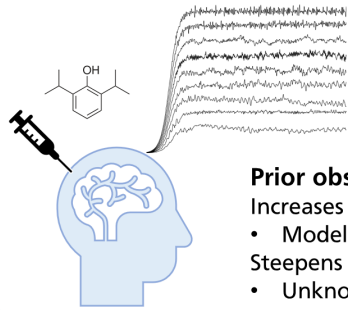


# Modelling EEG spectral changes during propofol-induced loss of consciousness

Niklas Brake<sup>1</sup>, Anmar Khadra<sup>1</sup>, and Gilles Plourde<sup>2</sup>  
 Departments of Physiology<sup>1</sup> and Anesthesiology<sup>2</sup>, McGill University

## Introduction

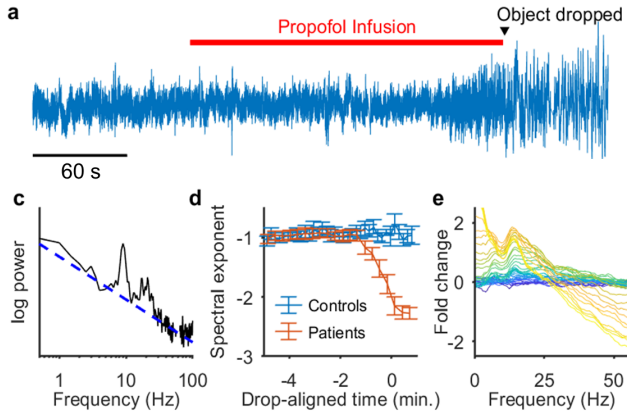


The EEG signal can be processed to analyze the **spectral density** at various frequencies.

### Prior observations with propofol

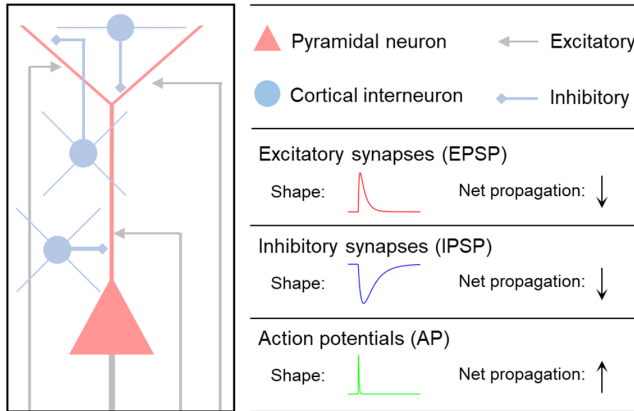
- Increases spectral power 12-30 Hz
- Models exist explaining this
- Steepens the spectral exponent
- Unknown mechanism

## Experimental Results

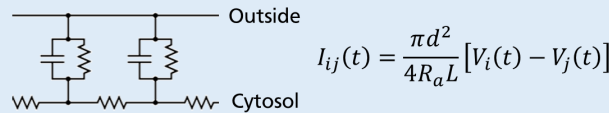


- We observe a steepening in the EEG spectral content
- Slope values consistent with those estimated by Colombo et al. (*NeuroImage*, 2019)

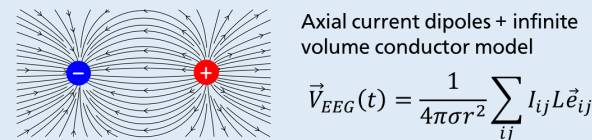
## Model Assumptions



### Compartmentalized membrane potentials

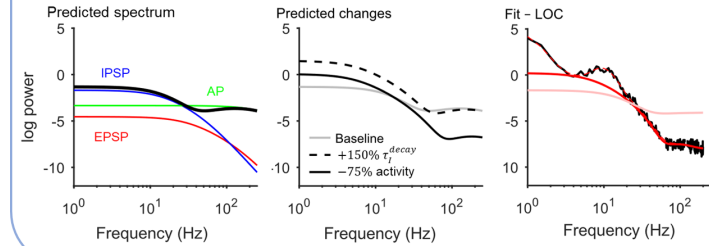


### Infinite volume conduction

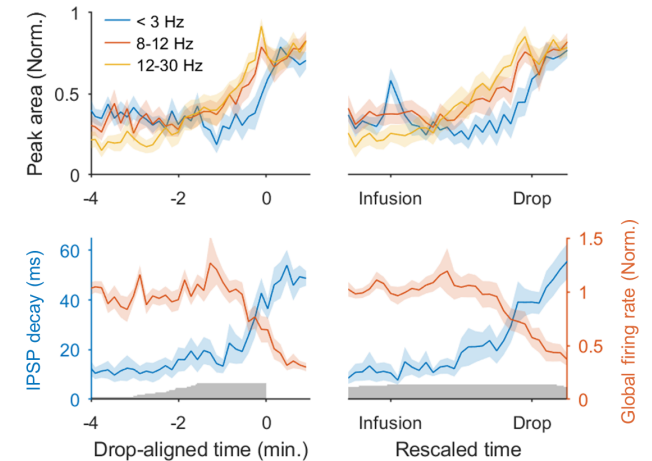


**Propofol leads to ~150% increase in IPSC decay time**  
 (Orser et al. *J. Neurosci.* 1994)

## Theoretical Results



## Data Reanalysis



- Global activity decreases and delta waves emerge with loss of consciousness
- Alpha/beta oscillations caused by propofol **not** loss of consciousness