



## Thesis Project Form

**Title (tentative):** Age dependent modulation of brain response of primary vs secondary motor areas

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### Description

#### Motivation and application domain

The application domain of this study is focused on intracortical electrical stimulation (ICS) during Stereo-EEG studies, specifically in the context of pediatric epilepsy surgery. Stereo-EEG is a diagnostic procedure used to localize epileptic foci in patients with drug-resistant epilepsy. This domain lies at the intersection of neurosurgery, neurophysiology, and pediatric epilepsy, exploring how differences in brain maturity across age groups may influence the effectiveness of stimulation used to trigger and identify seizure patterns in pediatric patients. The study aims to advance the understanding of age-specific parameters in electrical stimulation for better diagnostic outcomes.

#### General objectives and main activities

The primary objective of this research is to assess whether pediatric patients exhibit a different response to intracortical electrical stimulation compared to adult patients during Stereo-EEG studies. More specifically, the study aims to determine if variations in stimulation parameters are needed depending on the patient's age, and to identify the degree of clinical manifestation complexity in response to stimulation in the pediatric population.

The expected outcomes include:

1. Identification of age-dependent differences in the brain's response to electrical stimulation, particularly between primary and secondary motor areas.
2. Quantification of the complexity of clinical manifestations during stimulation, offering insights into how motor, sensory, speech, and undefined clinical signs are represented in children compared to adults.
3. Establishing a potential link between intellectual disability, anti-seizure treatment, and reduced stimulation efficacy.
4. Offering guidance for personalized stimulation protocols based on age and brain anatomy, thereby optimizing outcomes in pediatric epilepsy surgery.

These results could influence the future development of more age-specific and brain-area-specific protocols in Stereo-EEG studies, potentially improving diagnostic precision and therapeutic outcomes in pediatric patients with drug-resistant epilepsy.

#### Training Objectives (technical/analytical tools, experimental methodologies)

Brain response to active electrical stimulation, Brain signal and signal complexity, retrospective dataset

**Place(s) where the thesis work will be carried out:** DIBRIS, Ist. G. Gaslini

### Additional information

**Maximum number of students:** 1