M2 Neuroscience internship proposal

Title: Predicting surgical success in drug-resistant partial epilepsy

Topic summary

Despite ongoing therapeutic advances, epilepsy is considered to be resistant to drug treatment in around 30% of patients. In these patients with drug-resistant partial epilepsy, surgical treatment may aim to remove the brain area causing the seizures. This is currently the only treatment that can lead to a cure for epilepsy, which is achieved in around 65% of patients who undergo surgery. The aim of this internship is to better predict the chances of success of surgery using clinical and imaging data from epilepsy patients.

This internship comprises several stages:

- Recognizeand manually segment(using ITKsnap visualization and annotation software) lesions on patients' preoperative brain MRI scans.

- Segment the areas of surgical excision with the help of patients' operative reports, in order to establish precisely which brain structures have been removed.

- Retrieve patients' pre- and post-operative clinical data, already collected prospectively in an Excel file by neurologists in the Functional Neurology and Epileptology Department. However, missing data may need to be retrieved, especially concerning the outcome of patients after surgery.

- Experiment artificial intelligence tools developed by partner academic labs (CRNL and CREATIS) dedicated to the analysis of imaging and clinical data in order to find predictive factors for surgical success.

Pedagogical objectives

The trainee will be able to :

- Familiarize himself with the analysis of epilepsy surgery imaging (MRI, CT, PET-scan, etc.).

- Learn more about medical image segmentation techniques.

- Become familiar with the use of artificial intelligence methods applied to image analysis and clinical data.

- Participate in a translational project at the interface between clinical research and computational modeling.

Profile sought

Neurology / neurosurgery resident pursuing a Master's degree (M2) in Neurosciences

Neuroradiologist resident pursuing a Master's degree (M2) in Medical Imaging, Signal and System

M2 neurosciences student with an interest in clinical neurosciences and/or AI

Python and/or Matlab skills appreciated

Sense of autonomy, critical mind and scientific rigor

Supervisors

Claire HAEGELEN, neurosurgeon, Functional Department, Wertheimer Hospital, Hospices Civils de Lyon (HCL).

Pauline MOUCHÈS, Romain QUENTIN, Romain BOUET, researchers, Lyon Neuroscience Research Center (CRNL).

Carole LARTIZIEN, CREATIS Laboratory, INSA Lyon.

Location

The internship will take place at the CRNL (Centre de Recherche en Neurosciences de Lyon - Lyon Neuroscience Research Center, INSERM U1028 - CNRS UMR5292, Lyon F-69000, France), in close collaboration with the CREATIS laboratory (INSA, Lyon 1 University, Campus de la Doua) and the clinical teams at Lyon Civil Hospitals (HCL).