epimicro
human intracranial EEG data storage
Katia Lehongre
Ingénieure de recherche ICM, CENIR, PF-STIM
• intracranial electrophysiological recordings of epileptic patient
• clinical context
• additional research protocols
• main steps:
What is epilepsy?

- Neurological disorder
- 500,000 patients in France, 65 million around the world
- Seizure: simultaneous and abnormal discharge of thousands of neurons

- 1/3 of patients are drug-resistant:
  - only solution: remove the seizure onset zone when it is possible
Localization of the seizure onset zone

Electroencephalography (scalp EEG)  

Neuroimaging (MRI, Scan, Spect...)

Intracranial EEG
clinic, but also research with microelectrodes

**Macroelectrode (clinic):** thousands of neurons (1 cm$^3$)

**Microelectrode (research):** tens of neurons (1 mm$^3$)

- Intra EEG macro
- Intra EEG micro
- LFP Local Field Potential (<300 Hz)
- MUA Multiunit activity (>300 Hz)

**Action potential**
Data Acquisition

Data Acquisition

Clinic, but also research with cognitive protocols

Recordings

- Clinic: continuous recording for 2 to 3 weeks, until enough seizures have been recorded
- Research: around 10 protocols per patient, 30 to 40 min each
- 2 amplifiers/software simultaneously:
  - Micromed for clinic
  - Neuralynx for research (anonymized data)
• **EEG continuous recording**
  • clinical macroelectrodes:
  • around 10 electrodes with 4 to 12 contacts each -> 80 to 100 contacts
  • 4 kHz sampling rate
    • research microelectrodes
  • 1 to 4 bundles of microelectrodes -> 8 to 32 contacts
  • 32 kHz sampling rate
    • meta data bout the recording, like reference, eeg quality, etc..

• **clinical information**
  • age, sex, etc...
  • medication
  • description of the epilepsy
  • seizure onset zone

  -> 2 to 3 To per patient

• **neuroimages**
  • MRI
  • CT
  • DTI
Data storage
Where/How

• **Where**
  • lustre

• **How**
  • raw folder
  • 1 folder per patient with unique ID
  • 4 subfolders with (eeg, infos, neuroimages)
  • eeg: 1 folder every 2 hours containing 1 file per contact recorded for the Neuralynx format.

• **Current state**
  • 79 patients
  • no database (GUI)
**Data access / sharing**

**internal / external**

- **Access rights**
  - restricted
  - each user/group has access to the data associated to his research protocol
  - 15 groups

- **Internal access (from ICM)**
  - direct access to the lustre
  - restriction with specific acl that I am managing

- **External access**
  - currently: copy on owncloud
  - near future: Globus, with daily synchronization of the user dataset from the lustre to Globus

- **Projects**
  - development of a database (Redcap) for the sharing of clinical information (not the raw data)
The database would not exist without the contribution of all those clinicians and researchers:

- Vincent Navarro
- Claude Adam
- Virginie Lambrecq
- Valerio Frazzini
- Dominique Hasboun
- Stephen Whitmarsh
- Sara Fernandez

but also not without the help of the IT for the server

And thank you to the neuroinformatic for there help for developing a Redcap database
THANK YOU

Questions?