Digital Database: Experience from the Institute of Neurology Deolindo Couto at UFRJ

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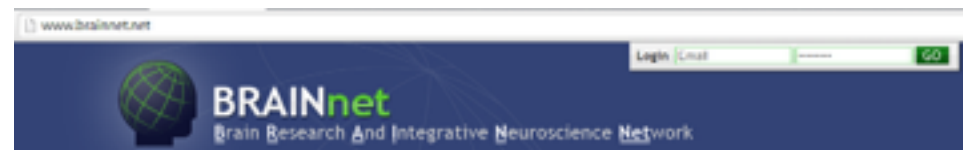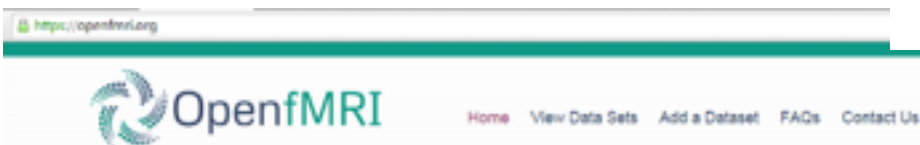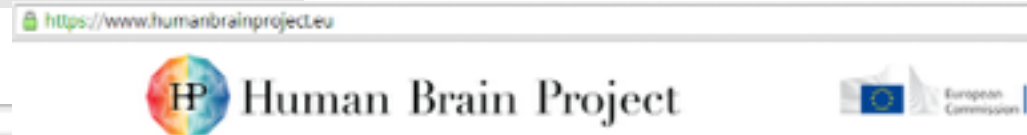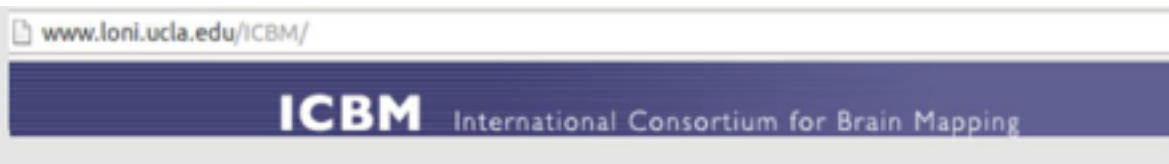Kelly Braghetto, Claudia Vargas
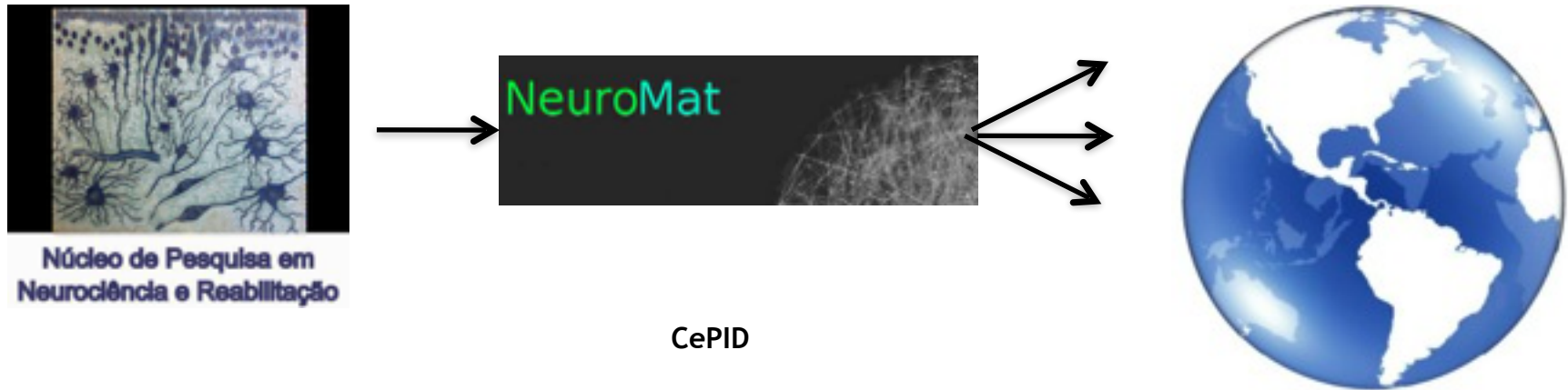UFRJ / USP

NeuroMat
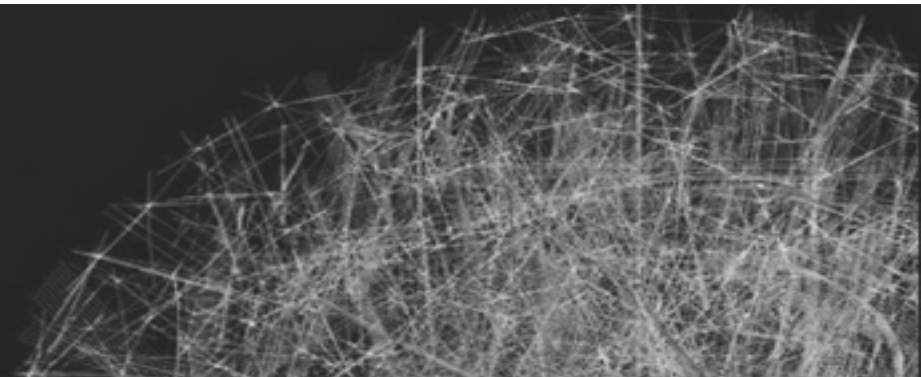
Introduction

Public Databases are fundamental for the effective advance in the understanding of brain function and treatment of its dysfunctions.

In neuroscience, the provision of public Data is a global trend, and building a database that will allow the recovery of clinical and neurophysiological information in a systematic way is a challenge in contemporary science

This challenge lies in the interface between computer science, neurobiology, statistics and medicine.

www.loni.ucla.edu/ICBM/

ICBM International Consortium for Brain Mapping

https://openfmri.org

OpenfMRI   Home View Data Sets Add a Dataset FAQs Contact Us

https://www.humanbrainproject.eu

HP Human Brain Project   European Commission

www.brainnet.net

BRAINnet
Brain Research And Integrative Neuroscience Network

Objective

INDC/UFRJ

CePID

Create a digital database of public access falls within the context of the The Research, Innovation and Dissemination Center for Neuromathematics (CePID NeuroMat).

In 2014 began the creation of database that stores in a standard and secure manner the data set collected in the Neuroscience and Rehabilitation laboratory (LabNer) in INDC/UFRJ, facilitating its sharing and reuse.

Methods and Results

Prototype: Database from patients with brachial plexus injury (BPI).

BPI occurs primarily by automobile accidents in young people, affecting motor and sensory nerves for upper limb. The main treatments are intense physical therapy and surgical reinnervation of the brachial plexus.

BPI is an important model to investigate mechanisms of brain plasticity following peripheral injury.
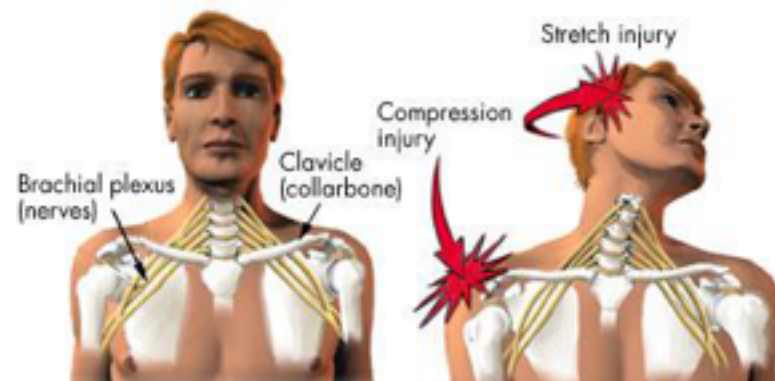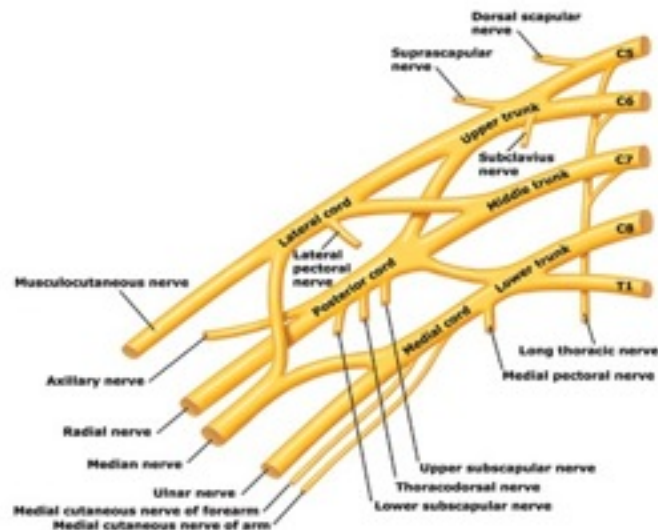
Example of brachial plexus injury mechanism.
Injury by stretching and compression.

A Multidisciplinary Team

The database for the BPI study was designed in INDC/UFRJ by:

- Doctors

- Physiotherapists

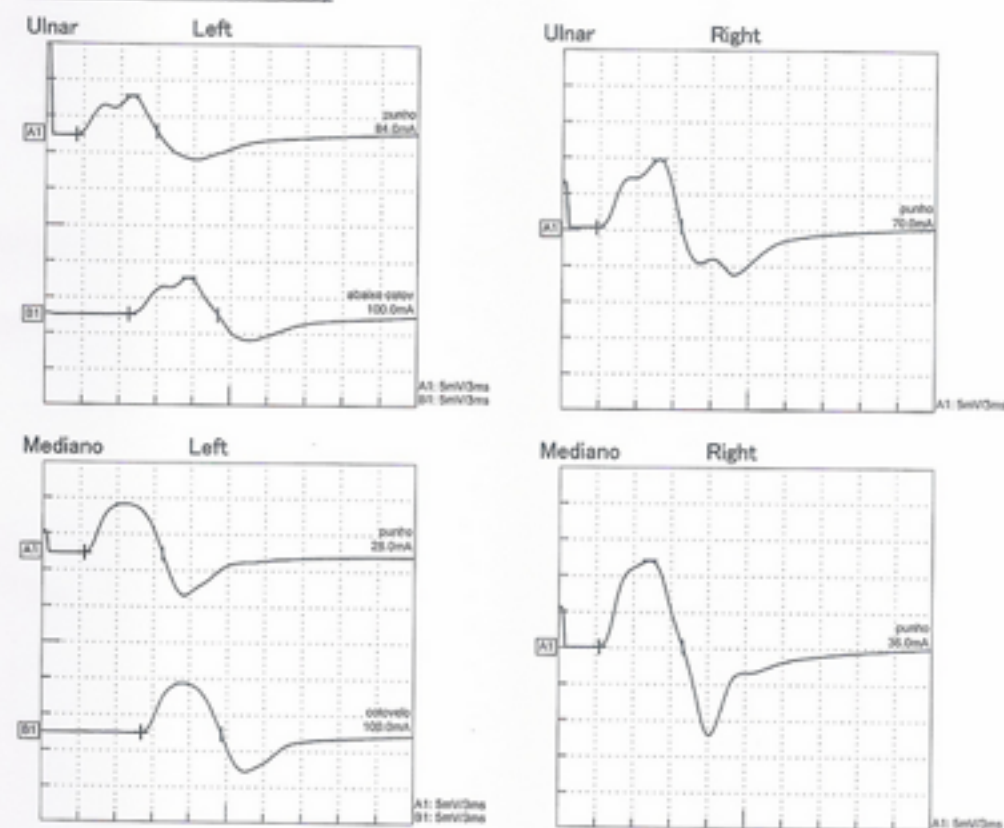- Neuroscientists

USP:

NeuroMat Researchers

Steps to create the database:

Step 1: General Information

- Patient Registration

- Socio-demographic data

- Social History

- Medical history and complementary exams (longitudinal)

Motor Nerve Conduction Study

Ulnar Left / Ulnar Right

Mediano Left / Mediano Right

Sensory Nerve Conduction Study

Ulnar Left / Ulnar Right

...RONEUROMIOGRAFIA DOS MEMBROS SUPERIORES

...miográfico com eletrodo de agulha monopolar evidenciamos sinais de
...da com ondas positivas e fibrilações em repouso nos músculos supridos
... C6, C7 e, em menor grau, C8 - T1 à esquerda. Observam-se ondas
...m na musculatura paravertebral cervical esquerda.

...ontração não foram dispolarizados potenciais de unidades motoras nos
...6 e C7.

...trínsecos da mão e nos supridos pelas raízes C8 - T1 observa-se
...tamento incompleto à contração.

...condução sensitiva com valores normais de amplitude e latência nos
...s, ulnares e radiais superficiais.

...condução motora evidenciando amplitudes dos CMAPs dos nervos
...esquerdos diminuídas em aproximadamente 40% em relação ao lado

...ais são sugestivos de comprometimento axonal pré-ganglionar agudo
...rritório das raízes motoras C5 -C6, C7 e, em menor grau, C8 - T1 à
...endo sido detectadas unidades motoras funcionantes nos miótomos C5
...estudo (aproximadamente 20 dias de evolução).

Steps to create the database:

Step 2: Evaluation and follow-up forms

- Medical admission

- Physiotherapist admission (longitudinal)

- Physical examination (longitudinal)

- Surgery Description (degree of injury, procedure description, complications)

- Berg Balance Scale, DN4, DASH, Laterality Assessment (Oldfield)

The Limesurvey is a free software developed in order to prepare, publish and collect survey responses. Once you have created a questionnaire, it can be published online (question by question, group by group or all issues in a single page questionnaires).

	Direita	Esquerda	Ambos	Não

Qual o lado da lesão?

Resposta		Contagem

Teve alguma fratura associada à lesão?

Resposta		Contagem	
Sim (A1)	11		57.89%
Não (A2)	8		42.11%
Não informado (A3)	0		0.00%
Sem resposta	0		0.00%
Não mostrados	0		0.00%

- Sim (11)
- Não (8)
- Não informado (0)
- Sem resposta (0)
- Não mostrados (0)
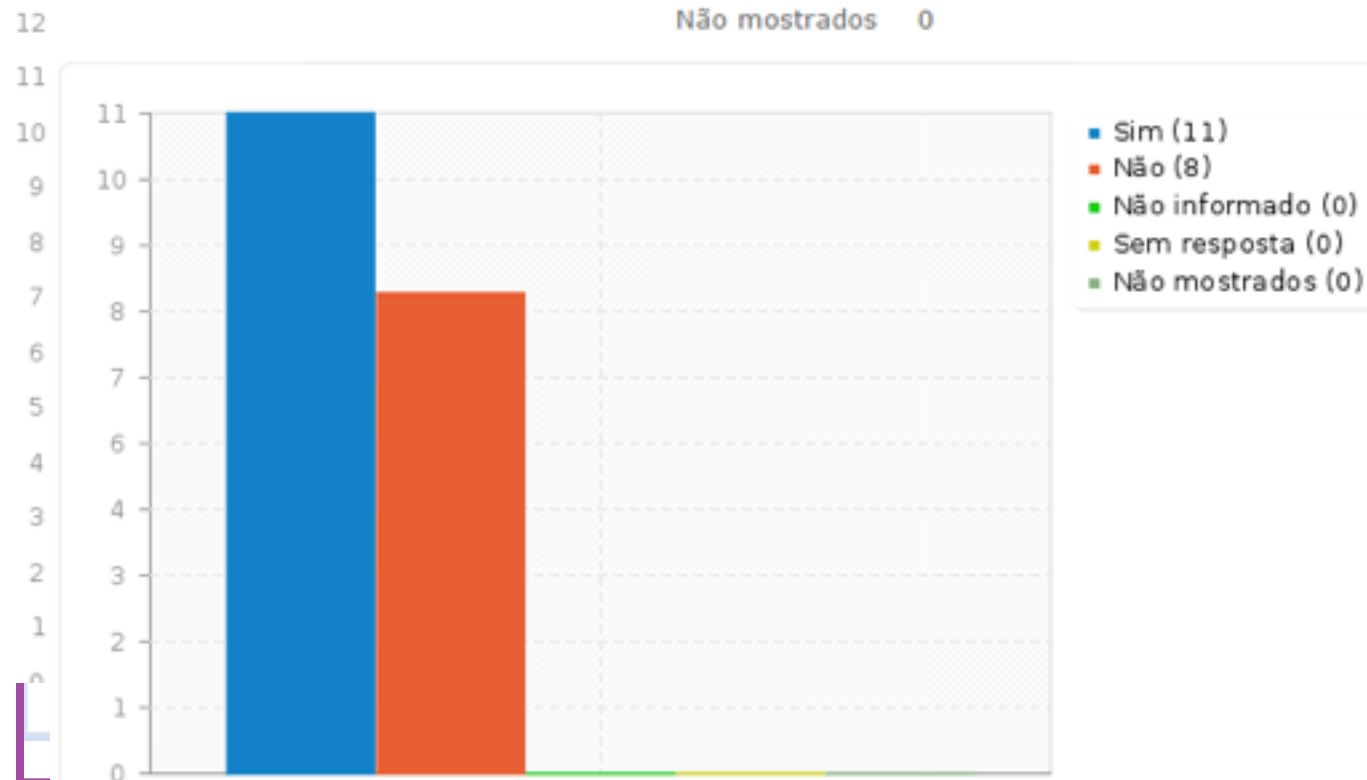
Next Steps

- Development version - versão 0.2
  - Experimental protocol description
  - Adjustments based on INDC experience

- Step 3: load and manage physiological data
  - EEG, EMG, TMS, Stabilometry etc.
  - Challenges
    - Several research projects use different ways to store data
    - Store data efficiently
  - Why Standardize?
    - Maintenance, recovery, sharing and reuse
    - Experimental reproducibility and comparison between research projects

• Step 4: Data Sharing

Labs' Local Infrastructure and Users

Integration Tools

Tools to manage local experiments and databases

NeuroMat Web Portal

NeuroMat Database

External Users (not members of NeuroMat)
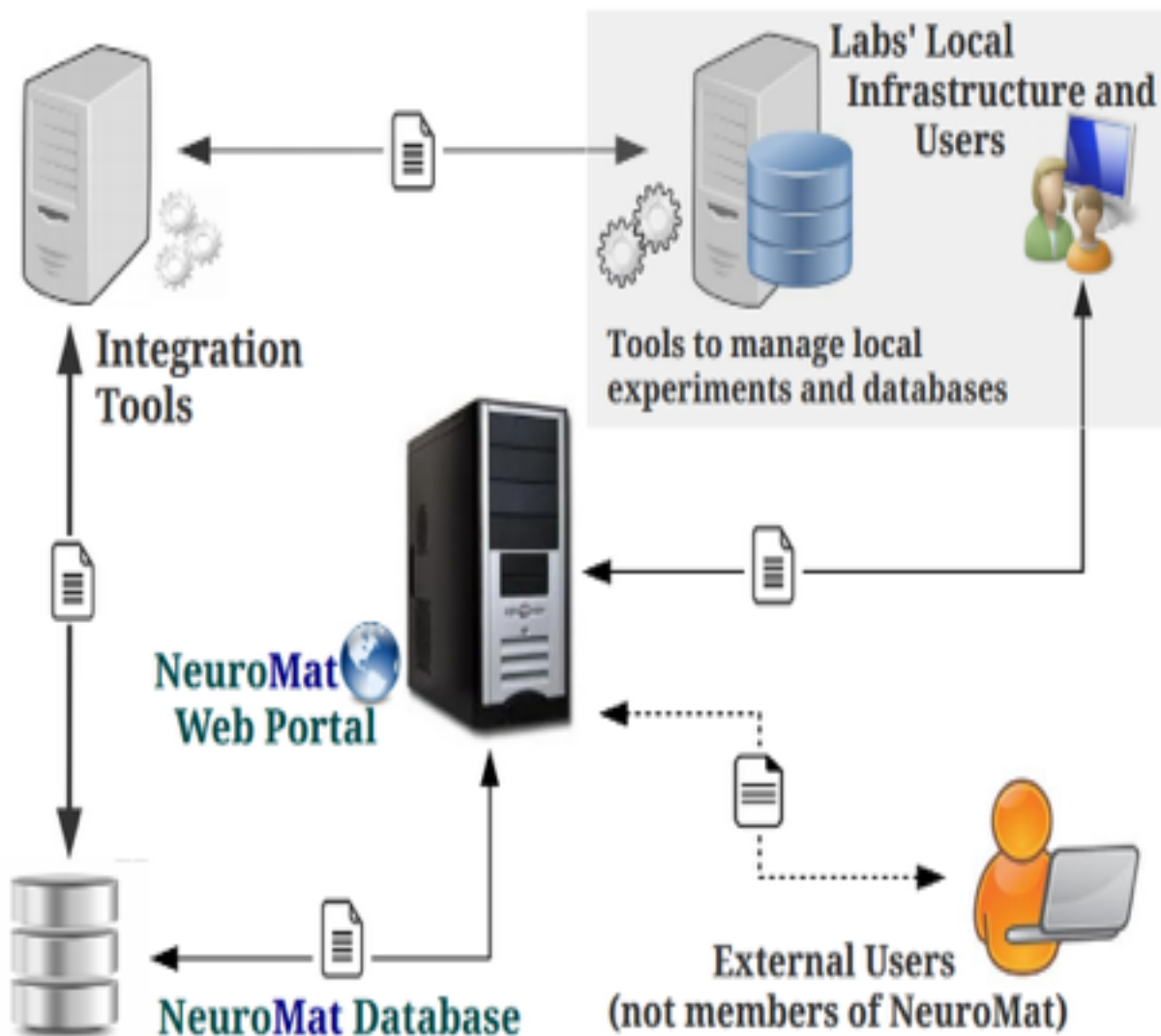
Current Numbers

53 patients already registered

69 patients to be registered

7 questionnaires per patient

Under development questionnaires:
- Pain Assessment
- Muscle strength by dynamometry
- Postural Assessment
- Psychological Assessment

Questions:	N	%
Which side of the lesion?		
Left	12	63,16%
Which event led to the trauma of the brachial plexus?		
Motorcycle accident	16	**84,21%**
Performs physical therapy regularly?		
No	11	57,89%
Degree of strength to muscle test: Shoulder Abduction		
0	10	52,63%
2	3	15,79%
Degree of strength to muscle test: Elbow flexion		
0	11	**57,89%**
4	2	10,53%
5	1	5,26%
Referred pain after the injury?		
Yes	12	63,16%
Which suggested diagnosis?		
Upper Trunk	1	5,26%
Extended upper trunk (C5-C7)	4	21,05%
Lower Trunk	1	5,26%
C5-T1	11	**57,89%**
No response	2	10,53%

Barriers

- Past records: review and data collect

- Incomplete and contradictory information

- Lack of follow up and recall

- Different types of information to be uploaded (anatomic, clinical, surgical, image, electrographic)

- NES program is still being adjusted to the INDC real needs

THANK YOU