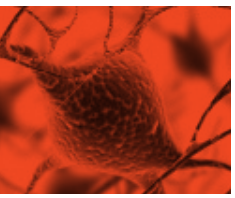

PROJECTS RECOMMENDED FOR FUNDING

## SEMAINE \\ SIMULTANEOUS MEG OR FMRI AND INTRACRANIAL EEG

Austria\ Belgium\ Canada\ Finland\ France\ Germany\ Israel\ Italy\ Luxembourg\ Poland\ Portugal\ Romania\ Spain

The basis of brain function and communication between neurons is the production of electrical activity that translates into brainwaves when recorded with electroencephalography (EEG) or magnetoencephalography (MEG). High-frequency brainwaves are known to represent a major component of normal brain processing, but sometimes also appear abnormally in association with epilepsy. They are often too weak to be easily detected from external measurements like scalp-recorded EEG or MEG. In fact, such brainwaves are usually captured by using intracerebral electrodes (icEEG) in patients with drug-resistant epilepsy. Thus, using icEEG, one can record both abnormal high frequency brainwaves that help locate the epileptic focus, and normal high frequency activity which allows assessing the functional role of the epileptic brain regions that might be resected in order to avoid removing important cerebral tissue. However, due to the limited number of electrodes that can be placed in a patient's brain, information regarding normal and abnormal high frequency brainwaves remains suboptimal.

Our research project aims to address this important limitation by performing icEEG recording of high frequency brainwaves with simultaneous MEG and functional magnetic resonance imaging (fMRI). The two latter imaging methods can explore the function of the entire brain noninvasively, and if coupled with icEEG, provide information regarding changes occurring in virtually every brain region when local high-frequency brainwaves are detected by intracerebral electrodes. Ultimately, this will allow us to develop new methods to accurately infer the location and extent of high-frequency activity within the brain purely from noninvasive imagery.

PROJECT **PARTNERS:**

**Jean-Philippe Lachaux** (coordinators)
Lyon Neuroscience Research Center, Lyon, France

**Sarang Dalal**
University of Konstanz, Konstanz, Germany

**Gustavo Deco**
Universitat Pompeu Fabra, Barcelona, Spain

COORDINATOR | JEAN-PHILIPPE LACHAUX