European Research Council
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Postdoctoral positions

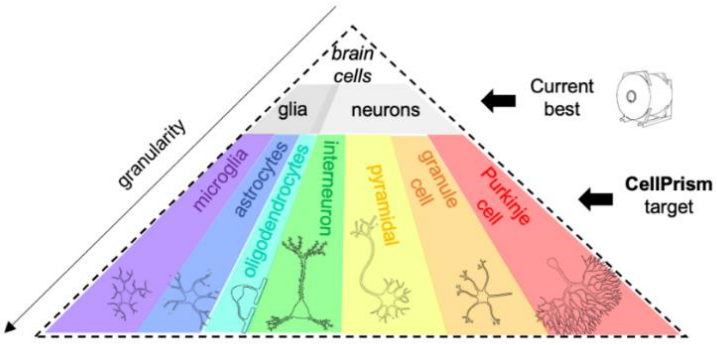
Resolving brain cell-types with diffusion-weighted MRS

Context

Two **4-year post-doctoral positions** funded by a grant from the European Research Council (CellPrism project, PI: Clémence Ligneul) are available now. Prospective applicants with expertise in **MR modelling and simulation**, **MR sequence development** and/or **advanced microscopy and 3D reconstruction** are wished for.

The work will be primarily performed in MIRCen, the preclinical research center from the French Atomic Energy Commission CEA site of Fontenay-aux-Roses (5 km south from Paris). MIRCen is equipped with a state-of-the-art 11.7 T MRI scanner for rodents, and provides on-site expertise and access to confocal microscopes, gene transfer facilities... Some experiments will be performed in NeuroSpin, the high field MRI research center in the CEA site of Saclay (10 km south from Paris) on the newly operating 11.7T human MRI scanner. For modelling and clinical aspects, OxCIN (University of Oxford, Oxford, UK), CUBRIC (Cardiff University, Cardiff, UK) and QIMR (Brisbane, Australia) are primary collaborators of the project.

About CellPrism



Within the great research effort to make brain MRI more specific, CellPrism aims to resolve brain cell-types with MRI. More precisely, the idea is to enhance diffusion-weighted MR spectroscopy (dMRS) specificity to go beyond the glial/neuronal dichotomy, and extract the cellular composition and morphometry for a range of cell subtypes in physiological and pathological conditions, akin to a non-invasive biopsy.

General requirements:

- Ph.D. in physics/biophysics/chemistry/neuroscience or equivalent obtained when the position starts. Salary will be commensurate with experience.
- Fluent in English or in French with scientific/conversational English, good oral and written communication skills.
- Collaborative and multidisciplinary mindset, capacity to communicate with different backgrounds (biologists, neuroscientists, medical doctors, etc).
- Generally appreciated:
    - genuine curiosity about neurobiology, brain functioning and neuropathologies

- eager to learn and try new tools and methods
- creativity, independence and proactivity
- open science mindset: code/data sharing (e.g., use of Git, Zenodo, etc)
- in vivo preclinical imaging experience

Scientific/technical expertise:

Primary expertise should cover some of the topics below. Preferred technical skills are listed in order of importance, but the lists are not exhaustive. Eagerness to develop new skills is appreciated.

MR modelling and simulation:

- Computer programming and computational methods
  - Languages: Matlab, Python, Julia, C languages
  - 3D modeling and rendering (e.g., Blender)
  - Monte Carlo simulations, machine learning
  - parallel computing, GPU programming
- Diffusion simulations in silico (brain cells or other numerical substrates)
- MR physics, diffusion physics and their mathematics
- MRS advanced fitting (e.g., simultaneous fitting)

MR sequence development

- MR physics (NMR, MRS, MRI) and sequences
- Pulse programming: Pulseq, Siemens, Bruker Paravision
- RF pulse, gradient waveform (diffusion) designs

Advanced microscopy and 3D reconstruction

- 3D cell reconstruction, 3D substrate reconstruction
- Co-focal microscopy, 3D light-sheet microscopy, electron microscopy
- Brain tissue preparation
  - Intracerebral injection
  - Sparse labelling techniques
  - Tissue embedding and cutting, immunohistochemistry

Contact info

CVs and application letter, as well as requests for additional information, should be sent to Clémence Ligneul by email at the following address: clemence.ligneul@cea.fr

Estimated timeline

Application deadline: August 31st 2025

Interviews: from September 2025

Start date estimation: from November 2025. If you are interested in these positions but cannot start in November 2025, feel free to get in touch. Depending on your profile, a later or earlier start date may be possible.