

Chair of Junior professor

Institution: INSERM

Head of the Institution: Gilles Bloch

Research unit: INSERM UMR 1103, iGReD, Clermont-Ferrand

Academic region: Auvergne Rhône Alpes

Partner Institution: University of Clermont Auvergne (UCA)

Project title: Dynamic regulation of the body axis morphogenesis

Keywords: *neuro-mesodermal progenitors, spina bifida, neural tube morphogenesis, muscle development, health/well-being*

Expected duration: 4 years

Research domain: Cellular and Developmental Biology, Rare Diseases

INSERM Scientific Commission: CSS1

INSERM's strategy

The proposed Chair will allow INSERM to recruit a young researcher with expertise in developmental biology, biophysics, in vivo imaging, and single-cell genomics approaches, all dedicated to investigate body axis morphogenesis and in particular the role of recently identified neuro-mesodermal progenitor cells (NMPs). The planned recruitment and developed research will foster the understanding of genetic and environmental factors underlying *spina bifida*, a multifactorial rare disease associated with mis-specification of NMPs. From this perspective, the proposed Chair is in line with the main INSERM objective: "Improve the health of all by improving our fundamental and disease-related knowledge and by innovative public health research and treatment". This recruitment is also expected to contribute to the international attractiveness of the INSERM and its local partner UCA as well as to an increase in technological developments and innovation.

Strategy of iGReD - the host INSERM institute

The proposed Chair is in line with "Reproduction and Development in Health and Disease" Research Axis 2 of iGReD, the INSERM host Institute located at Clermont-Ferrand. It is also in direct link with "health & well-being" - the main objective of Challenge 3, CAP2025 iSITE project of Clermont-Ferrand. The planned recruitment will reinforce the CAP2025 - Challenge 3 research potential and will highlight international attractiveness of the Clermont Auvergne University, its iSITE project and the iGReD Institute.

Abstract of the research project:

The proposed project "Dynamic regulation of the body axis morphogenesis" is dedicated to understand how the environmental factors influence the neuro-mesodermal progenitors (NMPs) during normal development and in pathological states. The NMPs are thought to have two functions: they contribute to the formation of i) neural tube and ii) muscles of the posterior part of the body axis. Defects in the specification of NMPs lead to a rare disease with fetal manifestation known as *spina bifida*. Recent single-cell genomics, in vivo imaging and cell tracking approaches indicate that NMPs display dynamic developmental behaviors and are characterized by a distinct gene expression signature, including genes encoding for folate

metabolism enzymes. The major objective of the project is to understand how folate deficiency impacts the specification of NMP-derived cell types and leads to *spina bifida*. In parallel, this project is dedicated to identify environmental factors that influence normal development of NMPs and could thus be targeted to avoid this malformation. The generated data will allow a better follow-up of pregnancies with the aim to prevent the development of *spina bifida*.

Teaching project:

The recruited young researcher will be involved in teaching at Master level related to the CAP2025 priority axes and in particular “human mobility, health & well being”. Her/He will participate actively in the “Graduate Track – CAP2025” teaching scheme, exclusively in English, and will contribute to the formation of PhD students.

Financial synthesis: provisional budget necessary to realize planned project including personnel (PhD students, postdocs, technicians) equipment and running costs

Total CPJ budget (including ANR package)	480 000 €
Co-funding	145 000 €
Total budget	625 000 €

Scientific communication:

Generated data will be largely communicated via publications in scientific journals and during international conferences such as (EMBO, GRC, FASEB and Keystone meetings). We will also use social networks to diffuse information on important findings.

Open science:

This project is designed to take part of open science initiative with the submission of manuscripts to “Open access” platforms before submitting to peer review journals. We plan to communicate non-published data during international conferences.

Science and society:

We will organize “open doors” to communicate about this project to the large audience. The host institute is involved in “Fête de Science” days of the French Association against Myopathies (AFM) and we will take this opportunity to communicate about this project. We will register and diffuse video spots presenting the research project and the importance of generated data.

Indicators:

Project realization will be followed with the following indicators:

- number of research communications during conferences
- number of research publications (including open source publications)
- number of research project submitted for competitive calls
- number of students and postdocs formed
- involvement in teaching (number of hours/yr)