

Postdoc position: electro-chemical patterning of cell tissues

We are looking for a postdoctoral researcher in theoretical biophysics to build cell-scale and tissue-scale models of how chemical and electrical cues jointly pattern living tissues. The position is funded by a 2026 Human Frontier Science Program (HFSP) Research Grant and is based in [Charlie Duclut](#)'s group at Institut Curie, Paris, France.

Start date: flexible

Duration: [24–36] months

Application deadline: until the position is filled

Project

During development and repair, cells read chemical gradients and migrate along them (chemotaxis). Tissues also generate their own electrical cues: ion pumps and channels set membrane potentials, and epithelia drive endogenous electric currents and fields that cells can sense and follow (electrotaxis). How these chemical and electrical signals combine to position cells and pattern tissues remains largely unknown.

Our HFSP project, *Electro-chemical Actuation of Tissue Morphogenesis*, tackles this question by combining theory with experiments in vivo and in engineered tissues. The international team brings together Elias Barriga (Cluster of Excellence Physics of Life, TU Dresden, Germany), Juan Ramón Martínez-Morales (CABD, Seville, Spain), Daniel Cohen (Princeton University, USA) and Charlie Duclut (Institut Curie, Paris, France). The postdoc will be the main theory link of this consortium.

Position

The postdoc will develop theory and simulations that link ion transport and chemical signalling to tissue patterning. Depending on your background and interests, the work will include:

- **Cell-scale models** of single and collective migration that couple chemotaxis and electrotaxis, for example using phase-field or agent-based descriptions.
- **Tissue-scale continuum models** that couple electrodiffusion, transepithelial currents and morphogen reaction–diffusion to tissue flows and mechanics.
- **Bridging scales** by coarse-graining cell-level rules into tissue-level theories, and identifying which cue dominates in which regime.

- **Numerical implementation** of these models (finite elements, finite volumes, particle- or agent-based simulations) and quantitative comparison with experimental data.
- **Close collaboration** with the experimental partners to design experiments and test predictions, in particular with Elias Barriga's lab, including research stays in partner labs.

Expected profile

Required

- A PhD in physics or applied mathematics (completed by the start date).
- A strong theoretical background, for example in soft-matter or statistical physics, active matter or nonequilibrium systems, biophysics, continuum mechanics.
- Solid numerical skills and experience writing your own simulation code (e.g. Python, Julia, C++; finite-element or pseudo-spectral tools such as FEniCS or similar).
- Genuine interest in biological questions and in working closely with experimentalists.
- Good written and spoken English.

Desirable

- Experience with active matter, cell migration or tissue mechanics models.
- Familiarity with electrodiffusion, bioelectricity, chemotaxis or electrotaxis.

Environment

- Full-time [24–36]-month position, with salary according to Institut Curie pay scale.
- Lively research environment at Institut Curie in the center of Paris, which hosts both theory and experimental groups.
- Highly interdisciplinary, international project with direct interactions with experiments.
- Funding for research visits to partner labs and conferences.

How to apply

Send a single PDF to charlie.duclut@curie.fr with the subject line "HFSP postdoc application – [your name]". Please include:

1. A CV with a full publication list.
2. Names and contact details of 1-2 referees.
3. (optional) A research statement describing your past research experience.

Review of applications will start on Oct. 15th 2026 and continue until the position is filled.

Informal enquiries are welcome at charlie.duclut@curie.fr.