

Mission

This is a highly interdisciplinary project, involving a consortium with expertise in cancer metabolism, experimental biology, genetics, bioinformatics and mathematical modeling. It takes place in a collaboration between the Unit of Pure and Applied Mathematics of ENS Lyon (Pr E Grenier and Dr H Leman) and the Cancer Research Centre of Lyon (Dr P Martinez and Dr A Vigneron). The candidate's role will be to develop and optimize deterministic and stochastic models integrating genetic and phenotypic data produced by the consortium. These models will be studied analytically, studying long-time behaviours and properties of population growth, extinction and adaptation. The aim is to infer the evolutionary dynamics of resistance in 3 cellular models differing by their evolutionary properties (genetic instability and phenotypic plasticity) and optimize model-specific therapeutic regimens. All 3 models will be treated with a pair of metabolism-targeting drugs, applied first in isolation then sequentially. Longitudinal readouts from sequencing data and metabolism production at multiple generations will be used to parametrise drug combination mathematical models, so as to fit the data observed in vitro. Finally, mathematical simulations will help optimize treatment regimens of the two drugs according to the evolutionary properties of each model, which will be implemented in murine models by collaborators in the consortium for validation.

The candidate will have to be in possession of a PhD or about to at the start of the contract, and will be required to interact with interdisciplinary collaborators. Candidates with a mathematical/computational background and a genuine interest in cancer evolutionary dynamics are encouraged to apply, even without previous experience with cancer data.

Principal tasks

- Mathematical / computational modeling
- Scientific articles and presentations

Associated tasks

- Bioinformatics analysis of somatic alterations (mutations and copy number alterations)

Required skills

- Programming
- Computational simulations (agent-based or analytical)
- Mathematical models
- English
- Basic biology (optional: cancer and evolutionary biology)

Desirable skills

- Experience with cancer data
- Background in mathematical oncology, population genetics or evolutionary biology.

Soft skills

- Autonomy
- Communication scientific results and issues
- Interacting with collaborators from different fields

Experience

- 0-3 years
- Required degree: PhD in mathematical or computational biology

Host institution

Label Ecole Normale Supérieure de Lyon
Supervision Pr Emmanuel Grenier, Dr H  l  ne Leman, Dr Pierre Martinez
Links http://www.umpa.ens-lyon.fr/umpa?set_language=en&cl=en
<http://www.crcl.fr/239-EMT-and-cancer-cell-plasticity.crcl.aspx?language=en-GB>
Address UMPA UMR CNRS 5669
ENS Lyon Site Monod
46 All  e d'Italie
69364 Lyon Cedex 07

Contract

Type CDD (fixed duration)
Duration 3 years.
Salary 2,567   – 2,949   gross according to experience
Preferred Start Date Early 2020

To apply

Please send a CV, a cover letter and two reference letters or contact to both *helene.leman AT inria.fr* and *pierre.martinez AT lyon.unicancer.fr*.