

Post-doc in biostatistics and bioinformatics: Innovative mathematical methods for the integration of proteomics and metabolomics data

Context

Proteomics and metabolomics provide unique and complementary information to decipher gene function and pathways, elucidate phenotypes, and robustly discover new biomarkers for disease treatments.

Integration of both approaches is a mathematical challenge because of the heterogeneity and the complexity of the proteomics and metabolomics data, and the partial annotation (i.e. metabolite identification) provided by the metabolomics mass spectrometry technologies.

The **national infrastructures** in **bioinformatics** (IFB), **metabolomics** (MetaboHUB), **proteomics** (ProFI), **genomics** (France Génomique), and **mouse phenogenomics** (PHENOMIN) have decided to join forces and **develop new biostatistics and bioinformatics methods and tools** for high-throughput and combined proteomics and metabolomics data analysis.

Project

First, **statistical modeling** will be used to explore the specific and common information from each type of omics data, and to determine how their combination as molecular signatures can optimally be used to interpret and predict the phenotypes. Such approaches will include linear and nonlinear methods for multivariate analysis.

Second, **network integration** will be used to facilitate interpretation and annotation of the data. Proteins and metabolites will be mapped on the metabolic networks to facilitate chemical annotation and biological interpretation, and to suggest new biomarkers and metabolic functions.

The mathematical approaches and tools will be validated on **two use cases**: 1) the high-throughput molecular phenotyping of comprehensive collections of mouse models and 2) the discovery of new gene functions in a bacterial model of interest for environmental and biotechnological applications.

Profile

Interested applicants should have a **strong background in statistics** (data analysis, network analysis), and be motivated by multidisciplinary applications (chemistry, biology, clinic).

Contact

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