

## Translational informatics

Development of a computational infrastructure dedicated to the integrated analysis of data from "-omics" sciences (cf. [www.omics-ethics.org/fr/definition-science-omics](http://www.omics-ethics.org/fr/definition-science-omics)) related to human genetic diseases and health. This infrastructure includes algorithms and original methods, such as:

- Algorithms for integrative structural biology, in the context of ongoing funded projects, including the European INSTRUCT research infrastructure for 'Integrative Structural Biology' and the French ANR Investments for the Future project: FRISBI, coordinated by Bruno Klaholtz, IGBMC, Strasbourg.
- Multi-scale methods for a better understanding of protein properties (structure, interactions, dynamics...) and better integration of the heterogeneous data associated with a protein or a family of proteins. Ongoing project, BIPBIP, funded by French ANR in collaboration with Annick Dejaegere, IGBMC, Strasbourg.
- Evolutionary analyses of protein sequences from NGS data, applied to health, in collaboration with the [Data Mining](#) data mining and [SONIC](#) teams.
- GREMSAP (GRid Evolutionary Multiple Sequence Alignment Platform), in collaboration with the [SONIC](#) team, l'Institut des Systèmes Complexes Paris Île de France, l'Institut de Neurobiologie Albert Fressard.
- Social Network Clinical Database for Intellectual Disabilities: Development of a social network for patients, related to genetic diseases causing developmental disabilities, in collaboration with the [SONIC](#) team, the [Translational medicine & neurogenetics team, IGBMC](#), led by Jean-Louis Mandel, and the [<http://www.ucad.sn> Cheikh Anta Diop University, Senegal].
- Infrastructure for 'big data' management for the translational analysis of mutations involved in human genetic disease. BIRD/SM2PH-central is aimed at the integration of heterogeneous data (genomic, phenotypic, evolution, cellular networks,...), with data mining methods (association rules, inductive logic programming,...), and includes the design of a semantic query language (BIRD-QL) and the development of original graphical interfaces. These developments are done in collaboration with Hoan Ngyugen, IGBMC, Strasbourg.

## Systems bioinformatics

Development of research in the field of biological systems analysis, to understand genotype-phenotype relationships, notable concerning genetic diseases, and the study of complex biological systems, for example in various cancers or rare diseases (ciliopathies, myopathies,...) in close collaboration with the Human Genetics Laboratory, led by H  l  ne Dollfus ([www.unistra.fr/index.php?id=19264&L=3](http://www.unistra.fr/index.php?id=19264&L=3)). The originality of our approach lies in the extraction and exploitation of evolutionary information (sequence analysis, comparative

