



Offer: PhD in Bioinformatics of Omics data and Artificial Intelligence methods (CEA Grenoble)

Title : Bioinformatics and Artificial Intelligence methods to assess Organoids and Tumor Spheroids models

Background: 3D cell models have become experimental tools of great interest because they allow better representation of the complexity of tissues, compared to 2D cell cultures. The development of organoids for various tissues and tumor spheroids quickly led to their use to better understand human pathologies or for the screening of therapeutic molecules. However, the degree of fidelity between the desired tissue phenotype and the 3D cell model is often estimated by simple measurements of the state of cell proliferation or the expression of a few marker genes. These measurements are not sufficient to finely establish the functional integrity of cell types and active molecular processes.

Objective: This thesis project aims to develop computational approaches integrating bioinformatics and artificial intelligence methods in order to: (i) accurately compare the cellular and molecular similarity states between 3D cell culture models and the corresponding tissues, (ii) predict experimental stimuli able to improve the maturation of organoids and (iii) assess the ability of tumor spheroids to recapitulate the mechanisms of drug resistance and to predict the response to treatments.

Data: This research project will be carried out using transcriptomic and genomic profiling data from: (i) cohorts of publicly accessible normal and tumor cell models and corresponding tissues, collected by the CEA as part of the European KATY project in personalized medicine (<https://katy-project.eu/>), (ii) several cellular and *in vivo* models that will be established from tumor patient-derived tissues by the European project CANVAS (<https://cordis.europa.eu/project/id/101079510>) and (iii) 3D cellular models established by ongoing collaborations with partner CEA laboratories.

Host laboratory: The PhD project will be hosted in the “Genetics and Chemogenomics” team of the Interdisciplinary Research Institute of Grenoble (IRIG) of the CEA Grenoble. He/she will be supervised by Christophe Battail, expert in computational analysis and modeling of omics data, and will evolve in a multidisciplinary research environment composed of bioinformaticians and biologists. The PhD student will also strongly interact with researchers from the European projects KATY and CANVAS, and with the CEA's biology laboratories partners in the project.

Candidate profile:

Technical skills

- Master degree with a focus on computational analysis of large-scale biological data.
- Experience in Python and/or R programming languages, and Unix command line.
- Prior use of bioinformatics, machine learning and biostatistics methods.
- Prior knowledge of molecular biology, oncology or “omics” data.

Professional aptitude

- Ability to speak and write in English.
- Curiosity and desire to improve their scientific and technological skills
- Rigor and organization
- Ability to work in a team and interact with other students, engineers and researchers

Job contract: 3-year PhD contract funded by the CEA.

How to apply: The candidate must send its application file to christophe.battail@cea.fr. It consists of a CV, grades obtained for each university degree and the names and emails of two scientists involved in assessing the academic performance. The application must also be accompanied by a cover letter describing in particular how the candidate meets the selection criteria, and how this thesis project contributes to its future career. The position starts in February/March 2023.



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