Universitat Pompeu Fabra Barcelona

Master in Bioinformatics for Health Sciences

Master project 2024-2025

Personal Information

Supervisor	Irene Hernando Herraez
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Institution	IBMB-CSIC
Website	https://www.ibmb.csic.es/en/department-of-cells-and-tissues/epigenetics-and-single-cell-dynamics/#lab-presentation
Group	Epigenetics and Single Cell Dynamics

Project

Computational genomics

Project Title:

Recording single cell dynamics with CRISPR barcoding.

Keywords:

Single cell barcoding; Crispr recording; single-cell RNA-seq; cell heterogeneity; machine learning modeling

Summary:

The cells in our body divide constantly throughout life. As they divide, the transmission of epigenetic and transcriptional states establishes a form of cellular memory, where daughter cells retain very similar properties to their ancestors. This allows distinct gene expression patterns to persist in different cell types despite a common genotype. But why does this form of cellular memory change over time? Ageing is an extraordinary complex process, and our understanding is still very limited. My main interest is understanding how the accumulation of errors in the epigenome can lead to the degradation of cell identity, ultimately contributing to age-related dysfunction and disease such as cancer. In this project, you will analyse a single-cell dataset from our novel cellular barcoding method to investigate the fundamental basis of cellular heterogeneity within the neural stem cell pool. You will not only explore one of the greatest mysteries in biology but also acquire valuable transferable skills in cutting-edge techniques, including CRISPR barcoding, single-cell multiomics, and machine learning modelling.

References:

https://pubmed.ncbi.nlm.nih.gov/31554804/ https://pubmed.ncbi.nlm.nih.gov/32634384/

Expected skills:

The ideal candidate should possess strong organizational and task management skills, effective communication, a strong sense of responsibility, and adaptability according to project needs. Personal involvement, motivation, and the ability to work collaboratively as part of a team are also crucial.

Possibility of funding:

To be discussed

Possible continuity with PhD:

To be discussed

Comments:

Possibility to apply for the Jae Intro Fellowship (May/June); location at the PCB; hybrid work model; flexible work schedule;