Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2020-2021

Laboratory/Institute: Institute for Advanced Biosciences (IAB)  Director: Pierre Hainaut
Team: Epigenetic and metabolic signaling in cell plasticity and Cancer
Head of the team: Pierre Hainaut

Name and status of the scientist in charge of the project:
Benedicte Elena-Herrmann (CR CNRS)  HDR: yes ☑  no ☐
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Program of the Master’s degree in Biology:
☐  Immunology, Microbiology, Infectious Diseases  ☐  Integrative Structural Biology
X  Physiology, Epigenetics, Differentiation, Cancer  ☐  Neurosciences and Neurobiology
☐  Planta International

Title of the project: Sub-cellular NMR metabolic profiling of gain-of-function p53 mutations

Objectives (up to 3 lines):
The project aims at providing a sub-cellular metabolomic characterization of a range of variants of cancer cell lines engineered with p53 mutations. Cell fractionation strategies will be optimized for mitochondrial metabolic profiling, and developed towards characterization of the metabolome of cell nuclei.

Abstract (up to 10 lines):
Our current inability to observe and quantify in a reliable manner the subcellular compartmentalization of metabolites in eukaryotic cells poses severe limitations to our understanding of the role played by small molecules in the regulation of many cellular processes. As metabolites typically have different functions in different cell compartments, metabolic profiling conducted at the global cellular level provides a blurred representation of organelle specific alterations of metabolic pathways associated with carcinogenesis.

The projects focuses on the development of sub-cellular NMR metabolomics assays on intact organelles, based on fast cell fractionation strategies that have been proposed for exploring mitochondrial metabolism. Subcellular metabolite fingerprints will portray the organelle-specific metabolic reprogramming status associated with gain-of-function mutations of the tumour suppressor gene TP53, known for its prominent role in cancer development.

Methods (up to 3 lines):
- Cellular Biology
- Metabolomics
- Nuclear Magnetic Resonance (NMR)

Up to 3 relevant publications of the team:

Requested domains of expertise (up to 5 keywords):
Biochemistry, cellular biology, or analytical and physical chemistry