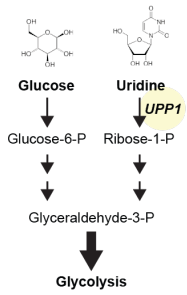
# PhD student position in mitochondrial biology & energy metabolism
(group of Prof. Alexis Jourdain, University of Lausanne - Switzerland)

Our laboratory at the interface of gene expression, systems biology and metabolism is seeking for a **highly motivated PhD student** to study mitochondria and their roles in energy metabolism.

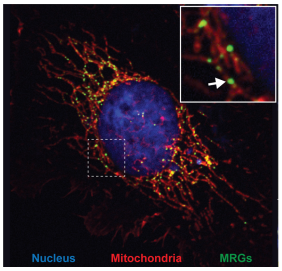
Two projects are currently available:

**Project 1: Systems metabolism of alternative nutrients**




Sugars, amino-acids and fats are the common nutrients used by cells to support proliferation, however, they may be limited, for example at the sites of infections or in tumors. To survive in nutrient-limited conditions, cells must present metabolic flexibility to harvest alternative nutrients, defined as nutrients that would not normally be part of their diet in rich conditions. We previously developed CRISPR/Cas9-based strategies to study energy metabolism in nutrient-limited conditions at a systems level (Arroyo*, Jourdain* *et al*. Cell Metabolism 2016 ; Jourdain *et al.*, Molecular Cell 2021). Using these tools, we recently discovered that cells can use nucleosides (uridine) and nucleic acids (RNA) as sources of energy when sugar is limiting, a process we called "uridinolysis" (Jourdain *et al.*, BioRxiv 2021). We found that uridinolysis is extraordinarily active in certain cancers and immune cells. Many questions remain to be addressed regarding the physiology of uridinolysis and its importance in disease, with strong implications in **cancer metabolism**, **metabolic disorders** and **immunometabolism**. Learning opportunities: systems genetics (e.g. CRISPR/Cas9 screening), nutrient screening, metabolomics, cancer- and immunology-related assays.

**Project 2: Mitochondrial RNA granules and mitochondrial myopathies**




Mitochondria contain a relic of their bacterial past: a small, circular genome called mitochondrial DNA (mtDNA). In humans, this small DNA molecule encodes 37 genes that are expressed in the organelle, including 13 genes encoding core subunits of the respiratory chain that are essential for OXPHOS. A few years ago, we reported the existence of "mitochondrial RNA granules" (MRGs) (Jourdain *et al.*, Cell Metabolism 2013). We and others provided proof-of-concept evidence that these structures play a crucial role in mtDNA expression by serving as RNA post-transcriptional factories for newly-made mitochondrial transcripts. Dysregulation of mtDNA expression and MRGs leads to mitochondrial disorders, a large class of inborn errors of metabolism for which no treatment is currently available. Exciting questions remain to be answered regarding the composition and function of mitochondrial RNA granules, with among them the **role of MRGs in myopathies** and their **biophysical properties** in ***in-vivo*** mouse models. Learning opportunities: confocal and super-resolution microscopy, animal models, mitochondrial genetics, muscle biology.

We are a dynamic team of international researchers composed of 2 (soon 3) postdocs, 2 PhD students, 1 master student and 2 technicians. The expertise present at the Department of Immunobiology and the University of Lausanne, as well as our ongoing collaborations with laboratories at the University of Geneva, CHUV and EPFL offers an ideal place for a PhD student to thrive. The PhD student will be encouraged to join our PhD program in cancer & immunology. The spoken language in the team and the department is English.

Further information: www.jourdainlab.org
Contact: alexis.jourdain@unil.ch
PhD program in cancer & immunology: https://www.unil.ch/cancer-immunology/en/home.html