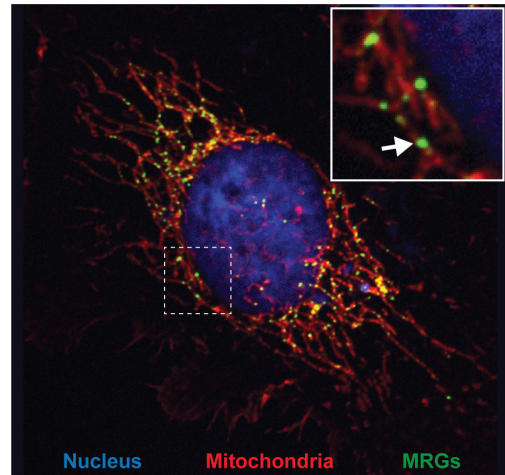


PhD student position in mitochondrial biology, innate immunity and immunometabolism
(group of Prof. Alexis Jourdain, University of Lausanne - Switzerland)

Our laboratory is seeking for a highly motivated PhD student to study the structure and function of **mitochondrial RNA granules**, their biophysical properties and their role in immunity and metabolism.

Mitochondria contain a relic of their bacterial past: a small, circular genome called the 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. Recently, 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. MRGs also contain high levels of double-stranded RNA (dsRNA), a highly immunogenic molecule that, when released in the cytosol, activates innate immune pathway such as inflammation and antiviral signaling.



Exciting questions remain to be answered regarding the composition and function of mitochondrial RNA granules and their role in immunity. Among those, this PhD project will address:

- How does the metabolic milieu influence mitochondria and the immune response?
- What roles do MRGs play in mitochondrial gene expression and what is their composition?
- How do mitochondrial nucleic acids participate to the immune response?
- How is the ultra-structure of MRGs maintained?

Learning opportunities: Mitochondrial biology, innate immunity, super-resolution microscopy, cell biology, genome perturbation, large-scale biology (e.g. proteomics, metabolomics, genetic screening).

The expertise present at the Department of Biochemistry and the University of Lausanne, as well as our on-going collaborations with laboratories at the University of Geneva and EPFL offers an ideal place for a PhD student to thrive in the field of mitochondria and immunity. 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>

Read more:

- Jourdain AA, Koppen M, Wydro M., Rodley CD, Lightowlers RN, Chrzanowska-Lightowlers ZM, Martinou JC. GRSF1 regulates RNA processing in mitochondrial RNA granules. *Cell Metabolism* 2013
- Jourdain AA, Koppen M, Rodley CD, Maundrell K, Gueguen N, Reynier P, Guaras AM, Enriquez JA, Anderson P, Simarro M and Martinou JC. A mitochondria-specific isoform of FASTK is present in mitochondrial RNA granules and regulates gene expression and function. *Cell Reports* 2015
- Jourdain AA, Boehm E, Maundrell K, Martinou JC. Mitochondrial RNA granules: Compartmentalizing mitochondrial gene expression. *Journal of Cell Biology* 2016
- Arroyo JD*, Jourdain AA*, Calvo SE, Ballarano CA, Doench JG, Root DE, Mootha VK. A Genome-wide CRISPR Death Screen Identifies Genes Essential for Oxidative Phosphorylation. *Cell Metabolism* 2016 (*first authors)
- Jourdain AA, Popow J, de la Fuente MA, Martinou JC, Anderson P, Simarro M. The FASTK family of proteins: emerging regulators of mitochondrial RNA biology. *Nucleic Acids Research* 2017