Project title: **"Dissecting the fatty acid-induced epitranscriptome driving cancer malignancies"**

Group leader: **Sylvain Delaunay**

Research group: **RNA Dynamics in Cancer**

Diet and nutrition have emerged as major environmental regulators of cancer cell metabolism. Patient's diet can dramatically impact the course of cancer progression, by providing nutrients that change the metabolic dependency of tumour cells, driving transition in cell state, such as proliferation or motility. To switch cell state, cancer cells undergo a profound rewiring of the proteome, in order to acquire new phenotypes. With over 170 different chemical modifications added to all RNA species involved in protein synthesis, the RNA epitranscriptome dictates the proteome plasticity. Rewiring of the RNA epitranscriptome is especially critical once tumour cells encounter external signals, such as a change in nutrient availability. Yet, how precisely diet remodels the epitranscriptome to support proteomic changes and cancer cell state transition is unknown.

Our lab focuses on how diet impacts the course of breast cancer progression by modulating mRNA translation. We have discovered that cells initiating metastasis rewire their RNA modifications landscape to synthesize proteins necessary for energy production and dissemination from primary tumours. We are looking at how these RNA modifications can be reprogrammed by certain nutrients in diet to affect tumour growth, metastasis and patient survival, and how we can use these vulnerabilities to improve cancer treatments.

In this project, we plan to induce motility in breast tumour through diet to identify the key RNA modifications that support the dissemination of cancer cells. We will map the changes in the epitranscriptome of cancer cells induced by high fat diet and identify the mechanisms by which RNA modifications controls cancer cells motility through the proteome. To this end, xenotransplantation models and multimodal molecular profiling techniques will be used, combined with diverse bioinformatics approaches, centred around RNA biology (i.e., Ribo-seq, RNA-seq, Nanopore-seq). We will also have access to patients' samples to use as discovery and validation of our findings.

We are seeking an ambitious, motivated, and focused researcher to join our RNA Dynamics in Cancer Group. Our research leverages cutting-edge techniques such as unbiased high throughput screenings, *in vivo* mouse xenotransplantation assays with dietary modulations, *ex vivo* tumouroids systems, and large-scale molecular biology approaches. Our ultimate ambition is to discover new vulnerabilities in malignant cancers as basis of novel therapeutic strategies and predictive biomarkers to advance precision medicine. Candidates with a strong academic track record and experience in RNA biology or cancer research are highly encouraged to apply. Applications from candidates with exceptional bioinformatics skills who are eager to gain hands-on wet lab experience are also welcome.