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M2 Internship and PhD
Dynamics of lipids and proteins exchange between organelles

In cells there are droplets made of a neutral lipid oil core surrounded by a phospholipid monolayer containing proteins. These droplets are the energy stores of cells and play multiple functions in biology. A dysregulation of their formation and maintenance is responsible for many metabolic disorders affecting liver, brain, heart etc. Regulation of these droplets relies in controlling their oil, phospholipid and protein content, which are acquired from other intracellular bilayer compartment.

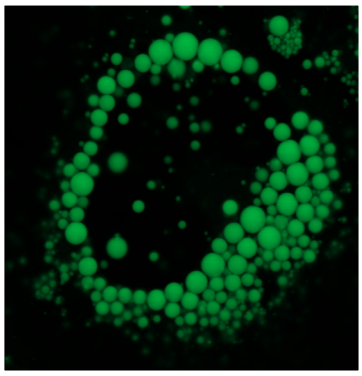

Figure 1: Lipid droplets labeled in green in a liver cell

In essence, these droplets simply form oil-in-water emulsion droplets. The physics of emulsion thus rules out their behavior and fate. Our lab developed these past years emulsion droplet tools to study the regulation of these droplets to address how lipids and proteins are transferred from a phospholipid membrane bilayer to a droplet.

The project here aims to develop semi-in vivo emulsion droplets to study how proteins relocalize from a cellular bilayer membrane to an in vitro emulsion droplets. We seek for an experimental physicist/biophysicist interested in spending 1/5 of time to optimize recovery protocols of cellular membranes (which she/he will be taught). Proteins and lipids of these membranes will be next used for the rest the time to study their interaction with in vitro emulsion droplets. Mechanisms controlling the protein and lipid exchange between membranes and droplets will be deciphered.

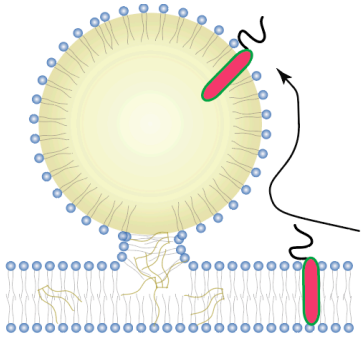

Figure 2: a protein transfers from a bilayer to a lipid droplet monolayer

The PhD candidate will benefit from a multidisciplinary environment in the lab where biologists and physicists collaborate in different but interrelated topics.

References:

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