



*A biomimetic emulsion in a constriction and a 10  $\mu\text{m}$  droplet in a developing brain.*

### ***Force transmission through the extracellular matrix during development***

During development, biological tissues undergo intense remodeling in order to give rise to future organs shape and function. To understand this phenomenon from a physical point of view we study the mechanical response of tissues under perturbations such as those encountered during development. In particular, we focus on the role of adhesion for the modulation of the tissue response. To do so, we use a synthetic system of so-called biomimetic emulsions in which oil droplets adhere to each other through specific interactions and can be tailored to mechanically mimic packings of cells in tissues [Pontani et al., 2012, PNAS]. The binding energy between the droplets can be tuned through the choice of binders such as thermoreversible DNA complementary single strands, or quasi-permanent biotin-streptavidin bonds. We apply a mechanical perturbation to such adhesive emulsions by flowing them inside microfluidic devices and we study their elastoplastic response through confocal microscopy [Golovkova et al., 2020, Soft Matter & Golovkova et al., 2021, Soft Matter].

The goal of this internship will be to study the role of the extracellular matrix in the transmission of forces inside adhesive tissues and between adjacent tissues during development. We will use two complementary approaches: *in vitro* and *in vivo*. For the *in vitro* approach we will integrate extracellular matrix in the continuous phase of adhesive biomimetic emulsions and will probe its effect on the mechanical properties of this artificial tissue. For the *in vivo* approach we will develop biocompatible droplets that can then be injected in developing embryos of zebrafish to measure force transmission through the interstitial matrix between developing tissues. These experiments will be carried out in close collaboration with the group of Marie Breau at the Developmental Biology Laboratory (IBPS, Jussieu campus).

- **Location**

Laboratoire Jean Perrin, CNRS UMR 8237, Institut Biologie Paris Seine, Sorbonne University

Tower 32-33, 5<sup>th</sup> floor, 4, place Jussieu, 75005 Paris, France

Web page: <https://www.labojeanperrin.fr/>

- **Contact**

Léa-Laetitia PONTANI [lea-laetitia.pontani@sorbonne-universite.fr](mailto:lea-laetitia.pontani@sorbonne-universite.fr) ☎ +33 1 44 27 28 23