

Internship and PhD opportunity :
MULTISCALE MECHANOBIOLOGY OF SPHEROIDS AND ORGANOIDS

Physical Microfluidics and Bioengineering, Institut Pasteur, Paris, France.

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Start date : early 2024.

KEYWORDS : ORGANOIDS, 3D CULTURE, MECHANOBIOLOGY, QUANTITATIVE BIOLOGY.

A PhD position in mechanobiology and biophysics is available in the [Physical microfluidics and Bioengineering](#) lab in paris. The objective is to address the mechanical and biological response of multicellular spheroids and organoids subjected to mechanical compression, across scales.

We will use a new microfluidic device that we have developed, combined with single-cell imaging and the analysis of large data sets, to link the mechanical forces experienced by individual cells to their biological response (see Fig. 1).

The project will involve working with different cellular models to form cancer spheroids or stem cell-derived organoids (cardioids). For each case we will explore specific biological responses to short and long-term mechanical forcing. The final objective is to be able to link both the mechanical *and* the biological responses of each cell with the global response of the 3D culture, through a combination of quantitative single-cell experiments and mathematical modeling.

The candidate : The ideal candidate should have a strong background in biophysics, bio-engineering, quantitative biology, or a related area. He/she should be comfortable with quantitative image and data analysis, while working closely with other group members who bring complementary skills on theoretical and experimental aspects. The student will work in a small but growing group within the lab, so the desire to collaborate within a diverse and multidisciplinary team is a prerequisite.

The lab : The project will take place at Institut Pasteur and Ecole Polytechnique, where our research is focused on understanding the link between the single-cell characteristics and the collective properties that emerge at the scale of a population (e.g. [1, 2]). We will interact with theorists in the Paris area and elsewhere.

To apply or for further information : Applicants are invited to send a CV with a publication list and the names of three referees to Charles Baroud (charles.baroud@pasteur.fr).

References

- (1) Ronteix, G., Jain, S., et al. . (2022). High resolution microfluidic assay and probabilistic modeling reveal cooperation between T cells in tumor killing. *Nature Communications*, 13(1), 1-13.
- (2) Sart, S. et al. (2020). Mapping the structure and biological functions within mesenchymal bodies using microfluidics. *Science advances*, 6(10), eaaw7853.

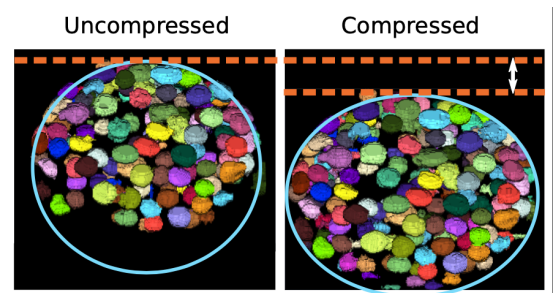


FIGURE 1 – Segmented nuclei in a spheroid, in the free vs. compressed states.