



Tumor ecosystem:
Cancer, endothelium, immune cells, fibroblasts

Paris, March 2022

Engineer position on Tumor-on-chip technology at Institut Curie – Paris

Project title: Personalized lung-cancer-on-chip to understand, predict and overcome resistance mechanisms to immunotherapies

Tumor-on-chip (ToC) approaches reconstitute highly-controlled tumor microenvironments in microfluidic devices. They have been recognized as breakthrough 3D models for immune-oncology research. We recently succeeded in reconstituting ex-vivo the immunotherapy response of a lung cancer ecosystem to an immune checkpoint inhibitor (anti-PD-1).

The project aims at generating personalized lung-cancer-on-chip platforms with clinically-relevant cell models, i.e. primary autologous cells isolated from fresh lung tumor samples. Resistance to immunotherapy involves both cancer-cell-intrinsic and environmental features. The unique controllability of ToC experimental approach will be exploited to investigate some of the immunotherapy resistance mechanisms, not linked to the molecular features of cancer cells. In particular, we will focus on the role of stromal components, cancer-associated fibroblasts and vascular endothelium, as well as of O₂ concentration (hypoxia).

This inter-disciplinary project, funded by Fondation ARC and coordinated by Maria Carla Parrini, will be developed as collaboration between Institut Curie (team of Fatima Mechta-Grigoriou), Institut Pierre-Gilles de Gennes for microfluidics (team of Stéphanie Descroix), Bichat hospital (team of Gérard Zalzman), and CNRS of Lille (team of Fabrice Soncin).

The candidate will work at Institut Curie, which is located in the heart of Paris, and will qualify for all social/health benefits of Curie employees. We are seeking for a candidate, with Master or Engineer or PhD degree, with a background in Cancer Cell Biology or Immuno-Oncology. Some experience in Microfluidics (organ-on-chip), Vascular Biology, or Cell Image analysis will be a plus. Salary will depend on experience, according to the current salary scale.

Candidates should send application (CV, motivation letter, 2-3 recommendation contacts) to: maria-carla.parrini@curie.fr

Our recent relevant publications

1. Apoptosis mapping in space and time of 3D tumor ecosystems reveals transmissibility of cytotoxic cancer death. Veith et al, **PLoS Comput Biol**. 2021 Mar 30;17(3):e1008870. doi: 10.1371/journal.pcbi.1008870.
2. In vitro bone metastasis dwelling in a 3D bioengineered niche. Han et al, **Biomaterials**. 2020 Dec 24;269:120624. doi: 10.1016/j.biomaterials.2020.120624.
3. Models for Immuno-oncology research. Tumour-on-chip breakthrough. Parrini, **Cancer Cell**. 2020 Aug 10;38(2):145-147. doi: 10.1016/j.ccell.2020.07.010.
4. Fibroblast heterogeneity drives metastatic spread through distinct mechanisms in breast cancers. Pelon et al, **Nat Commun**. 2020 Jan 21;11(1):404. doi: 10.1038/s41467-019-14134-w.
5. Dissecting Effects of Anti-cancer Drugs and Cancer-Associated Fibroblasts by On-Chip Reconstitution of Immunocompetent Tumor Microenvironments. Nguyen et al, **Cell Rep**. 2018 Dec 26;25(13):3884-3893.e3. doi: 10.1016/j.celrep.2018.12.015.