Post-doc position at the center of Paris

Ecole Normale Supérieure

Automated stem cell processing and on-chip organoid formation

Human induced pluripotent stem cells (hiPSCs) hold great potential for regenerative medicine, disease modeling, and drug discovery. Rapid progress has been made during the last 12 years but it is still challenging to produce high quality hiPSCs and their derivatives for industrial and clinic applications due to risks of gene instability and tumorigenicity. To solve the problem, we proposed a patch method by mimicking the in-vivo basement membrane and/or extracellular matrix with a monolayer of nanofibers, allowing a better control of spheroids formation and hiPSC differentiation. We also proposed a device configuration for easy patch and microfluidic integration. Finally, we initiated an auto-culture system for the long-term control of hiPSCs culture and differentiation conditions.

The objective of this project is to explore the above micro-engineered tools for automated stem cell processing and on-chip organoid formation. The advantage of the monolayer nanofibers relies on their high porosity and high biocompatibility, which serve as artificial basement membrane for multilayer tissue engineering, whereas the integration microfluidic devices can be used to dynamically regulate the soluble cell factors and the micro-physiological conditions. In addition, automatized culture platform will allow reduce as much as time-consuming efforts and make the stem cell products highly reproducible.

The candidate will collaborate with both academic and industrial partners and be in charge of the following tasks:

- Validation of the automatic culture system for hiPSC differentiation.
- Upgrading the protocols for on chip organoid formation.
- Modeling and in-vitro assays of drug and therapy effects using the optimized systems.

Candidate profile: Biophysics, microfluidics, stem cell biology, micro and bio-engineering.
Keywords: Microfluidics, stem cell, lab on-a-chip, automation.
Reference: Nanoscale 8, 14530, 2016; www.ens.fr; www.mesobiotech.com.

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