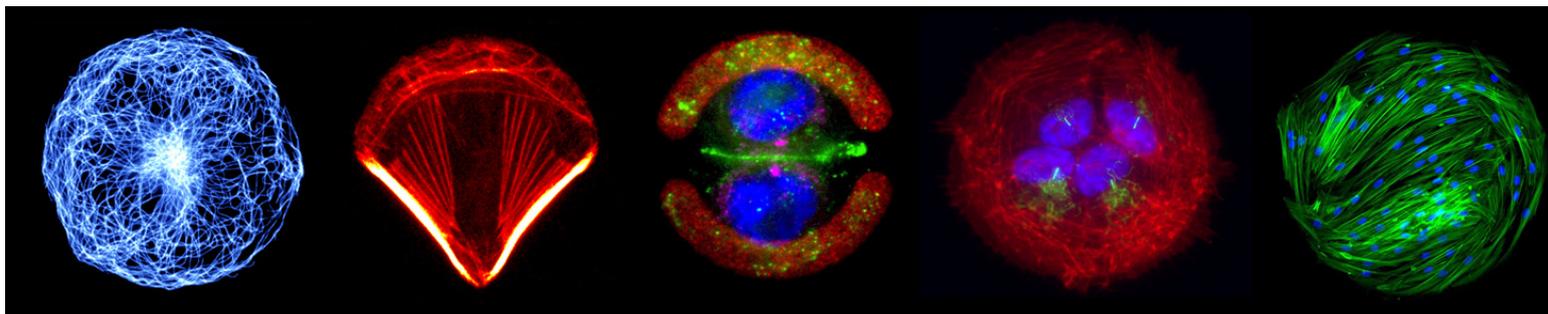




CytoMorpho Lab
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alvéole

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Open Post-doc Position (18 month)

The CytoMorpho Lab of the CEA and ALVEOLE join forces to engineer an artificial niche for hematopoietic stem cells.

Human Hematopoietic stem cells (HSC) are essential to maintain hematopoietic lineages homeostasis throughout life and have major potentials for treatment for haematological diseases.

In vivo, vertebrate HSCs are homed in distinct niches within the bone marrow, located respectively close to the mineralized matrix and around blood vessels. In these niches, complex and specific combinations of extrinsic cues govern HSC migration or homing, quiescence or proliferation, self-renewal or differentiation. Cell-cell interactions play a key role in these regulations. In particular, HSC behaviour has been shown to depend on their interactions with mesenchymal stem cells, macrophages, osteoblasts or endothelial cells.

OUR GOAL:

There is currently no device for the culture of HSC in vitro that would recapitulate those interactions in controlled and normalized conditions. The aim of the project is to combine surface microfabrication and micropatterning with cell 3D cell culture to reproduce the complex architecture of the bone marrow. In parallel microfluidics will be used as a substitute to blood flow in order to fully reconstitute HSC dynamic environment. The final

product will find applications in basic hematology studies as well as in the production of HSC for regenerative medicine.

WHAT WE EXPECT:

We seek for a motivated and talented post-doc to develop the device and investigate the extrinsic regulations of HSC during hematopoiesis. Experiences in cell culture (not necessarily HSC culture) and live cell imaging are mandatory. Skills in microfabrication would be appreciated but can be learned in the lab. Candidates should have a strong taste for technological development and interdisciplinary research.

WHO WE ARE:

The work will be performed in the CytoMorpho lab, which has long-standing experience in the investigation of cell architecture and microfabrication (1–4), including the development of microfluidic chambers for the culture of HSCs (5). All necessary equipment is already available in the lab including microfabrication tools and microscopes. The lab is located in the Hopital Saint Louis, which has an international recognition for its expertise in hematology. The work will be supervised by Manuel Théry and Benoit Vianay in close collaboration with Pierre-Olivier Strale, senior scientist at Alvéole.

Alvéole is an international french company founded in 2010. It develops and commercializes innovative tools for controlling the cellular microenvironment based on a micropatterning and a microfabrication device called PRIMO. It's a generic method for fast high resolution protein patterning on standard cell culture substrates to orchestrate cellular processes.

CONDITIONS:

The proposed funding is for 18 month. The salary will be adapted to the experience of the candidate. Starting date will be December 2017.

Candidate should send a CV, a motivation letter as well as their recommendation letters to Manuel Théry and Pierre-Olivier Strale:

manuel.thery@cea.fr, pierre.olivier.strale@alveolelab.com.

1. M. Burute *et al.*, Polarity Reversal by Centrosome Repositioning Primes Cell Scattering during Epithelial-to-Mesenchymal Transition, **Developmental Cell** **40**, 168–184 (2017).
2. P. Maiuri *et al.*, The first World Cell Race., **Current Biology**. **22**, R673-5 (2012).
3. Q. Tseng *et al.*, Spatial organization of the extracellular matrix regulates cell-cell junction positioning., **Proc. Natl. Acad. Sci. U. S. A.** **109**, 1506–11 (2012).
4. M. Théry *et al.*, The extracellular matrix guides the orientation of the cell division axis., **Nature Cell Biology**. **7**, 947–53 (2005).
5. T. Cambier *et al.*, Design of a 2D no-flow chamber to monitor hematopoietic stem cells., **Lab Chip** **15**, 77–85 (2014).
6. P.O. Strale *et al.*, Multiprotein Printing by Light-Induced Molecular Adsorption , **Adv. Mat** (2016).