Study of the impact of mechanical stress in pancreatic cancer progression

Context & Objectives

Cancer cells experience a wide range of mechanical stresses when tumors develop, ranging from solid compressive stress due to their growth in a confined environment, tensile stress through differential adhesion of a modified extracellular matrix, or shear stress coming from elevated interstitial pressure. The role of mechanical stress in promoting or restraining cancer progression is still poorly understood. Moreover, chemical signals coming from the microenvironment can potentially modulate cellular response differently in the presence of mechanical stress.

Pancreatic ductal adenocarcinoma (PDAC) accounts for most pancreatic cancers. PDAC is a deadly cancer with increasing incidence. Its local growth and the strong modification of the mechanical environment, makes it a good candidate to study the impact of mechanical stress.

The epithelial-to-mesenchymal transition (EMT) is a trans-differentiation process with tractable molecular signatures in which epithelial cells adopt a motile phenotype, eventually leading to the invasion of the local tissue and participating in the process of cancer dissemination and the creation of secondary tumors. Interestingly, both mechanical stress and chemical signaling can promote EMT. However, it remains unclear how these signals of very different origins couple within cells to promote EMT.

The two main objectives of this post-doc stay are:

1. Work in the design and characterization of a state-of-the-art microfluidic platform enabling a full control of both the mechanical and the chemical.
2. Investigate the role of mechanical stress, coupled to chemical signaling, in promoting the epithelial-to-mesenchymal transition.

Environment

The successful candidate will be co-advised by M. Delarue, biophysicist from the LAAS-CNRS, expert in mechano-biology and microfabrication, and J. Guillermet-Guibert, cancer biologist from the CRCT in Toulouse, expert in signaling in pancreatic cancer. The LAAS-CNRS offers 1,500m^2 of clean room with state-of-the-art 2D and 3D micro- and nano-fabrication facilities, microscopy and cell culture platforms. The CRCT, located at the heart of the Cancéropôle, is attached to a hospital with access to mouse facility and patient-derived samples. Toulouse is a vibrant life science cluster in France, but also a beautiful city in the South-West of France, ideally located close to the Pyrénées mountains (for hikers), the Atlantic Ocean (for surfers) and the Mediterranean Sea (for relaxation).

Application

A funded 2-3-year position is offered as from October 2018 for a successful candidate holding a PhD degree. We are looking for independent researchers with experience and a strong will for working at the interface between physics and biology. Preferred experience includes but is not restricted to microfabrication, microfluidic, cell culture, mouse work, modeling.

For more information, please send a short statement of interest, a CV, and the contact details of two references to:

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