Collective behavior of a confined population of transformed cells

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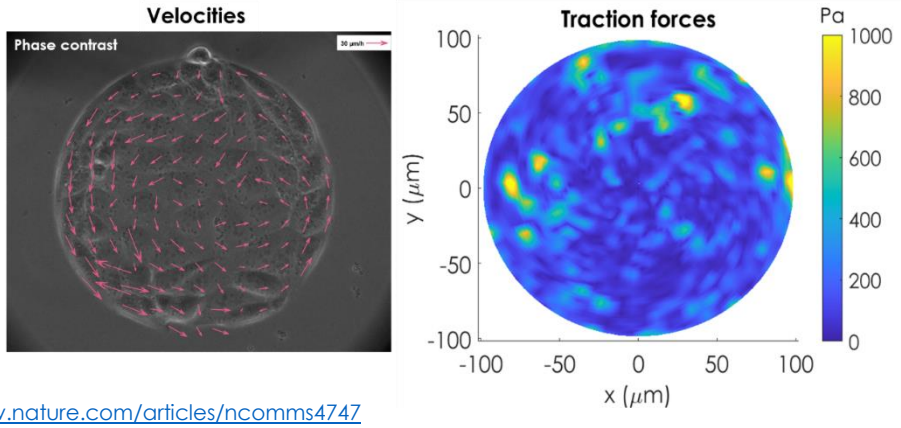
Ce stage peut être poursuivi en thèse : **OUI**

Biological tissues are active cellular materials whose mechanical characterization is a timely subject. How forces and motions drive collective behaviors in population of normal cells tends to be well characterized. Several works have reported propagation of waves in monolayers of normal epithelial cells under confinement. Such physical waves could be responsible for carrying information across the tissue. Much less is known about pathological situations for which collective behaviors are still relevant, like in cancer invasion. In that context, we wonder how mutated cells behave under confinement? More specifically we want to study the **impact of an oncogenic transformation on collective flows and forces.**

To address this question, we will study the mechanical behavior of confined colonies of cells, which are genetically modified to be light-sensitive. In dark, the cells keep a normal phenotype, while they over-activate the Src oncoprotein (known to be overexpressed in many cancers) if they are exposed to blue light. We will analyze **forces and motions of the cells in relation with the oncogenic stress**, directly controlled with the blue-light illumination.

To confine cells, we use microfabrication. Image analysis allows us to measure velocity field, the deformation rate and the cell polarity pattern. Traction Force Microscopy gives access to cellular tractions. We will look for **correlations between dynamics (cellular flows), mechanics (traction forces) and genetics (oncogenic state)**. Understanding the effect of an oncogenic activation on collective behaviors should help to unravel the mechanisms of collective cell migration in cancer.

Skills: cell culture, microfabrication, optical microscopy, optogenetics, image analysis, traction force microscopy



References: https://www.nature.com/articles/ncomms4747
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