Cell polarization on rigidity-patterned substrates

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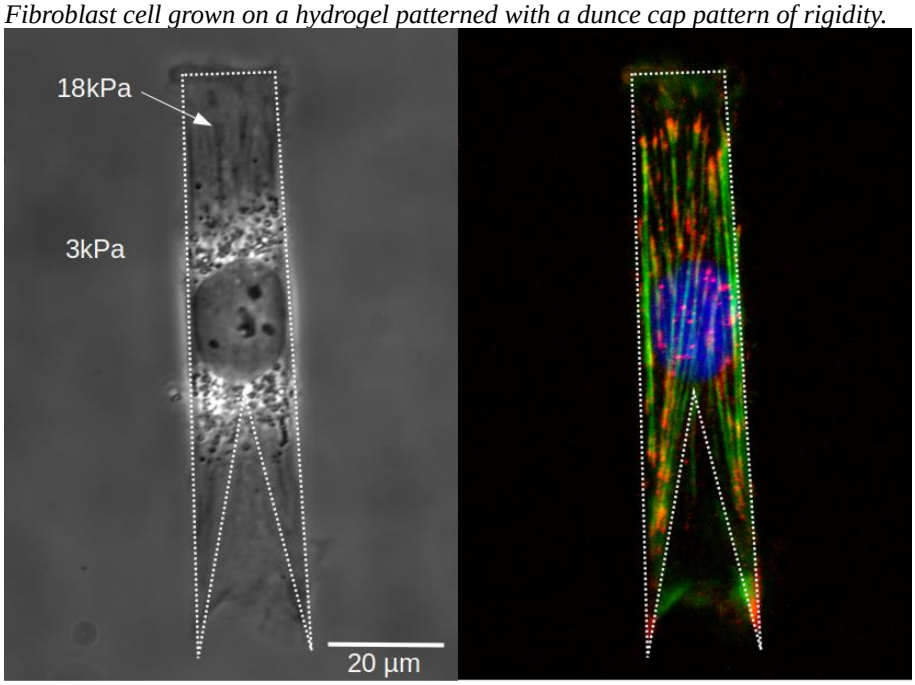
Animal cells adapt to extracellular chemical as well as physical cues. The rigidity of the extracellular matrix for instance impacts cell adhesion and cell contractility, and the subsequent biological processes such as cell migration, differentiation, apoptosis, etc. In this practical, we will explore how cells adhere on a rigidity patterned support, with patterns of similar dimensions as the cells. We will design a hydrogel-based synthetic extracellular matrix with patterns of rigidity using gray leveled lithography. We will compare cell growth on these patterns when the hydrogel is coated with a uniform surface density of proteins of the extracellular matrix, or when the proteins of the extracellular matrix is mainly condensed on the stiffer regions of the patterns.

Fibroblast cell grown on a hydrogel patterned with a dunce cap pattern of rigidity.



The cell takes the shape of the stiff pattern. Red: vinculin; green: actin; blue: nucleus.

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