Exploring the interplay between mechanics and mechanosensing in mammalian cells

Mechanobiology is a relatively new field with great potential for revolutionizing healthcare approaches. A biography of the presenter and an abstract of the talk are provided below.

Biosketch

Professor **Massimo Vassalli**

James Watt School of Engineering and Centre for the Cellular Microenvironment, University of Glasgow, Glasgow, UK

Massimo Vassalli graduated in physics from the university of Florence and later completed an interdisciplinary PhD in “nonlinear dynamics and complex systems”. He is internationally recognised for the development of biophysical methods to study mechanics at the nanoscale, and its impact on cell physiology. He is professor of bioengineering at the University of Glasgow where he serves as Director of Impact for the James Watt School of Engineering. His laboratory is part of the Centre for the Cellular Microenvironment (CeMi) and is located within the Mazumdar-Shaw Advanced Research Centre. He has worked as Endeavour Research Fellow at the Victor Chang Research Institute in Sydney (Australia) and ETH Zurich (Switzerland) as a SNF Fellow. He has spent time as invited scientist at different international institutions in France, Italy and the UK. In the last 10 years, Massimo Vassalli has been working on the development of nanoengineering tools for the study of cell mechanobiology with an angle of translating research findings towards the market. In this context, he developed several long-lasting collaborations with major industrial players. Using Atomic Force Microscopy, he has studied biological systems at different scales, from single molecules to cells and tissues. He is interested in understanding how cells sense mechanical stimuli, and the impact of mechanosensing in physiology and pathology.

Abstract:

Mechanosensing, the ability of cells to sense and respond to mechanical stimuli, is a central process in mammalian cells, triggered by a varied pool of molecular structures. Mechanosensitive ion channels, such as Piezo1, play a central role in this mechanism, directly converting forces and stretches into biochemical signals. This downstream cascade induces cytoskeletal remodeling, mobilization of intracellular organelles and reorganization of the adhesions structures, ultimately impacting on the mechanical properties of cellular structures which, in turn, modulates the mechanosensitivity of ion channels. A similar cross-talk exist with the extracellular environment, whereby cells mechano-adapt to the viscoelastic properties of the matrix in a process largely orchestrated by mechanosensitive ion channels. When the mechanical homeostasis of mammalian cells is altered, their phenotype can become aberrant and lead to the onset of a pathological state. During the talk, we will discuss this context and present new methods for the investigation of the interplay between mechanics and (piezo1) mechanosensing, with an accent on the application of Fluidic Force Microscopy and Brillouin spectroscopy