



Microcirculation on a chip

The goal of this project is to design and set-up a microfluidic device that mimics the characteristics of a blood microcirculation network. Capillaries are watertight conduits lined with endothelial cells surrounded by extracellular matrix with a 10 μm -wide lumen and organize in complex networks. These small vessels are submitted to various biophysical stimuli such as shear stress, pressure or oxygen concentration. In addition, different cell types such as pericytes and immune cells participate in the biology of these vessels. This microfluidic system will be designed to reproduce the 3-dimensional geometry of capillaries and precisely control their environment. Quantitative evaluation of the integrity of the network and the tightness of the cellular junctions by real-time spinning disc confocal imaging is an important specification of the device. Once the system is in place it will be challenged by different stimuli involving in particular infection with pathogenic bacteria that target the endothelium. This project is at the interface between biology and physics and will typically require a young scientist trained in microfluidics with a strong motivation to learn about applications in the field of biology. Either PhD students or postdoctoral fellows can apply.

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