

**PDMS-based specially designed microfluidic channels lined with primary endothelial cells: a novel tool for experimental pharmacology of endothelium**

Endothelium is a major organ in the body, formed by endothelial cells that cover the internal surface of all blood vessels in the body. Endothelial cells cover multiple function that are important for the health of cardiovascular system, like the regulation of vascular constriction and relaxation, the regulation of permeability and others. Endothelial dysfunctions, indeed, are a hallmark of all cardiovascular diseases.

Despite its importance, the *in vivo* mechanisms that regulate the endothelial functions are not completely understood.

Some of the limitations that are faced in the studies on endothelium come from the methods that are used. These methods frequently neglect important feature that are present in *in vivo* conditions, like the presence of flow and communication with neighbor cells. Additionally, the endothelial cells used for *in vitro* studies are mostly manipulated cells, which response is far from *in vivo* behavior.

The aim of the project is, therefore, to develop a microfluidic device for *in vitro* studies of primary endothelial cells under flow conditions. Merging the use of primary endothelial cells, which better replicate the behavior of endothelial cells *in vivo*, and the possibility offer by microfluidic channels to expose the cells to unidirectional flow, a novel tool will be available in the research on pharmacology of the endothelium.

The successful outcome of this project will allow to overcome the mentioned limitations and answer relevant biological questions related to the endothelial heterogeneity, responsiveness to drugs, and co-culture with neighbor cells in a solution that better represent the *in vivo* conditions.