

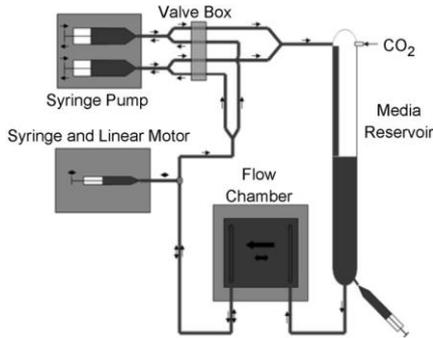
Master Thesis Proposal

Development of Pulsatile Flow Loop for Studies on Endothelial Cells

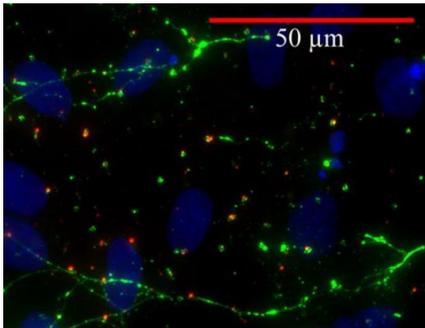


Universität
Zürich^{UZH}

 The Interface Group



Flow loop example [1]



VWF strings on endothelial cells [2]

Background

Von Willebrand Factor (vWF) is a large protein that plays a key role in coagulation and wound closure. It is secreted by endothelial cells (EC) into the blood stream, a process that is influenced among other factors by the strain and shear stress acting on the ECs. Patients with unphysiological blood flow conditions (e.g. through circulatory support pumps) often suffer from disrupted levels of vWF. Current studies suggest that impaired secretion of vWF could play a role. A better description of the correlation between mechanical stimuli on ECs and the secretion of vWF would help to understand underlying mechanisms and allow for new treatments. A detailed study of these effects in vitro requires a flow driving system capable of reproducing complex pulsatile flow profiles.

Project Goal

In this project, a test bench is to be developed which allows the generation of accurately controllable pulsatile flows for in-vitro studies on endothelial cells. The envisioned system should enable both steady and transient flows, including complex physiological profiles. The project presents the opportunity of experiencing and driving the complete development process, including the design of a suitable concept for the test bench, selection and assembly of the hardware and the implementation of needed control systems. Initial operations including tests with alive cells and validations of the system will provide a satisfying end goal.

You will

- experience the complete development process of an advanced fluidic test bench
- benefit from the collaboration within an interdisciplinary project
- gain insights into bio-engineering lab work

You bring

- basic knowledge of fluid dynamics
- basic experience with control systems
- interest for experimental work
- ability to work independently and reliably
- systematic and methodical approach to problem solving



<https://interfacegroup.ch/>

About us

The Interface Group addresses clinical needs through the convergence of engineering, biological, and medical research. The interdisciplinarity of our projects is reflected in our team and approach to problem solving. We regard the link between research and education as the key to excellence in training.

Facts

Type: Master Thesis
Start: as of now
Duration: 6 months

Contact

Jonas Abeken
Interface Group
UZH Irchel, Y23 J78
jonas.abeken@uzh.ch

References:

- [1] Conway, D. E., et al. (2009). Am. J. Physiol.-Heart Circul. Physiol., 298(2), H367–H374.
- [2] Turner, N. A., et al. (2009). Blood, 114(24), 5102–5111.