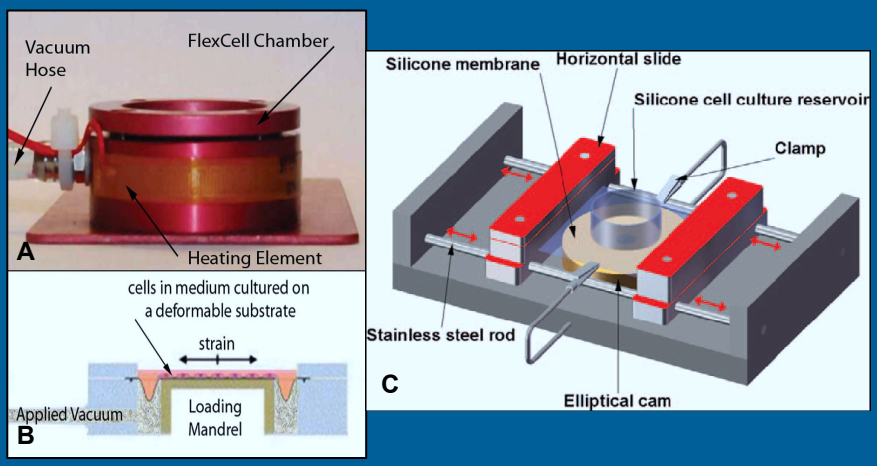
STUDENT RESEARCH PROJECT



Commercially available strain device currently used (A) and its principle of functioning (B). Design of a micro-device functioning on a different principle (C)

Design, implementation and calibration of a novel micro-device for imparting quantified mechanical strains to cells in 2D culture

Semester Project / Master Project

This project is part of a wider project aimed to develop an assay of live cell stiffness able to discern cancerous cells from normal cells. Cellular elasticity may in fact be used as cell marker and diagnostic parameter for underlying disease.

Techniques that have been developed to study the mechanical properties of cells can be classified in many ways. One broad distinction between the techniques is whether they are ‘‘active’’ or ‘‘passive.’’ Methods that apply forces or mechanically load cells in order to deform the cell in a particular manner can be referred to as active methods. Currently a commercially available active device is used.

The goal of the present project is to design and develop a novel micro-device capable to actively apply known strain profiles to cells. The device should meet the following criteria:

- Selectable equi-biaxial strain profile and frequency
- In-situ visualization of cells – Integration with a microscopy system
- Biocompatibility
- Computer controlled

The implementation requires a calibration of the device that allows gaining full control of the strain imposed to the substrate and to the cells. Calibration will be carried out using image analysis techniques and possibly finite element models.

Previous knowledge of image processing and computer vision is an advantage, but not mandatory.

50% practical work, 25% theoretical work and 25% computational work.
No specific prerequisites are required.

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