Master assignment

Uniform mechanical loading of encapsulated single cells

A multitude of tissue experience mechanical stress in one form or another, in the human body. For example, cartilage tissue is compressed during loading. This type of mechanical stress is often neglected in in vitro cell culture, but it has become increasingly clear that it also plays a role in cell behaviour. While a variety of devices have been developed to mimic mechanical loading on the tissue level (e.g. loading of explants, or loading of embedded cells in a bulk hydrogel), there are only very few setup that allow for mechanical loading on the single cell level. Specifically, a method to perform uniform loading (i.e. the same degree of mechanical stress on all cells) on single cells within 3D microenvironments, is currently still lacking. Hence, the aim of this assignment is to develop a setup that allows for the mechanical loading of single cells inside a 3D microenvironment.

Techniques/methods applied in the project:

In this project, you will gain expertise mechanical loading of encapsulated single cells. Depending on personal preferences, this can be combined with a wide variety of analysis techniques including single cell encapsulation, mechanical measurements, confocal microscopy, holotomography, fluorescence immunostaining, and image analysis.

Supervision

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