Silk-supported hydrogels towards organ-on- chip applications

Master's degree project available at Spiber Technologies AB in collaboration with KTH Biotechnology, AlbaNova

Background:

Spider silk is a natural polymer that combines both strength and elasticity. In our group, we work with the functionalized recombinant spider silk protein FN-4RepCT (FN-silk), produced in the bacterium *Escherichia coli*. When subjected to a hydrophobic/hydrophilic interface, the soluble FN-silk protein self-assembles into silk-like structures. By controlling the way FN-silk is exposed to those interfaces, different 3D matrices can be produced. The fibrillar nature of the FN-silk matrices, as well as the protein´s functionalization with an RGD motif from fibronectin, mimic the natural extracellular matrix (ECM). We have previously shown that they are excellent candidates for cell adhesion and growth in vitro. In this way, it is possible to produce physiologically relevant tissue models that can be used for improved drug development.

What can we offer you?

In our lab, we continuously have ongoing projects related to the development and evaluation of our silk materials. We now aim to investigate how FN-silk can be integrated into various hydrogels to improve protocols for conventional 3D cell cultures as well as organ-on-chips. The hypothesis is that the hydrogels with FN-silk will be stable at lower hydrogel concentrations, and as such improve cell culture conditions.

Methods:

During this project, spider silk proteins will be mixed with a variety of different hydrogels and the final formations will be evaluated using bright-field and fluorescence microscopy. Once protocols have been optimized, the feasibility of integrating the hydrogels into microfluidic chip systems will be tested. As a part of this project, it will also be necessary to become familiarized with a FromLabs 3D printer and print holders for the hydrogels during the initial formation studies.

If you are interested, contact:

Linnea Gustafsson, PhD
linnea.gustafsson@spiber.se

My Hedhammar, Professor
myh@kth.se
www.kth.se/profile/myh

Location:

Spiber Technologies
Roslagstullsbacken 15, SE-114 21 Stockholm

Department of Protein Science
AlbaNova University Center, SE-106 91 Stockholm