Micro Engineering/Biomedical Engineering

Type of position
Degree-seeking PhD position (48 mon)

Main supervisor
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Specific subject area(s)
Microfluidics, tissue engineering, cancer, glioma, Organ-on-Chips, neurovascular unit

Title of project
Model of glioma in a microfluidic Organ-Chip

Earliest start date
01/09/2018

Project website if available
https://www.kth.se/profile/aherland

Short description of the project

This project targets one of the most important challenges in medicine today: overcoming the limitations of current pre-clinical models used for drug development, which have resulted in high rates of failure when these compounds enter human clinical trials. There has been great excitement over the past decade based on major advances made relating to the development of microfluidic human Organs-on-Chips (Organ Chips), which are cell culture devices created with microchip manufacturing methods that contain continuously perfused chambers inhabited by living human cells arranged to simulate tissue- and organ-level physiology. By recapitulating the multicellular architectures, tissue-tissue interfaces, physicochemical microenvironments and vascular perfusion of the body, we and others have shown that these devices can produce levels of tissue and organ functionality, as well as recreate features of human disease states, not possible with conventional 2D or 3D culture systems.

Gliomas, a collective name for brain tumors affecting the glial cells, are often highly angiogenic and aggressive tumors, with a median survival time of only around a year. The interplay between glioblastoma cancer cells and the endothelial cell compartment has been shown to be critical for the disease development, but there is no relevant human in vitro model thereof that can be used in the search for more effective treatments. The aim of the project is to integrate glioma cell lines in our microfluidic neurovascular models and to evaluate effects on glioma progression as well as blood-brain-barrier integrity. A second part of the project will be devoted to evaluating the efficacy of established treatments in comparison with novel compounds. Experimental