Master project in Engineering Biology/Biotechnology

Lab-on-a-chip for real time assays of induced pluripotent stem cells

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Introduction

Efficient screening of pharmaceutical candidates at an early stage with realistic and high throughput *in vitro* systems is a requirement for reducing the time-to-market of a potential drug. Exposing toxicity and efficacy of a substance in pre-clinical trials can lower the development cost for a pharmaceutical company as well as involve fewer unnecessary animal experiments. Lab-on-a-chip and microfluidics offer a close control of the cell environment, a low consumption of material (cells, medium, drugs etc.) and are possible to scale out [1-3]. With the recent advances in induced pluripotent stem cell (iPSC) techniques, a new disease specific cell source is available. The cells are isolated from patients suffering from different disorders (e.g. Alzheimer's, schizophrenia and diabetes) and reprogrammed into iPSCs. The iPSCs can then be differentiated into various cells in order to create an *in vitro* model of an organ (e.g. liver, kidney and heart) with the same genome that caused the disease [4,5].

Goal for the master project

In this project, we will create a lab-on-a-chip *in vitro* model with iPSC-derived cardiomyocytes or hepatocytes. The model should be able to monitor the state of the cells, online and/or offline, when exposed to pharmaceutical substances.

Suitable study background

Master students in biology engineering, chemical engineering, bioengineering physics or biotechnology with strong interests in cell cultures, measurement techniques and computer control.

Time for project

HT2015-VT2016

Contact person

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Literature

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4. Takahashi, K, and S Yamanaka. "Induction of pluripotent stem cells from mouse embryonic and adult fibroblast cultures by defined factors." *Cell* 126.4 (2006): 663-676. Print.
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