Microfluidic System for Long Term Culturing of Organotypic Brain Tissue

Bakmand, Tanya; Andersen, Karsten Brandt; Sasso, Luigi; Svendsen, Winnie Edith

Published in:
Proceedings of The Gordon Research Conference on the Physics and Chemistry of Microfluidics

Publication date:
2013

Microfluidic System for Long Term Culturing of Organotypic Brain Tissue

Tanya Bakmand*, Karsten B. Andersen*, Luigi Sasso* and Winnie E. Svendsen*

*Technical University of Denmark (DTU), Department of Micro- and Nanotechnology (Nanotech), Nano Bio Integrated Systems (NBIS) group

Research in neurodegenerative diseases often utilises explanted organotypic brain tissue for experiments on the effect of various drugs and chemicals. The most widely used method for culturing brain tissue over longer time periods is the membrane interface method [1], which utilises a well plate systems situated inside a standard incubator.

In this work an open microfluidic system for long term culturing of organotypic brain tissue has been developed. The system mimics the in vivo environment of brain tissue by utilising a flow of growth medium underneath a culturing membrane to ensure an adequate supply of nutrients as well as proper waste disposal. The appropriability of the system has been demonstrated by culturing of embryonic brain tissue over the course of three weeks.

In addition to the development of the microfluidic culturing system an integrated electrochemical sensor for real time monitoring of analytes is described.

[1] L. Stoppini, P.-A. Buchs and D. Muller. (1991). A simple method for organotypic cultures of nervous tissue. Journal of Neuroscience Methods. 37. pp. 173-182.