



## **Culturing of PC12 Cells, Neuronal Cells, Astrocytes Cultures and Brain Slices in an Open Microfluidic System**

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## **Culturing of PC12 Cells, Neuronal Cells, Astrocytes Cultures and Brain Slices in an Open Microfluidic System**

Fatima AlZahra'a Alatraktchi, Tanya Bakmand, Ane Rømer Sørensen, Winnie E. Svendsen. Poster presentation at the Gordon Research Conference, Microfluidics, Physics and Chemistry, Tuscany, 2013.

The brain is the center of the nervous system, where serious neurodegenerative diseases such as Parkinson's, Alzheimer's and Huntington's are products of functional loss in the neural cells (1). Typical techniques used to investigate these diseases lack precise control of the cellular surroundings, in addition to isolating the neural tissue from nutrient delivery and to creating unwanted gradients (2). This means that typical techniques used to investigate neurodegenerative diseases cannot mimic *in vivo* conditions, as closely as desired. We have developed a novel microfluidic system for culturing PC12 cells, neuronal cells, astrocytes cultures and brain slices. The microfluidic system provides efficient nutrient delivery, waste removal, access to oxygen, fine control over the neurochemical environment and access to modern microscopy. Additionally, the setup consists of an *in vitro* culturing and electrochemical sensor system that enables real time detection of metabolites, e.g. dopamine from cell cultures and brain slices. In summary we present results on culturing of brain slices and cells in the microfluidic system as well as on the incorporation of an electrochemical sensor system for characterization of exocytotic dopamine release from neural and brain cultures.

### References:

- (1) D. Johnston, S. Wu, *Foundations of Cellular Neurophysiology*, Massachusetts Institute of Technology (1995)
- (2) Y. Huang, J. Williams, S. Johnson, *Brain slice on a chip: opportunities and challenges of applying microfluidic technology to intact tissues*, The Royal Society of Chemistry (2012)