



Sensor integration in a brain blood barrier on a chip

Mònica Mir

Barcelona Institute of Science and Technology, Spain.

Abstract:

Alzheimer's disease (AD) is a chronic neurodegenerative disorder characterized by a progressive loss of cognitive capacity and memory. AD is mainly associated to the accumulation of toxic aggregates of amyloid β peptide (A β) in the brain which produce oxidative stress and neurotoxicity [1]. In the last years, multiple efforts have been performed in order to develop new molecules for AD's treatment based on the disaggregation of A β cumulates [2]. However, most of them do not reach the action site due the strict permeability in the brain by the blood brain barrier (BBB).

It is very relevant for drug testing in AD and other neurodegenerative diseases to have a platform that can mimic the permeability of BBB in healthy people and AD patients where the BBB permeability is increasing along the diseases [3].

The present study investigated an animal free technology of permeability BBB tuning and sensing integrated in a BBB-on-a-chip. Two microfluidic channels interconnected through closely fabricated stacks to recreate barriers will be cell cultured in one channel with pericytes and astrocytes and another channel with endothelial cells to construct the BBB. The microfluidic chip is fabricated with integrated electrodes for Transepithelial/transendothelial electrical resistance measurements to monitor the permeability of the fabricated BBB and with electrodes under the barrier to tune the permeability. This platform is an excellent platform to study neurodegenerative diseases and drug testing.

Biography:

Dr. Mir received the Degree in Chemistry in 1998 and in



2006 her PhD in biotechnology. She realized different predoctoral stages in Greece and UK. From 2007, she held a postdoctoral position in Max Planck Institute, Germany. Since 2008, she joins the Institute for Bioengineering of Catalonia (IBEC), as Senior CIBER researcher, combined with her teaching as associate professor in the University of Barcelona. Along her carrier she was managing European, National and industrial research projects, supervising PhD students and collaborating in congresses as scientific committee. Her main interests are electrochemical biosensor, point-of-care technologies, implantable-sensors and organ-on-a-chip for biomedical applications.

Publication of speakers:

- Mattson, M.P., 2004. Pathways towards and away from Alzheimer's disease, *Nature*, 430, 631-640.
- Viola, K. L., Klein, W. L., 2015. Amyloid beta oligomers in Alzheimer's disease pathogenesis, treatment and diagnosis. *Acta Neuropathologica*, 129, 183-206
- Engelhardt, B., Sorokin, L., 2009, The blood-brain and the blood-cerebrospinal fluid barriers: function and dysfunction, *Semin Immunopathol.*, 31, 497-511.

Webinar on the Diagnostic of COVID-19 using Biosensors; June 20, 2020; London, UK

Citation: Mònica Mir; Sensor integration in a brain blood barrier on a chip; Diagnostic of COVID-19 using Biosensors 2020; June 20, 2020; London, UK.