Susanna Narkilahti

Susanna Narkilahti received Master degree in biochemistry from University of Oulu in 2000 and PhD in Neurobiology from University of Kuopio in 2005 and Adjunct Professor status in Stem cells and Tissue Engineering from University of Tampere in 2010. She initiated the NeuroGroup in 2006 and has thereafter been group leader. SN has extensive and internationally acknowledged knowhow in neurologic field including epilepsy research and pluripotent stem cell applications. She has participated several national and international projects and currently is leader of Academy of Finland Modular platform for epilepsy modeling in vitro (MEMO) consortium project and PI in Academy of Finland, Centre of Excellence in Body-On-Chip Research. In Faculty of Medicine and Health Technology, she is a leader of two core facilities; BMT Imaging Core and BMT Electrophysiology Core. The research of SN has focused on human pluripotent stem cells and in vitro modeling and her main interest/activities are: production and characterization of human pluripotent stem cell derived neural cells, controlled/guided 2D and 3D cultures, disease modeling, in vitro modeling, functionality of neuronal networks in vitro, and data analysis.

Title: Microfluidics chip platforms for modeling brain functions

Susanna Narkilahti, Adj. Prof, NeuroGroup, Faculty of Medicine and Health Technology, Tampere University, https://biomeditech.fi/research/neuro-group/

Traditional 2D cell culturing conditions often fail to offer cells in vivo mimicking environment. Controlled 2D cultures utilizing enabling engineering techniques such as microfluidics can provide tools to create more reductionist models than traditional 2D cultures. Integration of additional sensors to monitor cell type behavior, such as microelectrode arrays (MEA) to study neuronal network functions, bring additional ways to gain more specific information about the cellular functions. Also, in addition of using patients derived human induced pluripotent cells for disease modeling, insults mimicking brain traumas, such as hypoxia induced damage can be integrated to the platforms.

Here, the development of human pluripotent stem cells based neuronal models in chips in our laboratory are presented. The establishment and functionality of different types of chip set-ups, initial models of trauma, and models mimicking nerve innervation are presented.