Monday, February 21
12:30 PM – 2:00 PM
Esplanade, Room 158
Nanion Technologies

20 years At the Heart and Mind of Automated Electrophysiology
For 20 years, Nanion Technologies provides diverse solutions for electrophysiologists worldwide. We aim to successfully implement innovative technologies in the fields of ion channel automated patch clamp (APC) electrophysiology, monitoring of cell viability and contraction, as well as electrogenic transporters, with various throughput capabilities. This year, our symposium will start with an introduction by Dr. Andrea Brueggemann (CSO, Nanion) who will guide you through the overall capabilities of Nanion´s portfolio. Following this, we will welcome our speakers, whose work focuses on neural and cardiac physiology and pathophysiology.

Dr. Elena Govorunova will introduce the application of high throughput APC systems for research in channelrhodopsins (ChRs) used for activity modulation of neurons and cardiomyocytes with light (optogenetics). ChRs exhibit light-gated channel conductance, thereby enabling stimulation and inhibition of neuronal activity due to de- and hyperpolarization of the membrane, respectively. However, electrophysiological characterization of new ChRs lags behind because it is mostly done by time-consuming manual patch clamp. Here, Dr. Govorunova will show how the use of the SyncroPatch 384 benefits this program.

Fitzwilliam Seibertz will focus on atrial fibrillation (AF) as the most commonly reported cardiac arrhythmia. Current AF therapeutics lack efficacy, and mechanistic models to examine ion channel remodeling in AF are limited by a lack of atrial specificity in expression systems or low throughput methodologies. Seibertz will highlight APC technology as a key method to increase throughput in ion channel research, and possibly a crucial tool for mechanistic dissection of complex AF-induced ionic remodeling events. His data will show the capabilities of SyncroPatch 384 in characterizing atrial electrophysiology in a novel atrial-specific human induced pluripotent stem cell-derived cardiomyocyte (hiPSC-CMs) construct, and in atrial cardiomyocytes directly isolated from native myocardium**.**

Benefits of a physiological cell culture assay with stimulating effect on hiPSC-CM maturation will be the focus of Dr. Bettina Lickiss. To assess preclinical cardiac risk quickly and with high human relevance, the 96-well FLEXcyte technology is employed, containing flexible membranes that serve as a native-like environment for the cells. Gene expression, phenotype and functional properties were analyzed as well as the effect of long-term cultures. Dr. Lickiss will compare differences to hiPSC-CMs cultured on regular plates highlighting the pro-maturation effect of the technology for evaluating human relevant inotropic effects beyond the current perspective of preclinical cardiac risk assessment.

Lysosomal, mitochondrial and other internal membranes are moving into focus of transport protein research. However, the localization of these proteins complicates or permits the application of established electrophysiological methods. Dr. Maria Barthmes will introduce an electrophysiological approach based on solid-supported membrane technology (SURFE^{2}R N1) to address cardiac and neuronal transport proteins in intracellular membranes. Applying this approach in a pilot study, functional current recordings of TMEM175 expressed in lysosomes were generated. Furthermore, mitochondrial inner membranes were isolated from cardiac tissue and several exchangers and proton transporting complexes were successfully investigated using the SSM-based electrophysiology.

Speakers
Maria Barthmes, Senior Scientist, Nanion Technologies
Andrea Brueggemann, CSO, Nanion Technologies
Elena Govorunova, Associate Professor, Center for Membrane Biology, Department of Biochemistry & Molecular Biology, The University of Texas Health Science Center at Houston McGovern Medical School - Houston
Bettina Lickiss, innoVitro GmbH, Juelich
Fitzwilliam Seibertz, Scientist, University of Göttingen