Introductory Remarks to Symposium 30

Alternatives to living animal models

Kathrin Wicke and Akshay Kapadia, Hannover and Bonn

The concept of replacement of animals in research was first discussed in 1957 by Charles Hume and William Russell at the Universities Federation for animal welfares (Balls, M., 1994). A strategy of 3Rs is being applied which stands for reduction, refinement and replacement of laboratory use of animals (Ranganatha, N. and Kuppast, I., 2012). *In vitro* 2D and 3D cell culture models, theoretical computational techniques, as well as artificial tissue engineering techniques (Balls, M., 2002); are proposed to reduce/refine/replace the animal experimentation. In this regard, this symposium aims to touch upon four different aspects of using alternative methods in the field of neuroscience research.

Dr. Berg will present different human neural cell systems generated via transcription factor overexpression from somatic cells or induced pluripotent stem cells, that are suitable for disease modeling. Ms. Catarina Costa will touch upon the subject of using induced pluripotent stem cells and therefrom generated organoids to uncover the mechanisms of agenesis in the corpus callosum and neuronal defects. Dr. Chansoria will present their pilot data which demonstrates striking similarities within the micro-architecture of acellular grafts and fascicular arrangement of axons within the nerves, wherein the hydrogel grafts feature longitudinal microfilaments along fascicles. Their innovative technology represents a significant advance towards reducing the cost and increasing the effectiveness of nerve grafts for peripheral nerve injury repair. Dr. Zierenberg will discuss the use of computer model systems and theoretical understanding of occurrences, development and circumventing pathological bursts in neuronal cultures. They aim to direct succeeding phases to evade such pathological behaviour in neuronal cultures. Dr. Yiu will talk about their model that offers a mechanistic explanation of theta sequences which combines extrinsic and intrinsic origins, providing insights into the role of internal hippocampal connectivity in spatial representation.

Combination and integration of these approaches offer multiple avenues to tackle a neuroscientific research question in a holistic manner.

Symposium 30, Friday, March 24, 13:00 - 15:00

Symposium 30

Friday, March 24, 2023
13:00 - 15:00, Lecture Hall 9

Chairs: Kathrin Wicke and Akshay Kapadia, Hannover and Bonn

13:00 **Opening Remarks**

13:05 Lea Berg, Bonn
FROM ANIMAL STUDIES TO *IN VITRO* MODELS: PROSPECTS OF DIRECTLY CONVERTED AND FORWARD PROGRAMMED HUMAN NEURAL CELL TYPES (S30-1)

13:20 Catarina Martins Costa, Vienna, Austria
ARID1B MUTATIONS IMPAIR THE MATURATION OF PROJECTION NEURONS AND BRAIN WIRING (S30-2)

13:35 Parth Chansoria, Zurich, Switzerland
FILAMENTED LIGHT (FLIGHT) PROJECTION FOR THE RAPID FABRICATION OF NERVE GRAFTS (S30-3)

13:50 **Break**

14:00 Johannes Zierenberg, Goettingen
USING COMPUTER MODELS TO UNDERSTAND PATHOLOGICAL BURSTS IN NEURONAL CULTURES (S30-4)

14:15 Yuk Hoi Yiu, Freiburg
A NETWORK MODEL FOR TWO-DIMENSIONAL HIPPOCAMPAL THETA SEQUENCES OF EXTRINSIC AND INTRINSIC NATURES (S30-5)

14:30 **Panel Discussion**

14:55 **Concluding Remarks**

Symposia