Introductory Remarks to Symposium 9

Resolving the cognitive function of prefrontal circuits: from neurons to behavior

Ileana L. Hanganu-Opatz and Ilka Diester, Hamburg and Freiburg

The prefrontal cortex is a complex structure that plays diverse roles in cognition and is disrupted in multiple diseases. Despite decades of research, we have no formal model of how its circuits predict its multifaceted role in behavior and disease. This symposium will present recent research using a range of modern physiological, behavioral, and histological techniques to advance new perspectives on the intersection between structure, function, and development of prefrontal networks.
One guiding scheme of the symposium is the major quest in both rodent and primate research to reveal how the prefrontal cortex enables complex behavior, and how dysfunction of this brain area contributes to mental disorders. We will discuss current approaches to define the structure and function of the adult mouse prefrontal cortex as well as efforts undertaken with the goal to shed light on how the rodent prefrontal cortex relates to the primate prefrontal cortex (Carlen). In particular, we will present new ways of framing the connectivity and cytoarchitecture of the rodent prefrontal cortex and characterize homologies between rodents and primates (Heilbronner). A second focus of this symposium lies on functional interactions between prefrontal cortex and other brain areas. In this framework, we will describe how neuronal activity within prefrontal-basal ganglia circuits maps onto different stages of goal directed behavior (Womelsdorf). Moreover, we will dissect the thalamo-prefrontal interactions during working memory in mice and assess the relevance of their dysfunction for mental illness (Kellendonk). Together, these interactive presentations will bring together researchers using cutting-edge tools to discuss segregation and overlap of functional circuits with the goal of integrating across fields to develop new models of rodent PFC structure and function.

The symposium is supported by the DFG Priority Program SPP 1665 “Resolving and manipulating neuronal networks in the mammalian brain”.

Symposium 9

Thursday, March 21, 2019
11:30 - 13:30, Lecture Hall 10

Chairs: Ileana L. Hanganu-Opatz and Ilka Diester, Hamburg and Freiburg

11:30 Marie Carlen, Stockholm, Sweden
QUANTITATIVE WHOLE BRAIN MAPPING OF THE MONOSYNAPTIC INPUT TO FOUR DIFFERENT CELL TYPES IN THE MOUSE MEDIAL PREFRONTAL CORTEX (S9-1)

11:55 Christoph Kellendonk, New York, USA
THALAMO-PREFRONTAL INTERACTIONS IN WORKING MEMORY (S9-2)

12:20 Sara Rachel Heilbronner, Minneapolis, USA
CONNECTIVITY REVEALS PREFRONTAL CORTICAL CIRCUIT HOMOLOGIES BETWEEN RODENTS AND PRIMATES (S9-3)

12:45 Thilo Womelsdorf, Nashville, USA
PREFRONTAL CORTEX CIRCUITS AS A HUB FOR FLEXIBLE LEARNING AND ATTENTIONAL FILTERING OF GOAL-IRRELEVANT INFORMATION (S9-4)

13:10 Mattia Chini, Hamburg
MICROGLIA INHIBITION RESCUES DEVELOPMENTAL HYPOFRONTALITY IN A MOUSE MODEL OF COGNITIVE IMPAIRMENT (S9-5)

13:20 Abhilash Dwarakanath, Tübingen
LOW FREQUENCY OSCILLATORY BURSTS IN THE MACAQUE PREFRONTAL CORTEX PREDICT SPONTANEOUS TRANSITIONS IN THE CONTENT OF CONSCIOUSNESS (S9-6)