



Introductory Remarks to Symposium 3

Molecular mechanisms of cargo and organelle transport in neurons

Marina Mikhaylova and Wolfgang Wagner, Hamburg

Neurons are characterized by a complex, highly polarized and dynamic cellular architecture that underlies their function. Efforts to understand how this architecture is established and maintained and how dynamic changes at synapses are achieved revealed crucial roles for cytoskeletal motor proteins. These motor proteins fall into three families, the microtubule-based kinesins and dynein, and the actin-based myosins. All three types of motors are molecular machines that hydrolyze ATP to generate movement and force. Thereby they power active transport of cellular building blocks along cytoskeletal tracks and they impact cytoskeletal organization. In neurons, these motors are implicated for example in the trafficking of pre- and postsynaptic proteins and organelles, and in polarity development. Importantly, defects in neuronal cargo transport appear to be a common feature of several human neurodegenerative and psychiatric diseases.

This symposium aims to shed light on the 'traffic rules' in neurons that ensure controlled cargo delivery at the right time and at the right place. Through our speakers that approach kinesin, dynein and myosin function from different experimental angles, the symposium will provide novel insight into the manifold roles of this cytoskeletal machinery in neurons. Transport along axons which often reach extreme lengths poses a particular challenge for cytoskeletal motors. In this symposium, Giampietro Schiavo will present exciting new findings on how proper transport of extracellular matrix components is achieved in axons. Another important question concerns the impact of cytoskeletal motors on synapse function and whether they may promote synaptic plasticity. In this respect, Wolfgang Wagner will report on how unconventional myosins regulate postsynaptic structure and function. Furthermore, an important issue is whether neuronal activity has an influence on motor-driven cargo transport. Marina Mikhaylova will shed light on this topic and report how synaptic activity controls secretory organelle transport and positioning in dendrites. Tight control of cytoskeletal motors in time and space is crucial for their function. Martin Harterink will present how manipulation of this tight control with light leads to new insights into polarized cargo delivery in neurons *in vivo*.

In summary, this symposium will cover diverse aspects concerning the mechanisms of cytoskeletal motor-based transport in neurons, thereby demonstrating how new methodologies are pivotal to advance the field.

Symposium 3

Wednesday, March 22, 2017
14:30 – 16:30, Lecture Hall 104

Chairs: Marina Mikhaylova and Wolfgang Wagner,
Hamburg

- 14:30 **Opening Remarks**
- 14:40 Giampietro Schiavo, London, UK
REGULATION OF AXONAL TRAFFICKING OF
SIGNALING ENDOSOMES
(S3-1)
- 15:00 Wolfgang Wagner, Hamburg
UNCONVENTIONAL MYOSINS AS REGULA-
TORS OF SYNAPTIC FUNCTION AND DEVE-
LOPMENT (S3-2)
- 15:20 Marina Mikhaylova, Hamburg
SYNAPTIC CONTROL OF DENDRITIC
SECRETORY ORGANELLE TRANSPORT AND
POSITIONING (S3-3)
- 15:40 Martin Harterink, Utrecht, The Netherlands
LIGHT INDUCED TRANSPORT TO STUDY
NEURONAL POLARITY IN VIVO (S3-4)
- 16:00 Sindhuja Gowrisankaran, Göttingen
ENDOPHILIN-A STIMULATES PRIMING OF
SECRETORY VESICLES (S3-5)
- 16:10 Jennifer Stefani, Frankfurt/Main
THE ADP-SENSITIVE P2Y₁₃ RECEPTOR
ATTENUATES PROGENITOR CELL PROLIFERA-
TION, NEW NEURON FORMATION, AND NEU-
RONAL ACTIVITY IN THE DENTATE GYRUS OF
ADULT MICE (S3-6)
- 16:20 **Concluding Remarks**