

Introductory Remarks to Symposium 31

The tripartite synapse in health and disease

Gabor Petzold and Christine Rose, Bonn and Düsseldorf

Astrocytes are important safeguards of neuronal health. They support synaptic function and plasticity, provide energy substrates and contribute to the regulation of cerebral blood flow. How astrocytes mediate these complex functions remains incompletely understood. Moreover, the contribution of astrocytes to the pathogenesis of brain disease is still elusive. This symposium summarizes our current understanding and discusses novel findings on the role of astrocytes under physiological conditions and in neurological disease. It is supported by the DFG-Priority Programme SPP 1757 "Glial Heterogeneity" and the DFG-Research Unit "Synapses under stress" (FOR 2795).

Christian Henneberger (University of Bonn) will present recent findings regarding rapid restructuring of perisynaptic astroglial processes and their functional relevance for synaptic transmission. Niklas Gerkau (HHU Düsseldorf) will highlight the role of sodium, illustrating that an increase in astrocyte sodium reduces their capacity for clearance of extracellular glutamate and potassium. Moreover, he will describe cellular sodium loading in the ischemic penumbra in vivo. Such sodium increases result in cellular import of calcium through reverse NCX and may thus be a primary trigger for the generation of ischemic damage. Verena Untiet (University of Copenhagen) will discuss recent advances in understanding astroglial chloride regulation and alterations thereof in health and disease. Chloride concentrations in astrocytes determine the driving force for GABA and glycine uptake, GABA and glycine mediated chloride currents, regulate regulatory volume changes, and modify extracellular potassium buffering. Therefore, intracellular chloride is crucial for astroglial to neuronal signaling. Finally, Gabor Petzold (DZNE Bonn) will discuss how astrocytic calcium dynamics contribute to the pathogenesis of acute or chronic neurodegeneration. Specifically, he will highlight recent findings on the role of astrocytes in pathological network alterations in Alzheimer's disease and stroke, and how modulation of astroglial pathways may help alleviate disease progression.

Overall, this symposium will give an overview of our current knowledge and an outlook on future research directions about the contribution of astrocytes to synaptic plasticity and neuron-glia metabolic coupling under physiological conditions, as well as how these changes contribute to cell damage or neuroprotection in neurological diseases.

Symposium 31

Saturday, March 23, 2019
8:30 - 10:30, Lecture Hall XX

Chairs: Gabor Petzold and Christine Rose,
Bonn and Düsseldorf

08:30 Opening Remarks

- 08:40 Christian Henneberger, Bonn
PERISYNAPTIC ASTROCYTE STRUCTURE DYNAMICALLY SHAPES HIPPOCAMPAL GLUTAMATE SIGNALLING (S31-1)
- 09:00 Niklas J. Gerkau, Düsseldorf
SODIUM LOADING IN METABOLICALLY COMPROMISED CORTEX (S31-2)
- 09:20 Verena Untiet, Copenhagen, Denmark
ASTROGLIAL CHLORIDE-HOMEOSTASIS IN HEALTH AND DISEASE (S31-3)
- 09:40 Gabor Petzold, Bonn
ROLE OF ASTROGLIAL CALCIUM CHANGES IN ALZHEIMER'S DISEASE AND STROKE (S31-4)
- 10:00 Zhou Wu, Bonn
UNRAVELLING POTENTIAL MECHANISMS CAUSING ASTROCYTIC DEATH DURING EARLY EPILEPTOGENESIS (S31-5)
- 10:10 Mico Bozic, Ljubljana, Slovenia
ASTROGLIAL MHC CLASS II MOLECULES ARE ASSOCIATED WITH FUSION OF LARGER VESICLES (S31-6)
- 10:20 **Concluding Remarks**

