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Heterogeneity of neuron-NG2 glia synapses matches glial response to regionally diverse neuronal firing behavior.

Speaker:

Professor Dr. Dirk Dietrich
Rheinische Friedrich-Wilhelms-Universität Bonn
Klinik und Poliklinik für Neurochirurgie
Labor Experimentelle Neurophysiologie

Professorin Dr. Susanne Schoch McGovern
Rheinische Friedrich-Wilhelms-Universität Bonn
Medizinische Fakultät
Institut für Neuropathologie

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Project description:

For proper function the brain needs isolation material around nerve fibres called myelin. This myelin is produced by oligodendroglial cells during development. We now know that myelin can also be generated in adult brains in response to training and that myelin is regenerated after demyelinating lesions. Furthermore, recent evidence indicates that the generation of myelin is dependent on the activity of neurons. The finding that neuronal activity also releases transmitter onto oligodendroglial cells has stimulated the idea that neurons not only use synaptic transmitter release to transmit their pattern of activity to other neurons but also to oligodendroglial cells. However, it has remained obscure how neurons may be able to simultaneously signal to both, other neurons and glial cells although they posses only one output compartment, one axon. We propose that neurons adjust their firing pattern to communicate with other neurons but that they specifically adjust their transmission properties to oligodendroglial cells in order alter signalling to glial cells without the need of changing their firing pattern, a kind of ventriloquist function. We will use electrophysiology in brain slices, in vivo gene knockdown, three-dimensional electron microscopy and proteomics to address this question. Showing that modulation of transmission properties to glial cells controls myelination may be essential for future development of novel therapeutic approaches which could specifically target the release machinery to improve recovery in demyelinating diseases.

Quelle:
https://gepris.dfg.de/gepris/projekt/254853848?language=en