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Role of the Perisynaptic Extracellular Matrix in Synaptic Plasticity

Speaker:

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Perineuronal nets (PNN) are specializations of the adult brain extracellular matrix. They are rich in secreted glycoproteins, like Tenascin-R, and proteoglycans, like brevican or neurocan. Although PNN are formed around large neuronal somata and neurites, a major fraction of their constituents derive from glial cells. Functionally these net-like structures are discussed in the context of barrier-formation, but recent data point to an active role of PNN components in synaptic plasticity. We therefore propose (1) to investigate the conditions for PNN emergence in relation to the formation of excitatory and inhibitory synapses in dissociated primary cultures as a model system. Furthermore, (2) we want to search for (peri-) synaptic binding partners for brevican, which might act as PNN-anchoring points around synaptic contacts and (3) investigate the role of brevican cleavage by matrix metalloproteases for synaptic plasticity. Moreover (4), we propose a detailed phenotypical investigation of mouse lines deficient for brevican, neurocan or both proteoglycans with respect to changes in the plastic properties of the affected brains. Our mouse experiments will include anatomical studies of the hippocampus architecture, biochemical analysis of the composition of synaptic protein fractions, in vitro LTP measurements, EEG recordings and a detailed behavioral testing to elucidate the contribution of proteoglycan-containing PNN to adult neuronal plasticity.

Reference: https://gepris.dfg.de/gepris/projekt/5430244