Modulation of signal transmission in the hippocampus by GluR-type astroglial cells

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Project description:
Recent research has dramatically reshaped our knowledge of the contribution of glial cells to information processing in the CNS. Specifically, astrocytes have been shown to express almost the same large repertoire of different ion channels and transmitter receptors as neurons. Evidence from several groups now suggests that these channels and receptors enable astrocytes to sense and modulate neuronal activity, but the underlying mechanisms remain to be defined. In the hippocampus, we have unravelled a co-existence of distinct astroglial cell types, showing different morphological and functional properties. Among them, astrocytes of the GluR-type appear to receive direct synaptic input from neurons. The present project aims at characterizing in detail how these glial cells are activated by, and subsequently respond to, neurons to modulate signalling in the hippocampus. We have also shown that cells of the GluRtype share glial and neuronal properties ('astrons') and escape a classification into neurons, astrocytes or oligodendrocytes. Therefore, a second focus of this proposal is on the identification of the lineage relationship of the different types of cells with astroglial properties. We expect that the planned investigation will afford a better understanding of the crosstalk between neurons and glial cells in the hippocampus and, on a long term, will foster new concepts of brain information processing that consider the manifold, direct interactions between both cell types.