SPP 1172

Role of Müller Glial Cells in Synaptic Development and Functioning of the Mammalian Retina

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from 2004 to 2011

Project description:

The retina is an ideal model system for studies on (peri-) synaptic glia-neuron interactions since it possesses a clear-cut tissue structure, with the synapses being arranged in the two plexiform layers, and since it is dominated by only one type of macroglia, the Müller cells, which contact all neuronal compartments. Based on long-standing previous work in the field, the applicants want to study several questions in the present project, viz. (i) how are retinal perisynaptic glial sheaths organized at the ultrastructural level?, (ii) what types of functional/structural changes of the synapses and their glial sheaths occur in the mammalian retina during light/dark adaptation?, (iii) how is the activity of retinal synapses signalled to the perisynaptic glial elements?, and, (iv) how is retinal synaptic transmission modulated by (e. g., the release of neuroactive substances from) Müller cells? The main focus of the studies will be on the application of different vital dyes (including Ca2+ imaging and the 'activity-dependent' dye FM1-43) on intact isolated wholemount preparations of the retina, by using confocal microscopy. In addition, simultaneous electrophysiological recordings from retinal ganglion cells and Müller cells will be performed. The range of methods will be supplemented by morphological and morphometrical procedures (immunocytochemistry, electron microscopy, 3-D reconstruction); some studies will be performed on transgenic mice. The aim of the project is to elucidate (some of) the contributions of Müller glial cells to retinal information processing.

Reference: https://gepris.dfg.de/gepris/projekt/5430127