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INFORMATION

Hokkaido University confered the degree of Doctor of Philosophy (Ph. D) in Veterinary Medicine on December 24, 1999 to 1 recipient and March 24, 2000 to 13 recipients.

The titles of their theses and other information are as follows :

Morphological study on subcellular localization of synaptic transmission-related molecules in cerebellar Purkinje cells

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Cerebellar Purkinje cells (PCs) receive glutamatergic and / or aspartatergic inputs from parallel fiber (PF) and climbing fiber (CF). Neuronal activities through these excitatory synapses induce long term depression (LTD), a form of synaptic plasticity, which is thought to underlie locomotive learning. The type 1 metabotropic glutamate receptor (mGluR 1) is abundant in PCs, and is involved in LTD induction and CF synapse development. mGluR 1 is known to be coupled to Gq subclass of GTP binding proteins, which activate second messenger system. On the other hand, EAAT 4 is a PC-specific glutamate transporter which is thought to regulate PC synapse transmission via its function as rapid glutamate/aspartate removal from synaptic cleft. Despite peri-junctional localization of mGluR 1 as well as junctional localization of ionotropic glutamate receptor in PCs, subcellular and synaptic localization of Gq protein and EAAT 4 remains unknown.

In this study using mouse cerebellar sections, I showed that Gq protein α subunits Gαq / Gα11 were expressed and detected on the cell surface of somato-dendritic domain of PCs. In particular, high immunogold labeling was found on the extra-junctional membrane of PF and CF synapses. By contrast, the junctional membrane of PC synapses were avoid of immunolabeling. EAAT 4 was also detected on the cell surfece of somato-dendritic domain, particularly on dendritic domain. Immunoelectron microscopy showed that EAAT 4 was localized preferentially on the extra-junctional membrane at PF and CF synapses. Therefore, it is suggested that the signal from mGluR 1 is mediated through Gαq / Gα11 on extra-junctional cell surface to second messenger system, and that EAAT 4 uptakes excitatory amino acids at extra-synaptic sites. The present results have eventually highlighted the importance of extra-junctional domain of neuronal dendrites, in terms of intracellular signal transduction and transporter function.

Original papers of this thesis appeared in "NeuroReport", Vol. 8, 2461-2464 (1997),"Europian Journal of Neuroscience", Vol. 12, 781-792 (2000).