

Modulation of hippocampal glutamatergic neurons by zinc

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The hippocampus plays an important role in learning, memory and recognition of novelty. The neural circuits of the input and output in the hippocampus are glutamatergic and terminals of them are stained by Timm's sulfide-silver method, which detects histochemically reactive zinc in the presynaptic vesicles. The zinc is released with glutamate from neuron terminals. Zinc is an endogenous neuromodulator. However, the physiological significance of zinc in synaptic plasticity is poorly understood. We have reported that zinc serves as a negative-feedback factor against glutamate release and negatively modulates postsynaptic calcium mobilization. On the other hand, the hippocampus is vulnerable to glutamate excitotoxicity, a final common pathway for numerous pathological processes such as Alzheimer's disease and amyotrophic lateral sclerosis, in addition to stroke/ischemia, temporal lobe epilepsy. The excitotoxicity is linked to the excessive influx of calcium and /or zinc. The crosstalk between zinc and calcium via calcium channels seems to play a role in both synaptic plasticity and excitotoxicity. In the symposium, the involvement of zinc in functional and toxic aspects in the hippocampus is summarized focused on the crosstalk.