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New serotonergic pathways regulating neuronal morphology and synaptic plasticity

Prof. Dr. Evgeni Ponimaskin
Dept. of Cellular Neurophysiology
Medical School Hannover
Germany

ABSTRACT OF THE TALK

Serotonin (5-hydroxytryptamine or 5-HT) is an important neurotransmitter involved in a wide range of central and peripheral physiological functions. A number of different G-protein coupled 5-HT receptors are known to sensitively modify different neuronal networks by their specific action on synaptic transmission and postsynaptic excitability.

Recently we have shown that the 5-HT4 receptor is coupled not only to the heterotrimeric Gs, but also to G13 protein. Activation of this signaling pathway results in RhoA-mediated modulation of gene transcription and in reorganization of the actin cytoskeleton. We also demonstrated that serotonin receptor 5-HT7 can activate heterotrimeric G12 protein, leading to the selective activation of small GTPases RhoA and Cdc42. Analysis performed in hippocampal neurons demonstrated that 5-HT4/G13 and 5-HT7/G12 signalling pathways modulate dendritic branching and synaptogenesis, resulting in modulation of synaptic plasticity. These data suggest that serotonin plays a prominent role in regulating the neuronal cyto-architecture in addition to its classical role as neurotransmitter.