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Brain Derived Neurotrophic Factor (BDNF) is a Key Mediator of Learning Plasticity

Brain Derived Neurotrophic Factor (BDNF) is a Key Mediator of Learning Plasticity

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Abstract

The neurotrophins (NTs) are growth factors that play a critical role in the development, maintenance, survival, and death of the nervous system. BDNF is one of the neurotrophin family and plays a pivotal function in synaptic and learning plasticity. BDNF activates two different receptors, the Trk family of receptor tyrosine kinases and p75NTR, a member of the TNF receptor superfamily. These two receptors have a very unique function, Trk has a survivaldependent signaling through Ras-ERK, PI-3 kinases and PLC-γ, and p75NTR has a dual function: as a survival via activation of NF-κappaB and promoting apoptosis through activation of JNK, ceramide and some death adaptor proteins. BDNF can modulate hippocampal LTP through TrkB, LTP is a neurophysiologic model for learning process. BDNF can enhance acquisition of information, storage, consolidation and also recall memories. TrkB receptor can also regulate synaptic strength and plasticity. Several of apoptotic pathways from p75NTR can be suppressed by TrkB receptor-mediating signaling and p75NTR can modify ligand-binding specificity and affinity to TrkR with important development consequences.

Keyword : neurotrophin, growth, factors, nervous, system, synaptic, function, learning, plasticity, Trk, receptors,

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1. Alonso M, Medina JH, Pozzo-Miller L, (2004). ERK activation is necessary for BDNF to increase dendritic spine density in hippocampal CA1 pyramidal neurons - : Learning and Memory