

THE DEVELOPMENT AND SURVIVAL OF THE NERVOUS SYSTEM - A LONG BATTLE FOR TROPHIC FACTORS

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During development of the nervous system, the neurotrophic factors play an essential role in selecting neurons which build up networks and in preventing neuronal apoptosis. During whole ontogeny, the neurotrophic factors are permanently involved in the neural plasticity of the adult brain. By knocking-out different components of the neurotrophic system in mice it has been shown that trophic factors regulate early neuronal differentiation and maturation, neuronal survival and synapse function. Moreover, experimental studies demonstrated that the neurotrophines are important in spinal cord and dorsal root injury repair as well. Nevertheless, the peripheral nervous system is dependent of neurotrophic factors, which modulate its capacity of self-regeneration. Even skin, which encompasses various neuronal afferents, appear to be a neurotrophic organ, since it is providing trophicity for nerve endings and cutaneous receptors. In addition, many experimental studies demonstrated that treatment with trophic factors could rescue nervous cells from different deleterious stimuli. Stroke, as an acute form of cerebrovascular disease, and brain trauma are characterized by a rapid loss of brain tissue which results in neurological disability and no significant neuroprotective drug treatment is available yet for these severe conditions. This review focuses on mechanisms of signaling by different types of neurotrophines, on changes in gene expression in both acute and subacute phases of stroke, brain trauma and neurodegenerative diseases, and on the therapeutic potential of growth factors and growth factor-like peptides.