

Brain-derived Neurotrophic Factor (BDNF)

A new marker to estimate stress effects
on neuronal plasticity

Clinical background

Brain-derived Neurotrophic Factor (BDNF) as a growth factor is part to the family of neurotrophins. It is a central mediator of stress effects to the neuronal plasticity and links stress and affective disorders as well as somatic diseases. The neurotrophic functions of BDNF influence the survival of neurons und thereby important functions as learning, memory, appetite and sleep.

Biologic functions of BDNF

BDNF is produced mainly by central nervous system, especially by the hippocampus. Its production is likely to be stimulated by cortisol. BDNF inhibits apoptosis (cell death) of neurons. It activates an intracellular signal cascade by binding to TrkB-tyrosinase-receptors. This leads to the activation of survival signals on the one hand, on the other hand, pro-apoptotic signals are reduced. Thereby, BDNF promotes the survival of neurons and the neuronal plasticity in the adult central nervous system. Its biologic function is synergistic to serotonin, since both substances trigger similar transcription factors via the serotonin signal cascade. The BDNF gene-polymorphism is characterized by the expression of a premature BDNF variant that is less active and is attended by augmented fears, depression and suicide.

BDNF also influences peripheral organs and is produced e. g. by muscle cells, cells of the immune system and thrombocytes. In cases of atopic dermatitis BDNF has been found to be bound to eosinophil granulocytes in the skin, promoting their accumulations and stimulating the release of cytotoxic mediators. Furthermore, BDNF is likely to play a role in the perception of the pruritus by interaction with sensoric nerve fibers. BDNF passes the blood-brain-barrier so that levels in the periphery also mirrors the central concentration. A reduction of the hippocampus causes reduced BDNF serum concentrations.

Influence of stress on the BDNF concentration

Several studies could show that stress and depressive periods are linked to reduced serum concentrations of BDNF. Furthermore, BDNF serum concentrations increase in patients that went through a therapy. Therefore, the therapeutic result can be estimated by the determination of BDNF.

Indications for the determination of BDNF:

- Chronic stress, burnout, sleep disorder, fatigue syndrome
- Suspected depression
- Control and monitoring of antidepressant therapy
- Neurodegenerative diseases
- Atopic dermatitis: Confirmation of the status of the disease (especially of the pruritus) and monitoring of the therapeutic success

Interpretation

Stimulation factors to BDNF are caloric restriction, physical workout and sport, sufficient recreative sleep, stress reduction, therapy with antidepressants, serotonin precursors, and micronutrients, as well as an administration of omega-3-fatty acids, zinc, and vitamin E.

Chronic stress, insomnia, excessive physical training, advanced age, hormonal disorders (e.g. estradiol deficit) as well as numerous psychic and neurodegenerative diseases reduce the serum concentration of BDNF.

Although BDNF serum concentrations found in men and women do not differ in general, there is a dependency to the hormonal status. Other studies show a diurnal rhythm as well a seasonal variation in the serum concentration of BDNF.

Preanalytic

Serum should be sampled in the morning and should arrive in the laboratory the same day. If this is not possible, please send in frozen serum.

Notes for preanalytic and price	
Specimen	1 ml serum
Transport	Standard within 24 hours, otherwise frozen serum
Method	ELISA
Price	EUR 32.18

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References:

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