





NEW MULTI-MODAL THERAPIES FOR NEUROLOGICAL DISORDERS



The **Sonic Hedgehog (Shh)** signalling pathway regulates the development of organs including the organization of the brain. For example, the Shh activates the **Gli complex**, which is responsible for the expression of developmental genes underpinning neurorecovery and leading to an amplification of natural recovery.

Cerebrolysin activates the Shh pathway¹

Cerebrolysin has a promoting effect on neurogenesis and oligodendrogenesis via stimulating the expression of the Shh signalling pathway. Cerebrolysin increases mRNA modulation of Shh and its receptors 'Patched' (Ptch) and 'Smoothened' (Smo).



Studies confirm the important role of the sonic hedgehog pathway in **post-stroke brain repair and functional recovery**, and suggests the Shh pathway to be a possible target for prolongation of the therapeutic window after stroke.²

MAINTENANCE AND RECOVERY OF THE NEURONAL NETWORK

Neurotrophic factors (NTFs) are signaling molecules that **maintain**, **protect**, **and restore the neuronal network** and ensure proper functioning of the brain. An important role of NTFs are in the survival and regeneration of the neuronal network upon stroke, traumatic brain injury or in chronic diseases is well-documented.

Cerebrolysin mimics activities of NTFs³

Cerebrolysin is a neuropeptide preparation that acts like neurotrophic factors. Several fragments of NTFs have been identified in Cerebrolysin by immunoassay (ELISA) which are capable of stimulating neurotrophic signaling pathways.

CNTF Ciliary Neurotrophic Factor GDNF Glial Cell Line Derived Neurotrophic Factor IGF1 Insulin-like Growth Factor 1 IGF2 Insulin-like Growth Factor 2



Cerebrolysin modulates NTFs⁴

Cerebrolysin shows BDNF-like activity by stimulation of the PI3K/Akt pathway, which plays an important role in cell growth, proliferation, differentiation and migration.







Cerebrolysin is a multi-modal neuropeptide drug which improves the brain's ability for self-repair by stimulating neurorecovery

A MULTI-MODAL DRUG FOR ACUTE AND POST-ACUTE NEUROLOGICAL DISORDERS



Watch MoA video on www.cerebrolysin.com



1 ZHANG, li, et al. Sonic hedgehog signaling pathway mediates cerebrolysin-improved neurological function after stroke. Stroke, 2013, 44. Jg., nr. 7, S. 1965 – 1972. 2 JIN, Yongming, et al. Poststroke sonic hedgehog agonist treatment improves functional recovery by enhancing neurogenesis and angiogenesis. Stroke, 2017, 48. Jg., nr. 6, S. 1636 – 1645. 3 CHEN, Honghui, et al. Trophic factors counteract elevated FGF-2-induced inhibition of adult neurogenesis. Neurobiology of aging, 2007, 28. Jg., nr. 8, S. 1148 – 1162. 4 ZHANG, Chunling, et al. Cerebrolysin enhances neurogenesis in the ischemic brain and improves functional outcome after stroke. Journal of neuroscience research, 2010, 88. Jg., nr. 15, S. 3275 – 3281.

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ABBREVIATED PRESCRIBING INFORMATION: Name of the medicinal product: Cerebrolysin - Solution for injection. Qualitative and quantitative composition: One ml con-tains 215.2 mg of Cerebrolysin concentrate in aqueous solution. List of excipients: Sodium hydroxide and water for injection. Therapeutic indications: For treatment of cerebrovascular disorders. Especially in the following indications: Senile dementia of Alzheimer's type. Vascular dementia. Stroke. Craniocerebral trauma (commotio and contusio). Contraindications: Hypersensitivity to one of the components of the drug, epilepsy, severe renal impairment. Marketing Authorisation Holder: EVER Neuro Pharma GmbH, A-4866 Unterach. Only available on prescription and in pharmacies. More information about pharmaceutical form, posology and method of administ-ration, special warnings and precautions for use, interaction with other medicinal products and other forms of interaction, fertility, pregnancy and lactation, effects on ability to drive and use machines, undesirable effects, overdose, pharmacodynamics properties, pharmacokinetic properties, preclinical safety data, incompatibilities, shelf life, special precautions for storage, nature and contents of the container and special precautions for disposal is available in the summary of product characteristics. (Reference SPC – CCDS Version 2.0/03.06.2016)

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