

The Effects of Repeated Administration of the Micellar Complex of Methylprednisolone on the Locomotor Activity of a Terrestrial Snails

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We studied the effects of repeated injections of methylprednisolone and its micellar complex with block-copolymer on locomotor activity of a terrestrial snail. It was shown that methylprednisolone solution injected into the hemolymph of the animal produced a direct effect on the muscle system of the animal as soon as 1 h after administration: it slowed down snail locomotion and reduced contractile activity of the foot muscles. The micellar complex of methylprednisolone with block-copolymer prevented this effect during the first 2 days of injection and negatively affected locomotion only in 2 days after injection, the decrease in locomotion in this case was not accompanied by a decrease in contractile activity of the foot muscle.

Key Words: *methylprednisolone; amphiphilic trifunctional block-copolymer; snail; locomotion; contractile activity of the muscles of the mollusk sole*

Methylprednisolone is a controversial drugs that provide high neuroprotective assistance in the treatment of various neurodegenerative conditions. The use of synthetic glucocorticosteroid methylprednisolone sodium succinate (MP) is a standard therapy after acute spinal cord injury in humans [3]. The possible mechanisms of its neuroprotective effect are inhibition of LPO and stabilization of processes triggered by disturbances in homeostasis of sodium, potassium, and calcium ions, impaired mitochondrial metabolism, pathological glutamate release leading to increased excitability of spinal cord neurons [5]. In addition to the neuroprotective effects, prednisolone and its analogues affect muscle cells. For instance, analogues of prednisolone, in particular α -MP, increase intracellular calcium concentration in myoblasts [11,13] and the number of myofibril precursor cells [8] in patients Duchenne muscular dystrophy.

However, MP have a number of side effects that can lead to pneumonia, sepsis, some other complications during its intravenous administration [6]. To solve this problem, various systems for local delivery of MP have been proposed during the last decade [2]. A promising system for local delivery of MP to nerve cells is its micellar complex with an amphiphilic trifunctional block-copolymer (TBS). TBS is a carboxylated product of the polymerization of ethylene oxide and propylene oxide with glycerin [7].

The effects of new pharmacological preparations were tested on terrestrial snail *Helix lucorum*. Locomotion is one of the important forms of behavior of gastropods. Moving in space, mollusks coordinate waves of muscle contractions that propagate along the sole of the foot via axons of central neurons and peripheral ganglia neurons [10]. Locomotor activity of gastropod mollusks allows assessing the state of smooth muscles of the sole of the foot and coordinated work of the nervous and muscular system of mollusks [10,14]. That is why locomotor activity of invertebrates is a unique model for studying the pharmacological effects of both transmitters and neurospecific

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