

## NEUROPLASTICITY AND PAIN

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In the last decades chronic pain evolved in a widespread health-care problem with a negative impact on mental health, professional and family life of the patients. It is not yet completely understood and consequently not enough specifically treated. Also, the known pain therapies have significant adverse events limiting patient's normal functioning. Neuroplasticity and pain are strongly connected: it has an important role in pathophysiology of chronic pain; the neuroplastic changes are recognized during pharmacological treatment of pain and in the last years new approaches in pain treatment using principles of neuroplasticity are emerging.

Amputation of a limb leads to reorganization of brain cortex in motor, but also in somatosensory areas; the result of these changes is phantom limb pain. During exercises using mental imaginary this process of cortical reorganization can be stopped and reversed resulting in significant reduction in intensity of constant pain and exacerbations. After peripheral nerve injury neuroplastic changes of primary afferent neurons and spinal dorsal horn neurons occur, leading to central sensitization and neuropathic pain. Studies have shown that long-term use of opioids induces plastic changes of neurons in spinal cord by activation of N-methyl-D-aspartate (NMDA) receptors. This activation can lead to potentially irreversible degenerative neuronal changes in the spinal cord and development of opioid tolerance. Chronic morphine exposure in patients with mi-

graine also leads to plastic changes of neurotransmitter receptors similar to changes occurring in inflammatory pain states which at the end results in medication overuse headache. Continuous or intense painful stimuli can lead to neuroplastic changes in the spinal cord and brain, resulting in central sensitization and pain. These processes underlie symptoms of fibromyalgia, low back pain, migraine, temporomandibular disorder and other headaches. Fibromyalgia is chronic condition characterized by musculoskeletal pains. In this condition are also depression, sleeping, immune system and metabolism disorders involved. That fibromyalgia represents central sensitivity syndrome proves the success of centrally acting drugs using in its treatment. The facts about neuroplastic changes that led to this condition are used in studies dealing with fibromyalgia treatment and results showed that holistic approach using mental and repetitive physical methods are of significant help for curing fibromyalgia. Physical methods using touches to the spine in order to stimulate the nervous system and to correct a tension and position of spine and limb muscles are of considerable success in treatment of musculoskeletal disorders as well in fibromyalgia. Future studies can reverse the "dark side" of neuroplasticity and discover its value in pain treatment.