

# Electro-stimulation

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Electrostimulation is a method of electrotherapy that makes use of low frequency pulses or sinusoidal currents for the purpose of excitation of a target organ in the human body. The target of electrostimulation is skeletal muscle, the movement of which is under conscious control by the brain. Smooth muscle and nerve tissue can also be targeted. <sup>[1]</sup>

We make use of various types of electrostimulation, depending on the given health problem. Electrostimulation improves perfusion, relaxes muscles, or conversely strengthens the muscle and its functionality. It provides relief from pain and inflammation. It is often beneficial for patients that have undergone musculoskeletal surgery.

The treatment of patients with electrostimulation is carried out with the use of special devices, called electrostimulators.

## Types of Electro-stimulation

We categorize electrostimulation as direct and indirect. Another special type of electrostimulation is cardio-stimulation, which is used in the field of cardiology.

### Direct electro-stimulation

The electrical impulse is directed towards the muscle belly to stimulate the striated skeletal muscle tissue directly.

### Indirect electro-stimulation

Stimulates motor nerve cells, which control the contraction of the respective muscles.

## Electro-stimulator

This is a device that is a source of impulses. These are electrical low-frequency generators that are routed through electrodes on the skin. While the active electrode has a smaller surface area, sometimes in the shape of a ball on the insulating holder, the passive electrode has a larger area. This results in a higher density of current in the area of application. <sup>[1]</sup>

The most modern electrical stimulators offer many possibilities. We can adjust the intensity of the electrical stimulation and thus affect the amount of current directed to the muscles. This means that professional athletes can use higher intensities and, on the contrary, people who engage in less physical activity can use less electrical stimulation of lower intensity.

## Applications

Electro-stimulation is a method of electrotherapy that uses various electrostimulation currents.

We can divide it into two basic methods: EMS (Electrical Muscle Stimulation) and TENS (Transcutaneous Electrical Nerve Stimulation).

### EMS (Electrical Muscle Stimulation)

EMS is a method of direct electrostimulation. The EMS method can be used in healthcare for a diverse range of rehabilitation following injuries of the musculoskeletal system. Furthermore, it can be used for muscle atrophy. Smooth muscle stimulation is used for intestinal peristalsis disorders or for disorders of the urinary tract sphincters and bladder wall. <sup>[1]</sup>

Other uses are mainly for shaping the figure and beautifying the face. Using the EMS method we can improve physical fitness and condition.

## TENS (Transcutaneous Electrical Nerve Stimulation)

TENS is a means of indirect electrostimulation. It allows for the alleviation or even complete suppression of painful stimuli. It achieves this by stimulating nervous tissue at multiple levels of the nervous system. Nerve stimulation releases endorphins that soothe pain and release stiffness.

This method helps patients with both acute and chronic pain. TENS can be used to treat the following conditions:<sup>[2]</sup>

- Back pain
- Joint pain
- Tendon pain
- Headaches
- Post-traumatic pain
- Pain after limb amputation

## History

Luigi Galvani (1791) found the first evidence of a connection between electrical impulse and muscle contraction (via a known attempt to stimulate a frog's motor nerves with an electric current). Throughout the 19<sup>th</sup> and 20<sup>th</sup> centuries, scientists analyzed the electrical properties that determine muscle movement. Long-term changes in muscle tissue caused by electrical stimulation have been reported. In the 1960s, the USSR began to use electrical stimulation in top athletes for better performance. <sup>[3]</sup>

However, as the EMS method was not fully scientifically explained, the results of studies in the field of sports were deemed controversial. Today, the mechanism of electrostimulation resulting in the adaptation of muscle and nerve cells is well explained.

## Odkazy

### Související články

- Účinky elektrického proudu a elektromagnetických polí na organismus
- Elektroléčba
- Kardiostimulace

### Reference

- 1.
- 2.
- 3.

### Použitá Literatura

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### Externí odkazy

- <http://www.elektrostimulace.eu/>
- <https://en.wikipedia.org/wiki/Electrotherapy>
- <http://www.electrotherapy.org>
- <https://www.lekari-online.cz/rehabilitace/zakroky/elektrolecba-elektrostimulace>

Kategorie:Biofyzika Kategorie:Katalog metod v biofyzice Kategorie:Kardiologie