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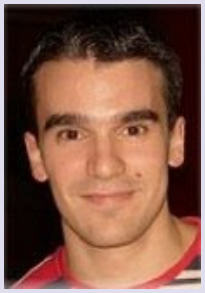
Neural Prosthesis Seminar

Historical Perspective of Therapeutic Electricity

Friday, April 14, 2017 • 8:30 AM

Wolstein Research Building, Room 1413
Case Western Reserve University



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Abstract

The development and employment of effective methods to treat clinical conditions has affected the quality and life expectancy of people worldwide. There are records showing that the Egyptian civilization, 4,000 years ago, used electricity from electric fish in the treatment of pathologies. Later, Luigi Galvani proposed the concept of bioelectricity in 1780, when he observed that if two metallic instruments are touched on the sciatic nerve of a toad there is a contraction of the musculature of the hind limbs. The electrical stimulation of tissues has developed noticeably over the past years. Shelden (1966) has employed electrical stimulation of a branch of the trigeminal nerve for the treatment of acute pain. It is believed, for example, that electrical stimulation of neural pathways promotes pain relief by blocking the transmission of the physiological electrical signals. The development of new forms of treatment based on electrical stimulation depends on three steps: 1) identification of the target tissue; 2) determination of the stimulation pattern; 3) development of appropriate equipment for the application. Among the clinical conditions currently treated with electrical stimulation we could highlight: depression, epilepsy, hypertension, chronic lower back pain, obesity, and obstructive sleep apnea. Although it seems a challenging technique, there are recent reports (2012) showing that more than 100,000 patients have already been implanted with electrical stimulators in the vagus nerve to treat diseases. It is clear that the technique is extremely promising but requires joint work by clinicians, neuroscientists and engineers to develop effective protocols for electrical stimulation of tissues.

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