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Letter to Editor

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Nesa Non-Invasive Neuromodulation; A New Frontier of Treatment of the Autonomous Nervous System in Physiotherapy

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In the 1920s there was no scientist suggested that life could be electrically oriented, from the discoveries of Hodgkin *et al.* (1964) [1] the existence of the nerves´ action potentials was demonstrated, moreover they demonstrated that the electrical impulses could be coordinated by a central nervous system by the existence of ion channels. Sixty years later, the application of electricity in medicine has potentially been developed and is a continuous growing field. The development of a new microcurrent application called NESA takes a step further in the field of physical medicine. It is a neuromodulation with global capacity, this means that it acts on modulating actions such as orthodromic impulses that activate descending inhibitory tracts, afferent regulation mechanisms and efferent regulation of neuromodulator systems [2].

Nesa non-invasive neuromodulation is based on a superficial treatment through electrical microcurrent, which is governed by Wilder's law and hormesis [3]. It produced imperceptible sensations through low impedance areas by the NXsignaldevice. This treatment is based on the application of a biphasic low frequency current with parameters lower than conventional electrotherapy [4,5]. Its intensity varies from 0.1 - 1 milliamp and the frequency from 1.14 to 14.28 Hertz. All these parameters fluctuate determined by the programs of the device NXsignal, except the voltage, which the therapist can choose between 3 or 6 volts.

The input is generated and introduced into the patient's electrical circuit through 24 semi-electrodes, located at the distal nerve endings of the hands and feet, and a directional electrode. The anatomical position of these semi-electrodes is the key for the effectiveness of the treatment, it located low impedance areas. Every six semi-electrodes are joined to form a single electrode, the total number of electrodes being four, one for each end. The electrical algorithm generated by the device is introduced into the body through the metallic contact of the semi-electrodes with clean skin. A series of intermittent and cyclical stimuli or inputs enter through the low impedance zones provided by the nerve endings in those areas. Once the stimulus is introduced into the body, the autonomic nerve pathways could serve as a means of propagation, converging on the directing electrode, which performs the function of a directional electrode (See figure 1).

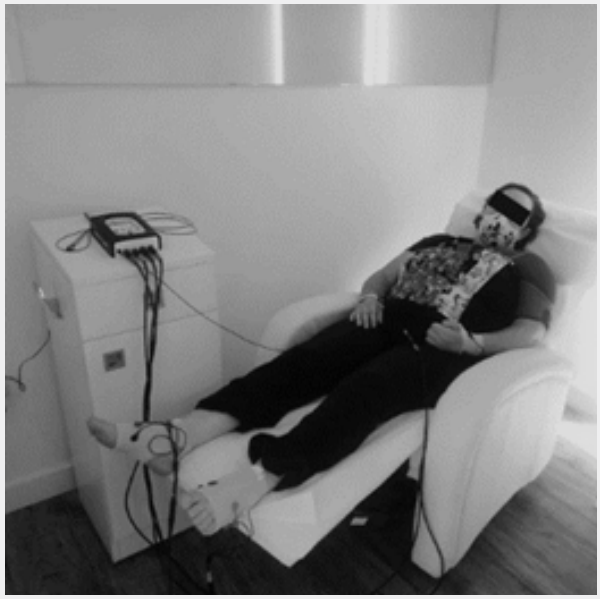

Figure 1: *The photo shows the Xsignal device in a physiotherapy clinic. It shows the application of the electrodes and the passive application on a patient. The patient has signed the informed consent for the distribution of photographs.*

Nowadays, some preliminary studies have shown evidence in terms of neuralgic pain and autonomous nerve system, for example for Sudeck Syndrome [6] or trigeminal pain [7]. A randomized clinical trial in overactive bladder is also developing (Clinical Trials Code-NCT04120545). In addition, effects in the field of neurology have been also studied, such as multiple sclerosis [8] and cerebrovascular accidents [9], where the quality of life of the patient has shown improvements. However, one of the lines with a great potential is the health science field, where a trial study have shown a improve in sleep quality in basket players after being treated with NESA neuromodulation (article in press). In addition, others pilot studies have shown a decrease in alpha brain waves after being treated with NESA neuromodulation and it could provoke improvement in concentration [10].

It is our duty as physiotherapy and scientists, to communicate the advances about NESA neuromodulation technology that is transversal to the fields of physical therapy, medicine and psychology. Perhaps we are opening a new frontier in dysfunctions related to the autonomic nervous system.

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Conflicts of Interests

All authors did not have any conflict of interest to declare.

Author Contributions

RM and FM designed the idea and developed the writing of the paper. AB and DA contributed to revision, ideas, and translation.

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