

Sports Medicine and Fitness

April 18-20, 2016 Dubai, UAE

The effect of common peroneal nerve electrical stimulation on maximum capacity of quadriceps activation in patient with knee osteoarthritis

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Background: Activity failure or arthrogenic inhibition of quadriceps muscle is a common consequence following knee problems. The incapacity in quadriceps activation not only affects the functional ability of the patients but also can affect the prognosis of the rehabilitation programs.

Aim: The purpose of this study was to evaluate the impact of the common peroneal nerve stimulation on the maximum activation capacity of quadriceps muscle in individuals with knee osteoarthritis.

Materials & Methods: 15 participants with knee osteoarthritis (9 men and 6 women, with mean age 53 ± 4) were recruited. The activity failure in quadriceps at the baseline was calculated by subtracting the maximum knee extension torque without stimulation by the one with superimposed electrical stimulation. To evaluate the effect of common peroneal nerve stimulation the same procedure was conducted but with concomitant nerve stimulation at the level of fibular head.

Results: The peak knee extension torque was significantly higher with concomitant common peroneal nerve stimulation and the activity failure of quadriceps showed significant decrease accordingly ($P=0.02$).

Conclusion: Electrical stimulation of the common peroneal nerve can be used to overcome the arthrogenic inhibition of quadriceps.

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Role of exercise-induced free radical production on brain function

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Regular exercise has systemic beneficial effects including the promotion of brain function. The adaptive response to regular exercise includes the up-regulation of the enzymatic antioxidant system, and modulation of oxidative damage. Reactive oxygen species (ROS) are important regulators of cell signaling and exercise through activity dependent modulation of metabolism and/or direct activation of ROS generating enzymes, thus, modulating the cellular redox state in the brain. ROS are also involved in the self-renewal and differentiation of neuronal stem cells and, as a result, exercise-mediated neurogenesis could be associated with ROS production. Exercise has a powerful effect on the immune system, and readily alters the production of cytokines. Certain cytokines, especially IL-6, IL-1, TNF- α , IL-18 and IFN γ are actively involved in the modulation of synaptic plasticity and neurogenesis. Cytokines can also contribute to ROS production. ROS-mediated alteration of lipids, protein and DNA could directly affect brain function while exercise modulates the accumulation of oxidative damage. Oxidative alteration of macromolecules to a moderate degree can activate signaling processes. Hence, it could be a part of the adaptive response to exercise training.

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