

## Original research papers

# LOW-LEVEL LASER THERAPY AND THE RECOVERY OF MUSCLE FUNCTION AFTER A SINGLE SESSION OF NEUROMUSCULAR ELECTRICAL STIMULATION: A CROSSOVER TRIAL

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### Abstract

**Introduction.** Neuromuscular electrical stimulation is applied in muscle atrophy and in muscle strength and endurance training in athletes. Muscle soreness and temporary reduction in muscle strength may occur as adverse effects. Laser therapy has been used as a method of counteracting delayed onset muscle soreness following volitional exercise, but not following electrical stimulation. The aim of the study was to determine whether low-level laser therapy applied prior to electrical stimulation accelerates the recovery of muscle strength and decreases the duration and intensity of muscle soreness at rest after intensive isometric neuromuscular electrical stimulation of the quadriceps femoris muscle. **Material and methods.** A randomised crossover trial was carried out on 24 healthy, recreationally active men aged 22-24 years. Low-level laser therapy or sham laser therapy was applied prior to a single session of neuromuscular electrical stimulation of the quadriceps femoris muscle with typical technical and training-related parameters. Irradiations were performed immediately prior to and shortly after electrical stimulation as well as 24, 48, 72, and 96 hours after this procedure. Muscle soreness was examined using the VAS scale in the same time periods. Quadriceps moments of force were recorded with the use of a Biodex 4 Pro device during maximum voluntary static contraction and during electrical stimulation that triggered a tetanic contraction of the quadriceps femoris muscle reaching the level of maximum tolerance. **Results.** No significant differences were noted in the severity of quadriceps soreness and in the magnitude of the decrease in the moments of force of maximum voluntary contractions after stimulation preceded by laser therapy and that preceded by sham irradiations. **Conclusions.** In the group studied, laser therapy applied before single electrical stimulation with typical parameters did not bring about a faster recovery of muscle strength or a more rapid decrease in soreness than sham laser therapy used prior to electrical stimulation. Further research on larger groups of subjects with the application of various procedures as well as research on training programmes is needed.

**Key words:** low-level laser therapy, neuromuscular electrical stimulation, delayed onset muscle soreness, exercise-induced muscle damage