

Effect of IR Laser on Myoblasts: Prospects of Application for Counteracting Microgravity-Induced Muscle Atrophy

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Received: 29 November 2011 / Accepted: 15 October 2012
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Abstract Microgravity-induced muscle atrophy is a problem of utmost importance for the impact it may have on the health and performance of astronauts. Therefore, appropriate countermeasures are needed to prevent disuse atrophy and favour muscle recovery. Muscle atrophy is characterized by loss of muscle mass and strength, and a shift in substrate utilization from fat to glucose, that leads to a reduced metabolic efficiency and enhanced fatigability. Laser therapy is already used in physical medicine and rehabilitation to accelerate muscle recovery and in sports medicine to prevent damages produced by metabolic disturbances and inflammatory reactions after heavy exercise. The aim of the research we present was to get insights on possible benefits deriving from the application of an advanced infrared laser system to counteract deficits of muscle energy metabolism and stimulate the recovery of the hypotrophic tissue. The source used was a Multiwave Locked System (MLS) laser, which combines continuous and pulsed emissions at 808 nm and 905 nm, respectively. We studied the effect of MLS treatment on morphology and energy metabolism of C2C12 cells,

a widely accepted myoblast model, previously exposed to microgravity conditions modelled by a Random Positioning Machine. The MLS laser treatment was able to restore basal levels of serine/threonine protein phosphatase activity and to counteract cytoskeletal alterations and increase in glycolytic enzymes activity that occurred following the exposure to modelled microgravity. In conclusion, the results provide interesting insights for the application of infrared laser in the treatment of muscle atrophy.

Keywords Muscle atrophy · Microgravity ·
Myoblasts · IR laser

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