**Impact of vascular photobiomodulation on collagen deposition and distribution in an experimental model of acute muscular injury**

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The connective elements within skeletal muscle perform structural roles and are pivotal in the process of muscle regeneration. They contribute to the modulation of inflammation and the regeneration process, a critical aspect of recovery from muscle injuries. Such injuries can result in functional limitations and discomfort for individuals, including both high-performance athletes and sedentary adults. The organization of connective tissue post-injury plays a vital role in maintaining optimal muscle function. Extensive literature supports that Photobiomodulation (PBM) can effectively modulate inflammation, reduce myonecrosis, and enhance the diameter and cross-sectional area of muscle fibers. Therefore, the aim of this study was to investigate the impact of transcutaneous vascular PBM (VPBM) administered prior to inducing acute muscle injuries in rats, on the overall collagen deposition within the healing muscle tissue following cryoinjury. A total of 15 Wistar rats were used and divided into the following experimental groups: (1) Control; (2) Injury; (3) Previous VPBM + Injury Group. The animals were submitted to the cryoinjury on the anterior tibial muscles (TA). VPBM administration was performed once, 24h before cryoinjury procedure, by irradiating the tail artery/vein (AlGaAs, 780 nm, 40 mW, 10 J/cm², 3.2 J). Euthanasia was performed on day 2 after inducing the injuries. Muscle samples were collected, processed histologically, and stained with Picrosirius Red (Sigma-Aldrich, St. Louis, MO, USA) to quantify the total collagen area using ImageJ software. The results were subjected to statistical analysis (ANOVA/Tukey). The findings revealed a consistent organization and distribution of collagen. Notably, the Injury group exhibited a significant increase in collagen compared to the Control group, whereas the Previous VPBM + Injury group showed a significant reduction in collagen. In conclusion, prior VPBM effectively modulated collagen deposition in skeletal muscle tissue during the repair process following acute injury However, additional studies are required to delve further into the mechanisms of VPBM, especially concerning the relation to optimal dosimetric parameters.

Keywords: inflammation; skeletal muscle; collagen; vascular photobiomodulation; low-light laser.

Pessoa de camisa branca

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I am currently pursuing a master’s degree in Biophotonics applied to Health Sciences at UNINOVE, supported by a CAPES scholarship. In 2023, I completed a specialization in the treatment of Special Needs Patients at the Hospital das Clínicas, Faculdade de Medicina/Universidade de Sao Paulo. Additionally, I have expertise in Family Health, acquired through the Multi professional Residency Program in Family Health in São Bernardo do Campo in 2021. Furthermore, I underwent specialized training in digital dentistry with laser certification at UNINOVE in the same year. I earned my undergraduate degree in Dentistry from the Universidade Nove de Julho/ UNINOVE in 2017, during which I actively participated in the Scientific Initiation Project centered on Applied Biophotonics to Health Sciences, with a specific focus on Cell Culture, Immunology, and Molecular Biology.