Lasers Med Sci. 2016 Apr;31(3):531-8. doi: 10.1007/s10103-016-1888-9. Epub 2016 Feb 12.

Light-emitting diode therapy increases collagen deposition during the repair process of skeletal muscle

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PMID: 26873500 DOI: 10.1007/s10103-016-1888-9

Abstract

This study analyzed the effects of light-emitting diode (LED) therapy on the morphology of muscle tissue as well as collagen remodeling and matrix metalloproteinase 2 (MMP-2) activity in the skeletal muscle of rats following acute injury. Wistar rats were divided into four groups: (1) control, (2) sham, (3) untreated cryoinjury, and (4) cryoinjury treated with LED. Cryoinjury was induced by two applications of a metal probe cooled in liquid nitrogen directly onto the belly of the tibialis anterior muscle. For treatment, the LED equipment (wavelength 850 nm, output power 30 mW, and total

energy 3.2 J) was used daily. The study periods were 1, 3, and 7 days after cryoinjury. Morphological aspects were evaluated through hematoxylin-eosin staining. The amount of collagen fibers was evaluated using Picro Sirius Red staining under polarized light. The gelatinase activity of MMP-2 was evaluated using zymography. The results showed significant reductions in inflammatory infiltrate after 3 days and an increased number of immature muscle fibers after 7 days. Furthermore, treatment induced a reduction in the gelatinolytic activity of MMP-2 after 1, 3, and 7 days in comparison to the untreated injury groups and increased the collagen deposition after 3 and 7 days in the treated groups. LED therapy at 850 nm induced a significant reduction in inflammation, decreased MMP-2 activity, and increased the amount of immature muscle and collagen fibers during the muscle repair process following acute injury.

Keywords: Collagen; Inflammation; LED therapy; MMP-2; Repair; Skeletal muscle.

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