

The low level laser therapy application improves the healing process of the Achilles tendon of rats

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BACKGROUND - The Achilles tendon has high incidence of rupture especially during sport activities. Usually, the healing process leads to a disorganized extracellular matrix (ECM) with a high recurrence of injury [1, 2]. The low level laser (LLL) application has been effective, but the results are still conflicting. Our purpose was to evaluate the effects of different intensities and conditions of LLL application on partially tenotomized tendon of rats.

METHODS – Adult male rats were divided into the following groups: G1- intact tendon, G2- injured tendon, G3- injured + LLL (4J/cm²-continuous), G4-injured + LLL (4J/cm²-20 Hz, pulsed emission), G5- injured; G6- injured + LLL (4J/cm²-continuous) and G7- injured + LLL (4J/cm²-20 Hz, pulsed emission until the 7th day and 2 kHz from 8 to 14 days). G2, G3 and G4 were euthanized on day 8 after injury, and G5, G6 and G7 on the 15th day. Our analyses were based on quantification of glycosaminoglycans (GAGs), zymography for MMP-2, western blotting for collagen types I and III and on morphology through Toluidine blue (TB) staining.

RESULTS – In the quantification of GAGs (mg/g of tissue), G6 (8.98± 1.46) and G7 (6.66± 0.89) presented higher values compared to their control G5 (4.13± 0.99). The analyses of sections stained with TB showed higher metachromasy in G6 and G7 compared to G5, indicating increase of GAGs in those groups. Western blotting analyses for collagen type I showed increased amount of this protein in G4 and G7. Considering the collagen type III, G4 presented higher value compared to its control G2. With relation to the zymography, the band densitometry indicated higher values (pixels) of the active isoform in G4 (109,940.63± 13,099.99) and G7 (38,667.91± 4,398.35) groups, compared to G2 (82,053.42± 3,308.56) and G5 (28,231.45± 3,604.38) respectively.

CONCLUSION - The laser treatment is effective during the healing process in tendons, since there is more presence of GAGs and collagen types I and III in tendons submitted to LLL than in tendons without treatment. With respect to the active isoform of MMP-2, the LLL with pulsed emission is more effective than LLL-continuous.

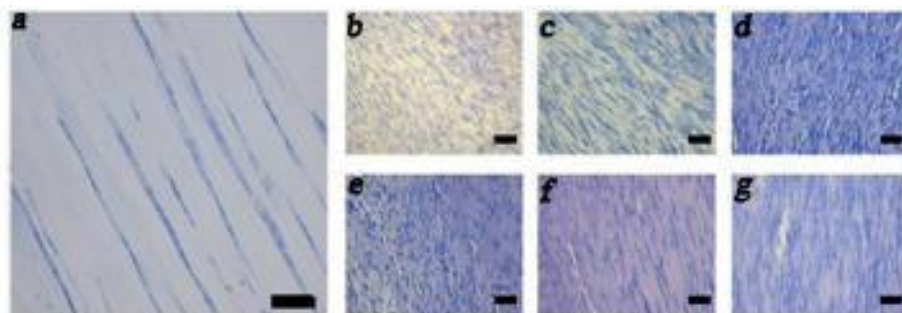


Figure 1: Sections of Achilles tendon stained with TB. More intense basophilia was found in tendons treated with LLL-pulsated irradiation (d and g). a:G1, b:G2, c:G3, d:G4, e:G5, f:G6, g:G7. Bar: 20 μ m.

References:

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