

## Low-Level Laser Therapy and Cryotherapy as Mono- and Adjunctive Therapies for Achilles Tendinopathy in Rats

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### Abstract

**Background and objective:** Low-level laser therapy (LLLT) and cryotherapy are widely used treatments in the acute phase of tendon injury. The aim of this study was to investigate the interaction of these two treatments on tendon inflammation and mechanical properties.

**Materials and methods:** Six groups of six Wistar rats were used in this study. The Achilles tendons of the healthy control group were not subjected to injury or treatment. The tendons of the injured nontreated group (ING) were injured, but not treated. The remaining four groups were injured and subjected to LLLT, cryotherapy, LLLT first/cryotherapy, or cryotherapy first/LLLT. All treatments were performed at 1 h post trauma. Inflammatory mediators, tendon histology, and biomechanical properties were assessed at 24 h post-trauma by comparing the treatment groups with the ING.

**Results:** In all treatment groups, the inflammatory process shifted in an anti-inflammatory direction compared with the ING. Significant alterations in cytokine expression were found in only the LLLT group (YIL-1b) and the combined intervention groups (YIL-1b, YTNF-a, [IL-6]). It was also found that cryotherapy followed by LLLT was the only treatment that significantly ( $p < 0.05$ ) improved the biomechanical parameters of force (N) and displacement (mm) at the tendon rupture and corresponded with the best histological scores of all of the treatment groups.

**Conclusions:** Our results demonstrate that cryotherapy in combination with LLLT can produce an anti-inflammatory “add-on” effect. The order of therapy administration seems essential, as superior histology and biomechanical results were found in the cryotherapy first/LLLT group.