

# Low Level Laser Treatment of Tendinopathy: A Systematic Review with Meta-analysis

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## Abstract

**Objectives:** To assess the clinical effectiveness of Low Level Laser Therapy (LLLT) in the treatment of tendinopathy. Secondary objectives were to determine the relevance of irradiation parameters to outcomes, and the validity of current dosage recommendations for the treatment of tendinopathy. **Background:** LLLT is proposed as a possible treatment for tendon injuries. However, the clinical effectiveness of this modality remains controversial, with limited agreement on the most efficacious dosage and parameter choices. **Method:** The following databases were searched from inception to 1<sup>st</sup> August 2008: MEDLINE, PubMed, CINAHL, AMED, EMBASE, All EBM reviews, PEDro (Physiotherapy Evidence Database), SCOPUS. Controlled clinical trials evaluating LLLT as a primary intervention for any tendinopathy were included in the review. Methodological quality was classified as: high ( $\geq 6$  out of 10 on the PEDro scale) or low ( $< 6$ ) to grade the strength of evidence. Accuracy and clinical appropriateness of treatment parameters were assessed using established recommendations and guidelines. **Results:** Twenty-five controlled clinical trials met the inclusion criteria. There were conflicting findings from multiple trials: 12 showed positive effects and 13 were inconclusive or showed no effect. Dosages used in the 12 positive studies would support the existence of an effective dosage window that closely resembled current recommended guidelines. In two instances where pooling of data was possible, LLLT showed a positive effect size; in studies of lateral epicondylitis that scored  $\geq 6$  on the PEDro scale, participants' grip strength was 9.59 kg higher than that of the control group; for participants with Achilles tendinopathy, the effect was 13.6 mm less pain on a 100 mm visual analogue scale. **Conclusion:** LLLT can potentially be effective in treating tendinopathy when recommended dosages are used. The 12 positive studies provide strong evidence that positive outcomes are associated with the use of current dosage recommendations for the treatment of tendinopathy.

## Introduction

IN RECENT TIMES, the term "Tendinopathy" has been used as a general clinical descriptor to indicate pain in the region of the tendon without any indication of the underlying cause.<sup>1</sup> However, the prevalence of tendinopathies is apparently increasing. For example, in New Zealand the incidence of Achilles tendon ruptures more than doubled between the years 1998 to 2003, from 4.7/100,000 to 10.3/100,000, a phenomenon that follows international trends.<sup>2</sup> Patella tendinopathy accounted for 20% of all knee injuries reported over a six month period at a sports injury clinic,<sup>3</sup> while tennis elbow affects approximately 1%–2% of the population.<sup>4</sup> Other common sites of tendinopathy are golfer's elbow at the medial side of the elbow, and the rotator cuff tendons in the shoulder.

Perhaps because of the multifactorial nature of the pathogenesis of tendinopathy,<sup>5,6</sup> there is a plethora of treatment modalities available to reduce symptoms and to attempt to control or enhance the tendon healing response. These modalities, which include various electrotherapy modalities, eccentric exercise, a variety of injection techniques, and cross-fiber massage, provide mixed or uneven benefit across patient populations.<sup>7–9</sup>

Low level laser therapy (LLLT) or the use of laser sources at powers too low to cause measurable temperature increases, has been used to treat soft tissue injuries and inflammation since the 1960s, and studies from as early as the 1980s reported benefits in a variety of tendon and sports injuries.<sup>10,11</sup> More recently, the term LLLT has been used to describe not only the use of low power laser sources, but also

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