# Shoulder Pain

## LLLT is as well documented as NSAIDs and steroid injections for shoulder tendinitis/bursitis and epicondylaglia.

**The Norwegian physiotherapist Jan M Bjordal published his thesis "Low level laser therapy in shoulder tendinitis/bursitis, epicondylalgia and ankle sprain" in 1997, at the Division of Physiotherapy Science, University of Bergen. It has also been published in Physical Therapy Reviews. 1998; 3: 121-132.**

Here is the Conclusion of the thesis: "A systematic review has been performed on the effect of LLLT for three diagnoses. LLLT was evaluated on similar criteria for methodological assessments of trials as previously established for medical interventions. No evidence was found to indicate that randomized controlled trials on LLLT for tendinitis/bursitis of the shoulder, lateral epicondylalgia and ankle sprains were methodologically inferior to RCTs on medical interventions. The clinical effects of LLLT were found to be supported by scientific evidence regarding short (0-4 weeks) and medium term (<3 months) efficacy for subacute or chronic lateral epicondylitis, and short term efficacy (>3 months) for subacute or chronic lateral epicondylitis, and short term efficacy (> 3 months) for subacute or chronic shoulder tendinitis/bursitis. The evidence of effect from LLLT for acute ankle sprain is inconclusive, although there seems to be a slight tendency in favour of LLLT. Adverse effects of LLLT are rarely seen and only in minor forms (nausea, headache) compared to medication, where more serious gastrointestinal discomfort or ulcers are not uncommon. It has also been shown that trials in favour of active treatment had more treatments per week than the trials showing no difference in effect. In short one could say that LLLT should be used much in the same way as NSAID are used for short periods of time. Most trials showing significant effects used an IR 904 nm laser, but some results in favour of IR lasers with wavelengths of 780, 820 and 830 nm were also observed. Clinical effects of LLLT were best in subacute conditions. In chronic conditions a higher dosage and more treatments seem to be needed. The results of the high quality LLLT trials were all in favour of treatment with confidence intervals not including zero, and the trials came from several different research groups. Evidence was found to be at the highest or the second highest level depending on what level of clinical significance is decided according to the classification of Oxman (1994) and McQuay (1997). The review found little support for the alleged large placebo effects of LLLT. In chronic cases the placebo effect is probably less that 10%, after the natural history of the complaints is taken into account."

In the "Summary of discussion on clinical effect estimates for LLLT" the author writes:

"The majority of the included LLLT-trials found significant clinical effect from LLLT. Seven of the eleven LLLT-trials with acceptable methods included calculations of 95% confidence limits

above zero, and one LLLT-trial on anke sprain included zero (Axelsen & Bjerno 1993). The clincal effect estimates from LLLT-trials for shoulder tendinitis/bursitis are similar or higher than for NSAID or steroid injections. For lateral epicondylalgia estimates for short term clinical effects are similar or lower for LLLT than for steroid injections, but medium clinical effect estimates are similar or higher for LLLT. Recurrence of symptoms in lateral epicondylalgia is less likely after LLLT than after steroid injections. Evidence of clinical effects from ankle sprain is inconclusive. Adverse effects from LLLT are seldom seen and they appear less serious than for patients treated with NSAID and steroid injections."

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## Effects of LLLT on the periarthritis of the shoulder: A clinical study on different treatments with low level laser therapy, corticosteroid injections or a wait-and-see policy

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Low level laser irradiation is a treatment method widely used in medical science. Many disorders, such as osteoarthritis and musculoskeletal conditions with pain, have been treated with LLLT. With respect to pain the action of the laser interferes in the cytokines TNF-a, interleukin-1, interleukin-6 that drive inflammation in the arthritis and are secreted from CD4 and T cells. LLLT also increases the endorphin synthesis in the dorsal horn of the spinal cord, stopping the production of bradykinin and serotonin, and increases the production of nitric oxide into the endothelia cells and into the smooth muscular cells of the vessels walls having a vasodilatory, anti-inflammatory and analgesic action.

Patients, suffering from periarthritis of the shoulder of at least 6 weeks' duration, were recruited by family doctors. We randomly allocated eligible patients to 6 weeks of treatment n. 20 (33%) with corticosteroid injection, n. 21 (35%) with LLLT and with wait-and-see policy n.19 (31%). We applied a number of 12 sessions with infrared Diode Laser Ga-As (904 nm), 60 W maximum power, peak power per pulse 27 W, pulse frequency 1280 Hz, average point region 2-8 J; dose/point = 3-4 J; total energy density 24 J/cm 2. Outcome measures included general improvement, severity of the main complaint, pain, shoulder disability, and patient satisfaction. Severity of shoulder complaints, abduction and elevation of the arm, and the pressure pain threshold were assessed. The principal analysis was done on an intention treatment basis. We assessed all outcomes at 3, 6, 12, 26, 52 weeks.

We randomly assigned 60 patients. At 6 weeks, corticosteroid injections were significantly better than all other therapy options for all outcome measures. Success rates were 90% (18) compared with 52% (11) for LLLT and 35% (7) for wait-and-see policy. Long-term differences between injections and LLLT were significantly in favour of LLLT. Success rate at 52 weeks were 14 (70%) for injections, 19 (90.5%) for LLLT, and 16 (83%) for wait-and-see policy. Low Level Laser Therapy had better results than a wait-and-see policy, but differences were not significant ($p < 0.001$).

Patients should be properly informed about the advantages and disadvantages of the treatment options for the periarthritis of the shoulder. The decision to treat with LLLT or to adopt a wait-

and-see policy might depend on available resources, since the relative gain of Low Level Laser Therapy is better, but also small at long-term.

**THE USE OF LOW LEVEL LASER THERAPY (LLLT) IN THE TREATMENT OF TRIGGER POINTS THAT ARE ASSOCIATED WITH ROTATOR CUFF TENDONITIS.**

Al-Shenqiti, J Oldham

60 patients were randomly allocated to either sham or laser therapy. The active laser parameters included a wavelength 820 nm, power output 100 mW, frequency 5000 Hz (modulated) and energy density 32 J/cm2. 12 treatments were given over four weeks. The blinded outcome measures were pain, range of motion (ROM), functional activities and pressure pain threshold (PPT). Outcome measures were carried out pre and post treatment, then 3 months later. Considerable improvement in pain ($p < 0.001$) was seen for the laser compared to sham group post treatment, and at follow-up (6 points on a 10 VAS compared to 2 points respectively). Similarly, significant differences in favour of laser were seen for ROM ($p < 0.01$), functional activities ($p < 0.001$) and PPT ($p < 0.05$).

## Application of laser acupuncture in the treatment of periarthritis humeroscapularis.

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The effect of low intensity semi conductor laser was used as treatment methods for periarthritis humeroscapularis. The CC laser (Computer Controlled laser) was applied.
Laser therapy has positive biological effects and antiinflamatory, antioedema effects and analgesia. We treated 18 patients with periarthritis humeroscapularis, 14 were female patients.

The laser was locally applied at the AC points Sj 14, Sj 15, Li 15, Li 10, Sj 5, Si 3, three times a week for the first week and twice a week for the second and the third week. After first treatment 12 of patients had pain - alleviating effect. After 6-7 treatments al had pain - alleviating effect and complete recovery of shoulder's motor activity. Low intensity therapy has its place for treatment of periarthritis humeroscapularis.

## Treatment of the acute Periarthritis humeroscapular with laserpuncture.

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The periarthritis humeroscapular is a syndrome that contains very precise affections: the bursitis, the calcified tendinitis of supraespinoso, the bicipital tendinitis, among others. Pain and limitation of the joint movements of the shoulder characterize it. The treatment with laser of low

power can produce resolution of the lesion, whenever it is made in early phases of the disease. In this study we propose the use of the laserpuncture, due to our accumulated experience in the treatment of these affection in acute phase, with acupuncture. A prospective study was carried out during 2 years (1997 - 1999), where 62 patients were selected because they accomplished the Approaches of Inclusion for the study. The sample was divided by aleatory assignment in 2 Groups of Treatment. Th study Group I was treated with laserpuncture, using Cuban laser equipment of HeNe of 632,8 nm and a dose of joule/cm2 was applied, and the Control Group II was treated with acupuncture needles. The conventional medical treatment was suspended. Daily sessions were given from Monday to Friday, for two weeks, until a total of 10. Both techniques demonstrated to be effective in the treatment of these affections, improving the clinical and radiological symptoms significantly when the treatment sessions was concluded. The patients accepted the laserpuncture better because of its painless character, less time of application, and the absence of bleeding and stress.

## The Biological Effects of Laser Therapy and Other physical Modalities on Connective Tissue Repair Processes

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Connective tissue injuries, such as tendon rupture and ligamentous strains, are common. Unlike most soft tissues that require 7-10 days to heal, primary healing of tendons and other dense connective tissues take as much as 6 - 8 weeks during which they are inevitably protected in immobilization casts to avoid re-injury. Such long periods of immobilization impair functional rehabilitation and predispose a multitude of complications that could be minimized if healing is quickened and the duration of cast immobilization reduced. In separate studies, we tested the hypothesis that early function, ultrasound, 632.8 nm He-Ne laser, and 904 nm Ga-As laser, when used singly or in combination, promote healing of experimentally severed and repaired rabbit Achilles tendons as evidenced by biochemical, biomechanical, and morphological indices of healing. Our results demonstrate that: (1) appropriate doses of each modality, i.e., early functional activities, ultrasound, He-Ne and Ga-As laser therapy augment collagen synthesis, modulate maturation of newly synthesized collagen, and overall, enhance the biomechanical characteristics of the repaired tendons. (2) Combinations of either of the two lasers with early function and either ultrasound or electrical stimulation further promote collagen synthesis when compared to functional activities alone. However, the biomechanical effects measured in tendons receiving the multi-therapy were similar, i.e., not better than the earlier single modality trials. Although tissue repair processes in humans may differ from that of rabbits, these findings suggest that human cases of connective tissue injuries, e.g., Achilles tendon rupture, may benefit from appropriate doses of He-Ne laser, Ga-As laser, and other therapeutic modalities, when used singly or in combination. Our recent meta-analysis of the laser therapy literature further corroborate these findings.