

# Efficacy of 904 nm Gallium Arsenide Low Level Laser Therapy in the Management of Chronic Myofascial Pain in the Neck: A Double-Blind and Randomized Controlled Trial

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**Background and Objectives:** A prospective, double blind, randomized, and controlled trial was conducted in patients with chronic myofascial pain syndrome (MPS) in the neck to evaluate the effects of infrared low level 904 nm Gallium-Arsenide (Ga-As) laser therapy (LLLT) on clinical and quality of life (QoL).

**Study Design/Patients and Methods:** The study group consisted of 60 MPS patients. Patients were randomly assigned to two treatment groups: Group I (actual laser; 30 patients) and Group II (placebo laser; 30 patients). LLLT continued daily for 2 weeks except weekends. Follow-up measures were evaluated at baseline, 2, 3, and 12 weeks. All patients were evaluated with respect to pain at rest, pain at movement, number of trigger points (TP), the Neck Pain and Disability Visual Analog Scale (NPAD), Beck depression Inventory (BDI), and the Nottingham Health Profile (NHP).

**Results:** In active laser group, statistically significant improvements were detected in all outcome measures compared with baseline

( $P < 0.01$ ) while in the placebo laser group, significant improvements were detected in only pain score at rest at the 1 week later of the end of treatment. The score for self-assessed improvement of pain was significantly different between the active and placebo laser groups (63 vs. 19%) ( $p < 0.01$ ).

**Conclusion:** This study revealed that short-period application of LLLT is effective in pain relief and in the improvement of functional ability and QoL in patients with MPS.

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## Action of 904 Nm Diode Laser In Orthopaedics and Traumatology

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**Objective:** The semiconductor or laser diode (GaAs, 904 nm) is the most appropriate choice in pain reduction therapy.

**Summary Background Data:** Low power density laser acts on the Prostaglandins synthesis, increasing the change of PGG<sub>2</sub> and PGH<sub>2</sub> Peroxidos into PGI<sub>2</sub> (also called Prostacilin or Endoprostol). The last one is the main product of the Arachidonic acid into the endothelial cells and into the smooth muscular cells of the vessel walls having a vasodilating and anti-inflammatory action.

**Methods:** Treatment was carried out on 447 cases and 435 patients (250 women and 185 men) in the period between 20.05.1987 and 31.12.1999. The patients, whose age ranged from 25 to 70, with a mean age of 45 years, were suffering from rheumatic, degenerative and traumatic pathologies as well as cutaneous ulcers. The majority of the patients had been seen by orthopaedists and rheumatologists and had undergone x-ray examination. All patients had received drug-based treatment and/or physiotherapy, with poor results. Two thirds were experiencing acute symptomatic pain, while the others presented a chronic pathology with recurrent crises. We used a pulsed diode laser, GaAs 904 nm wavelength. Frequency of treatment: 1 application per day for 5 consecutive days, followed by a 2-day interval. In the evaluation of the results the following parameters have been considered: disappearance of spontaneous and induced pain, anatomic and functional evaluation of the joints, muscular growth, verbal rating scales, hand dynamometer, patient's pain diary.

**Results:** Very good results were achieved especially with cases of symptomatic osteoarthritis of the cervical vertebrae, with sport-related injuries, with epicondylitis, and with cutaneous ulcers; also, last but not of least importance, with cases of osteoarthritis of the coxa.

**Conclusions:** Treatment with 904 nm diode laser has substantially reduced the symptoms as well as improved the quality of life of the patient, thus postponing the need for surgery.

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# Effects of 904-Nm Low-Level Laser Therapy in the Management of Lateral Epicondylitis: A Randomized Controlled Trial.

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**Objective:** The aim of this study was to evaluate the effectiveness of 904-nm low-level laser therapy (LLLT) in the management of lateral epicondylitis.

**Background Data:** Lateral epicondylitis is characterized by pain and tenderness over the lateral elbow, which may also result in reduction in grip strength and impairment in physical function. LLLT has been shown effective in its therapeutic effects in tissue healing and pain control.

**Methods:** Thirty-nine patients with lateral epicondylitis were randomly assigned to receive either active laser with an energy dose of 0.275 J per tender point (laser group) or sham irradiation (placebo group) for a total of nine sessions. The outcome measures were mechanical pain threshold, maximum grip strength, level of pain at maximum grip strength as measured by the Visual Analogue Scale (VAS) and the subjective rating of physical function with Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire.

**Results:** Significantly greater improvements were shown in all outcome measures with the laser group than with the placebo group ( $p < 0.0125$ ), except in the two subsections of DASH.

**Conclusion:** This study revealed that LLLT in addition to exercise is effective in relieving pain, and in improving the grip strength and subjective rating of physical function of patients with lateral epicondylitis.

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# Acute Cervical Pain is Relieved with Gallium Arsenide (GaAs) Laser radiation: A Double Blind Preliminary Study

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**Study Design/Patients and Methods:** Seventy-one patients with acute cervical pain were randomized in two groups. Group A, 37 patients were irradiated with a pulsed GaAs diode laser, 904 nm, pulse width 200 nsec, pulse frequency 10,000 Hz, peak power of 20 W, average power 40 mW, spot size 150  $\mu\text{m}^2$  in area (incident power density of approximately 26  $\text{W}/\text{cm}^2$ ) and an angle of divergence of 6°. The laser was applied in the point technique with a dose of 4  $\text{J}/\text{cm}^2$  per point in the area of pain. Group B, 34 patients, was treated with sham irradiation with a deactivated laser system. Neither the patients nor the operator knew which group each patient was randomly assigned to. The use of analgesic drugs and physical therapy was excluded in both groups. Pain was evaluated through a linear colour scale. Laser treatment was considered effective when pain relief was more than 60%.

**Results:** The treatment was effective in 94.59% of patients in group A and 38.24% of group B ( $p < 0.0019$ ). The pain was relieved completely in 67.56% of patients in group A and in 17.65% in group B. In patients in whom the response to the treatment was effective, the pain returned in the six months following treatment in 14.28% of Group A, but in 58.33% of group B ( $p < 0.005$ ). No side effects were observed.

**Conclusion:** These results suggest that GaAs laser radiation is an efficient and safe treatment for patients with acute cervical pain. Six years have passed since we incorporated the GaAs laser into our therapeutic arsenal and up to date we have irradiated more than two thousand patients with different kinds of pain and pain sites. The aim of this work is to evaluate the real therapeutic effect versus the placebo effect of laser therapy in patients with acute cervical pain in both the immediate effect and the possible latency of the pain relief with LLLT.

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# Efficacy of Low Power Laser Therapy in Fibromyalgia: A Single-Blind, Placebo-Controlled Trial

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**Objective:** The aim of this study was to evaluate the effectiveness of 904-nm low-level laser therapy (LLLT) in the management of fibromyalgia.

**Background:** Low energy lasers are widely used to treat a variety of musculoskeletal conditions including fibromyalgia, despite the lack of scientific evidence to support its efficacy.

**Methods:** A randomised, single-blind, placebo-controlled study was conducted to evaluate the efficacy of low-energy laser therapy in 40 female patients with fibromyalgia. Patients with fibromyalgia were randomly allocated to active (Ga-As) laser or placebo laser treatment daily for two weeks except weekends. Both laser and placebo laser groups were evaluated for the improvement in pain, number of tender points, skinfold tenderness, stiffness, sleep disturbance, fatigue, and muscular spasm.

**Results:** In both groups, significant improvements were achieved in all parameters ( $p < 0.05$ ) except sleep disturbance, fatigue and skinfold tenderness in the placebo laser group ( $p > 0.05$ ). It was found that there was no significant difference between the two groups with respect to all parameters before therapy whereas a significant difference was observed in parameters as pain, muscle spasm, morning stiffness and tender point numbers in favour of laser group after therapy ( $p < 0.05$ ). None of the participants reported any side effects.

**Conclusion:** Our study suggests that laser therapy is effective on pain, muscle spasm, morning stiffness, and total tender point number in fibromyalgia and suggests that this therapy method is a safe and effective way of treatment in the cases with fibromyalgia.