Arthritic Pain Relief, The Lancet Review for (LLLT)

Pain Relief for Rheumatoid Arthritis, Cervical Spine Osteoarthritis, Injuries and inflammatory Conditions.

Low Level Laser Therapy (LLLT) also known as Cold Laser therapy, Research on the Clinical application of GaAIAs 830 NM diode laser in the treatment of Rheumatoid Arthritis, Cervical Spine Osteoarthritis, including LLLT Research on Pain Relief for other Inflammatory Conditions and Injuries.

Cold or Low level laser therapy,

A review on research published by The Lancet shows that Low Level Laser Therapy (LLLT) also so known as Cold Laser Therapy has been tested in over 200 clinical trials (RCTs) and published in the world's top medical journals including a review by The Lancet, a clinical study in the journal PAIN and is acknowledged by the World Health Organisation Bone and Joint Task Force, and published in the journal Spine. There are 26 research papers on low level laser therapy, for Musculoskeletal pain and syndromes, both chronic and acute, Rheumatoid Arthritis, Cervical Spine Osteoarthritis, lateral and medial epicondylitis,(Tennis, Golfers Elbow).Achilles Tendonitis, Carpal Tunnel, TMJ, Tendonitis, Bursitis, soft tissue injuries, fractures, neck, shoulder, back, lower back pain, disc injuries, hip, joints knee, ankle injuries, conditions and disorders, and research on low level laser therapy are included on this page.

Cold or Low Level Laser Therapy (LLLT) Clinical application of GaAIAs 830 NM diode laser in treatment of Rheumatoid Arthritis. **Department of Orthopaedic Surgery, Osaka City University Medical School, Japan**

The authors have been involved in the treatment of rheumatoid arthritis (RA), in particular chronic poly-arthritis and the associated pain complaints. The biggest problem facing such patients is joint contracture, leading to bony ankylosis. This in turn severely restricts the range of motion (ROM) of the RA-affected joints, thereby seriously restricting the patient's quality of life (QOL). The authors have determined that in these cases, daily rehabilitation practice is necessary to maintain the patient's QOL at a reasonable level.

The greatest problem in the rehabilitation practice is the severe pain associated with RA-affected joints, which inhibits restoration of mobility and improved ROM. LLLT or low reactive level laser therapy has been recognized in the literature as having been effective in pain removal and attenuation. The authors accordingly designed a clinical trial to assess the effectiveness of LLLT in RA related pain (subjective self-assessment) and ROM improvement (objective documented data).

From July 1988 to June 1990, 170 patients with a total of 411 affected joints were treated using a GaAlAs diode laser system (830 nm, 60 mW C/W). Patients mean age was 61 years, with a ratio of males: females of 1: 5.25 (16%: 84%). Effectiveness was graded under three categories: excellent (remarkable improvement), good (clearly apparent improvement), and unchanged (little or no improvement).

For pain attenuation, scores were: excellent – 59.6%; good – 30.4%; unchanged – 10%.

For ROM improvement the scores were: excellent – 12.6%; good – 43.7%; unchanged – 43.7%. This gave a total effective rating for pain attenuation of 90%, and for ROM improvement of 56.3%.

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Low Level Laser Therapy for Osteoarthritis and Rheumatoid Arthritis: A Metaanalysis

ABSTRACT.Osteoarthritis (OA) and rheumatoid arthritis (RA) affect a large proportion of the population. Low level laser therapy (LLLT) was introduced as an alternative non-invasive treatment for RA and OA about 10 years ago, but its effectiveness is still controversial. We assessed the effectiveness of LLLT in the treatment of RA and OA.

Objective.

Methods.A systematic review was conducted, following an a priori protocol, according to the methods recommended by the Cochrane Collaboration. Trials were identified by a literature search of Medline, Embase,

and the Cochrane Controlled Trials Register. Only randomized controlled trials of LLLT for the treatment of patients with a clinical diagnosis of RA or OA were eligible. Thirteen trials were included, with 212 patients randomized to laser and 174 patients to placebo laser, and 68 patients received active laser on one hand and placebo on the opposite hand. Treatment duration ranged from 4 to 10 weeks. Follow-up was reported by only 2 trials for up to 3 months.

Results. In patients with RA, relative to a separate control group, LLLT reduced pain by 70% relative to placebo and reduced morning stiffness by 27.5 min (95% CI –52.0 to –2.9), and increased tip to palm flexibility by 1.3 cm (95% CI –1.7 to –0.8). Other outcomes such as functional assessment, range of motion, and local swelling were not different between groups. There were no significant differences between subgroups based on LLLT dosage, wavelength, site of application, or treatment length. In RA, relative to a control group using the opposite hand, there was no difference between control and treatment hand, but all hands were improved in terms of pain relief and disease activity. For OA, a total of 197 patients were randomized. Pain was assessed by 3 trials. The pooled estimate (random effects) showed no effect on pain (standardized mean difference –0.2, 95% CI –1.0 to +0.6), but there was statistically significant heterogeneity ($p > 0.05$). Other outcomes of joint tenderness, joint mobility, and strength were not significant.

Conclusion.LLLT should be considered for Pain relief and morning stiffness in RA, particularly since it has few side effects. For OA, the results are conflicting in different studies and may depend on the method of application and other features of the LLLT. Clinicians and researchers should consistently report the characteristics of the LLLT device and the application techniques. New trials on LLLT should make use of standardized, validated outcomes. Despite some positive findings, this metaanalysis lacked data on how effectiveness of LLLT is affected by 4 factors: wavelength, treatment duration of LLLT, dosage, and site of application over nerves instead of joints. There is a need to investigate the effects of these factors on effectiveness of LLLT for RA and OA in randomized controlled clinical trials. (J Rheumatol 2000;27:1961–9)

LUCIE BROSSEAU, VIVIAN WELCH, GEORGE WELLS, PETER TUGWELL, ROBERT de BIE, ARNE GAM, KATHERINE HARMAN, BEVERLEY SHEA, and MICHELLE MORIN

Key Indexing Terms:

Leaders of International laser organizations met during the third Congress of the World Association for Laser Therapy held in Athens, Greece, to explore ways of advancing research, education and practice world-wide. Photo was taken immediately after the special session in May, 2000

Cold /Low Level Laser (LLLT)

Low Level laser Therapy (LLLT) also known as Cold Laser Therapy/Treatment

The lasers used are certified as low level laser therapy (LLLT). For the past 30 years the technology of low level laser therapy (also known as Cold Laser Therapy has been formally accepted in North America and in many other parts of the world such as Europe, Russia and Japan. In all this time there have been no recorded long-term adverse effects from low level laser therapy. It is considered to be non-invasive, painless and safe.

Low Level Laser Therapy (LLLT) uses laser light energy to stimulate cells to function optimally. In the body, light sensitive chromophores and other elements within the cell absorb energy, initiating a series of important photochemical changes such as increased production of ATP. The mitochondria and Kreb's Cycle stimulation initiates the production of ATP, providing the cell with the extra energy needed to accelerate the healing process and positively influence pain. These activities can occur in all types of cells and includes ligament, nerves, cartilage and muscle.

Low Level Laser Therapy (LLLT) is a treatment where by a low level laser is utilized to treat chronic and acute pain. Low level laser therapy may be used for patients suffering from Sciatica, back and neck, hip, knee, ankle, foot pain and conditions a, musculoskeletal pain, joint pain associated with arthritis, fibromyalgia, tendonitis, bursitis, neuropathy, Achilles tendonitis, migraine headaches, sprains and strains, trapped nerves, carpal tunnel syndrome , back, neck, shoulder pain and other associated pains. Low Level laser therapy also treats conditions such as TMJ, reflex sympathetic dystrophy (RSD) and other inflammatory and scarring conditions. By increasing serotonin levels, low level laser therapy contributes to the body's own healing process. Non-thermal and non-invasive, low level laser therapy involves a combination of low level laser and electric stimulation and is one of the most effective healing therapies. Completed in ten to twelve sessions, low level laser therapy (LLLT) can significantly reduce treatment time and costs.

Low Laser Therapy(LLLT) has been tested in over 200 clinical trials (RCTs) and published in the world's top medical journals including a review by The Lancet, a clinical study in the journal PAIN and is acknowledged by the World Health Organisation Bone and Joint Task Force and published in the journal Spine.

A Review on research published by The Lancet, for the treatment of neck pain with Cold/Low Laser Therapy (LLLT)

Low level Laser treatment for neck pain.

Neck pain is common, often persistent, and responds poorly to medication. So it is encouraging to read that a relatively novel, non-invasive treatment shows evidence of effectiveness. A systematic review and meta-analysis of 16 randomised controlled trials of low-level laser therapy (LLLT)' yielded 820 patients, for whom data was pooled. LLLT was found to reduce pain immediately after treatment in acute neck pain and up to 22 weeks after completion of treatment in patients with chronic neck pain. Low-level laser – or cold laser is yet to be established as a medical treatment but, according to Wikipedia, papers are appearing at the rate of around 25 per month, mainly investigating treatment of musculoskeletal disorders.

1. Chow RT, Johnson MI, Lopes-Martins RA, Bjordal JM. Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomised placebo or active-treatment controlled trials. Lancet 2009 Dec 5;374(9705):1897-908.

Lower Back Pain, Low Level Laser Therapy (LLLT) Research.

Abstract

Objective:

The aim of this study was to investigate the clinical effects of low-level laser therapy (LLLT) in patients with acute low back pain (LBP) with radiculopathy.

Background Data:

Acute LBP with radiculopathy is associated with pain and disability and the important pathogenic role of inflammation. LLLT has shown significant anti-inflammatory effects in many studies.

Materials and Methods:

A randomized, double-blind, placebo-controlled trial was performed on 546 patients. Group A (182 patients) was treated with nimesulide 200 mg/day and additionally with active LLLT; group B (182 patients) was treated only with nimesulide; and group C (182 patients) was treated with nimesulide and placebo LLLT. LLLT was applied behind the involved spine segment using a stationary skin-contact method. Patients were treated 5 times weekly, for a total of 15 treatments, with the following parameters: wavelength 904 nm; frequency 5000 Hz; 100-mW average diode power; power density of 20 mW/cm^2 and dose of 3 J/cm^2; treatment time 150 sec at whole doses of 12 J/cm^2. The outcomes were pain intensity measured with a visual analog scale (VAS); lumbar movement, with a modified Schober test; pain disability, with Oswestry disability score; and quality of life, with a 12-item short-form health survey questionnaire (SF-12). Subjects were evaluated before and after treatment. Statistical analyses were done with SPSS 11.5.

Results:

Statistically significant differences were found in all outcomes measured ($p < 0.001$), but were larger in group A than in B ($p < 0.0005$) and C ($p < 0.0005$). The results in group C were better than in group B ($p < 0.0005$).

Conclusions: The results of this study show significant improvement in acute LBP treated with LLLT used as additional therapy.

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Low Level Laser Therapy (LLLT)

Low Level Laser Therapy (LLLT) has a 5 star rating for soft tissue injuries,conditions and inflammation. Low Level Laser Therapy is a handheld, non-invasive, light-emitting medical device which is used over different areas of the body. It provides an unmatched advantage in the treatment of conditions such as;

Athletic and sports Injuries, Soft tissue injuries including Sprains and Strains, Tendonitis and Haematomas

Lower leg (calf pain) inflammation, Shin splints, Hamstring, Achilles tendonitis, Bursitis, conditions and disorders

Ankle sprains, injury, and fractures, inflammation conditions and disorders

Heel and foot injury, pain, Bursitis, Achilles Tendonitis, Plantar fasciitis, conditions and disorders

Knee pain, injuries, tears, ligament, Tendon injury, ruptures, Runners Knee, inflammation, Bursitis, conditions and disorders

Shoulder injury, pain, Shoulder tears, fractures inflammation, Tenosynovitis ,Tendonitis, Bursitis, conditions such as frozen shoulder, and disorders

Neck injury, Neck Pain, Neck sprain, Whiplash injury.

Back Injury, Lower back pain, Sciatica, slipped discs, prolapsed disc, herniated / bulging discs, Trapped nerves and inflammation.

Elbow, Wrist and Hand injury, Tendonitis, inflammation, fractures, conditions and disorders, such as Tennis Elbow,(Golfers Elbow) Carpal Tunnel Syndrome,

Hip injury and pain, Sacroiliac Joint inflammation, groin and thigh strain (pull), sports hernia, Hip Bursitis/Tendonitis, Trochanteric Bursitis, conditions and disorders

Muscle sprain and spasms, Cramps, Joint Pain and stiff Joints.

Pain Relief, including Arthritic pain relief.

Wound Management including Skin Ulcers, Pressure Sores and Burns, Skin infections

Chronic pain such as Trigeminal Neuralgia and Chronic Neck and Back pain.

Safety

Low level laser therapy(LLLT) is not harmful. Lasers used for tissue stimulation have insufficient strength to damage cells. 30 years of clinical studies and clinical use have shown no adverse effects whatsoever.

The Advantages of Low Intensity Laser Therapy

- Non-invasive
- Non-toxic
- Easily applied
- Highly effective
- Cure rate > 95%
- No known negative side effects

Mechanism of Action

Therapeutic lasers work by supplying energy to the body in the form of photons of light. The tissues and cells then absorb this energy, where it is used to accelerate the normal rate of tissue healing.

Therapeutic Benefits of Laser Therapy:

- Anti-inflammatory Action: Laser light reduces swelling, leading to decreased pain, less stiffness, and a faster return to normal joint and muscle function.
- Rapid Cell Growth: Laser light accelerates cellular reproduction and growth.
- Faster Wound Healing: Laser light stimulates fibroblast development and accelerates collagen synthesis in damaged tissue.
- Reduced Fibrous Tissue Formation: Laser light reduces formation of scar tissue, leading to more complete healing, with less chance of weakness and re-injury later.
- *Increased Vascular Activity: Laser light increases blood flow to the injured area. No it does not*
- Stimulated Nerve Function: Laser light speeds nerve cell processes which may decrease pain and numbness associated with nerve-related conditions.

Frequency of Treatments

While some patients get immediate results, others require 6-12 treatments before seeing a lasting effect. Less severe or acute injuries will require fewer treatments than chronic or severe conditions.

Low Level Laser Therapy (LLLT) Applications, Case Studies and Low Level Laser Research with 26 Worldwide Clinical Studies is presented below:

Musculoskeletal pain syndromes, both chronic and acute.Cold/Low level laser therapy (LLLT)has been shown to be effective in a variety of musculoskeletal conditions and associated pain presentations.In Rheumatoid Arthritis, LLLT can benefit not only the pain of acute small joint inflammation but also the chronic pain.In a review article on rheumatology (3), some 18 papers were considered. All studies involved double-blind trials with LLLT in chronic rheumatoid, and reported significant improvement in pain (80% success rate in relieving pain). Upon comparing LLLT to a similar rate of pain attenuation using anti-inflammatory drugs (NSAIDs), the LLLT was free of any side-effects while 20% of patients treated with NSAIDs suffered unacceptable side-effects of medication . In another study of 170 patients with rheumatoid arthritis using LLLT (4), pain attenuation of up to 90% was noted.Trellis et al (6) used LLLT for osteoarthritis of the knee in 40 patients. He reported a significant reduction of 82% of the patients with improved joint mobility. Among 36 randomized patients, with pain caused by cervical osteoarthritis, those who received Infra-Red and Low Level Laser treatment improved 75% compared with the group receiving mock treatment (31%) . Similarly, a study of 60 patients with Cervical Osteoarthritis, Low Pulsed Laser was successful in relieving pain and in improving function.
The results of a study show that cervical myofascial pain is significantly improved at 3-month with Diode laser . A similar successful LLLT treatment has been described for whiplash injuries.In a randomized study with 30 patients with supraspinatus or bicipital tendonitis, the results demonstrated the effectiveness of laser therapy in tendonitis of the shoulder . Another study with a patient population (n = 324), with either medial epicondylitis (Golfer's elbow; n = 50) or lateral epicondylitis (Tennis elbow; n = 274), and randomly allocated, provides further evidence of the efficacy of LLLT in the management of lateral and medial epicondylitis .

Treatment with low-level laser therapy (LLLT) was shown effective in treating Carpal Tunnel Syndrome pain. Another study, significant decreases in McGill Pain Questionnaire scores, median nerve sensory latency, and Phalen and Tinel signs were observed after treatment series with Low Level Laser Therapy. Patients could perform their previous work .

In acute trauma there is a soft tissue injury comprising swelling, haematoma, pain and reduced mobility. Sporting injuries and domestic accidents usually involve damage to muscles, joint ligaments and tenclass. In the absence of bone fracture or other injury demanding priority treatment, LLLT should be instituted at the earliest opportunity. Kumar reported a comparative study in 50 patients with inversion injuries of the ankle. He found that compared to conventional physiotherapy, the LLLT treated patients showed a more rapid resolution of symptoms and an earlier return to full weight-bearing .

Fibromyaliga (FM) is characterized by widespread pain in the body, associated with particular tender points. It is often accompanied by disturbed sleep patterns, fatigue, headaches, irritable bowel and bladder syndrome, morning stiffness, anxiety and depression. FM can cause a high level of functional disability and have a

significantly negative effect on quality of life. One study suggests that “Laser Therapy is effective on pain, muscle spasm, morning stiffness, fatigue, depression and total tender point number in Fibromyalgia”.

A randomized controlled study with 63 with non-radiating low back pain showed that LLLT significantly improved pain and function.

In summary, the bulk of published work to date supports the use of LLLT for treatment of a variety of musculoskeletal conditions and associated pain. Moreover, the LLLT proved to be not only more effective than conventional methods, but more economical as well. The added advantage of absence of side effects, non-invasive nature of therapy and the ease of application, ensures good patient acceptance of the treatment modality.

Low Intensity Laser Therapy(LILT) for Head, Neck and Facial Pain.

Prof P.F. Bradley

The clinical application of low incident power density laser radiation for the treatment of acute and chronic pain is now a well established procedure. This paper reviews the currently available English speaking literature and summarises a selection of serious scientific papers which report a beneficial effect following the treatment of a wide variety of acute and chronic syndromes whose main presenting symptom is pain.

Head and Neck Clinical Applications of LILT

LILT is proving useful in a wide variety of painful conditions in the Head and Neck but the following are particular applications:

1. TM Joint Pain Dysfunction

2. Post Herpetic Neuralgia

3. Trigeminal Neuralgia

4. Painful Ulcerative Conditions

5. Pain of Advanced Oro Facial Cancer

The above information has been suppled by Quantum Healing Lasers .Com

The Ability of Low Level Laser Therapy (LLLT) to Mitigate Fibromyalgic Pain.

The CFIDS Chronicle Physicians’ Forum Fall 1993

Douglas Ashendorf, MD, FAAPMR Newark, New Jersey

Physiotherapist Shows Lasers Relieve Pain.

A physiotherapist at Royal Brisbane Hospital (Australia) recently received a PhD from the University of Queensland for demonstrating that laser treatment prompts the release of endorphins into the bloodstream. Endorphins are a type of natural morphine that dulls pain. Physiotherapist Liisa Laakso studied the effects of lasers on 56 people who suffered myofascial pain syndrome, a chronic hypersensitivity often secondary to a person’s primary painful affliction, such as arthritis. Previous experiments linking endorphin release and lasers have only been done on rats.

In the study, Laakso applied different doses and wavelengths of a laser diode to “trigger points” on the body and took blood samples measuring endorphin levels in these subjects and a control group. The control group reported some pain relief – most likely a placebo effect – but endorphins were present. Those patients that underwent laser treatment reported pain reduction of up to 78%, and endorphins were present in their blood.

THERMOGRAPHIC STUDY OF LOW LEVEL LASER THERAPY FOR ACUTE-PHASE INJURY.

Yoshimi Asagai, M.D.1, Atsuhiro Imakiire, M.D.2, Toshio Ohshiro, M.D.3, 1. Shinano Handicapped Children`s Hospital Shimosuwa, Nagano, Japan 2. Department of Orthopaedic Surgery, Tokyo Medical University Shinjuku, Tokyo, Japan 3. Japan Medical Laser Laboratory, Shinanomachi, Tokyo, Japan.

Acute-phase injury is generally treated by localized cooling of the region, and rarely by theactive use of low level laser therapy (LLLT) in Japan. Thermographic studies of acutephase injury revealed that circulatory disturbances at the site of trauma occurred due to swelling and edema on the day following the injury, and that skin temperature was high at the site of the trauma and low at the periphery. Following LLLT, circulatory disturbances rapidly improved, while temperature in the high temperature zone around the site of trauma fell by 3 degrees on the average, but at the periphery the low temperature rose by 3 degrees on the average to nearly normal skin temperature. Clinically, swelling and edema improved. LLLT was also useful in treating necrosis of the skin in the wound area and in accelerating healing of surgical wounds of paralytic feet, which are prone to delayed, wound healing and also wounds due to spoke injury. LLLT is useful in treating swelling and edema in acutephase injury and in accelerating healing of surgical wounds**.**

Key words: Laser therapy, acute-phase injury, thermography, ankle joint sprain

Introduction

It has not been clearly defined to date if LLLT is indicated for acute-phase injury with swelling and calor. Yet it is frequently considered to be contraindicated in acute-phase injury. We have previously reported that, in patients with cerebral palsy with reduced peripheral skin temperature, the skin surface temperature was elevated to normal after LLLT

(1). in this study, we used thermography to examine changes in skin temperature following LLLT chie fly inacute-phase injury.

Patients and Methods

Subjects were 7 patients with sprains of the ankle joint, two patients with fractures of the tibial shaft, and one patient with dislocation of the elbow joint. LLLT was also used in orthopedic surgery for disorders of the distal lower extremity such as talipes varus, which is frequently followed by postoperative necrosis of the skin in the wound area as well as delayed wound healing, and pre- and postoperative treatment of paralytic feet with circulatory disturbances. The procedure was as follows. Room temperature was maintained at 25oC. After acclimatization for 20 minutes, continuous irradiation with a GaAlAr semiconductor laser (JQ305, Minato Medical Science Co., Ltd., Japan) with the wavelength adjusted to 810 nm and the output to 100mW was applied using the contact method.

The spot size on the tissue was 0.56cm2 with a power density of 17.86W/cm2 at 100mW, the energy density per point being 107.5J/cm2. The area surrounding the site of trauma was irradiated for 3 to 5 minutes in total, one minute per spot, and changes in the skin surface temperature were followed using Thermotracer TH1106. The test was performed from immediately after injury till 5 days post-trauma, an average of two days after injury.

Results

Immediately after injury, the skin surface temperature was elevated to about 34 degrees at and around the site of trauma (Fig. 1). On the day following the injury, skin temperature remained elevated around the site of trauma to the same degree as immediately after injury, but was markedly reduced to about 29 degrees at its periphery (Fig. 2). Skin temperature began to fall in the high temperature zone and began to rise in the peripheral low temperature zone immediately following LLLT, and the peripheral skin temperature reached a peak or became almost normal at about 40 minutes after the initiation of irradiation (Fig. 3). Changes in post-LLLT skin temperature in all patients

a b c

1. Sprain of the right ankle joint immediately after injury:

a) Before irradiation, a high temperature zone extends over the trauma site and a wide area around it.

b) At 10 minutes after LLLT,skin temperature fell at the trauma site, and rose in the toes at the periphery.

c) At 20 minutes after LLLT,skin temperature was re-elevated at the trauma site.

 showed that skin temperature fell by an average of 3degrees in the high temperature zone around the site of trauma, and rose by an average of 3 degrees in the peripheral low temperature zone, both to approximately normal skin temperature. Clinically, swelling and edema were diminished and repeated irradiation suppressed exacerbation of swelling and edema.Patients receiving pre- and post-operative

application of LLLT for such conditions as talipes varus, in which postoperative necrosis of skin in the wound area and delayed wound healing are frequent, spoke injury produced when the foot is caught in a bicycle's spokes (Fig. 4), and paralytic feet with distal circulatory failure due to spin bifida or cerebral palsy, we have not seen any necrosis of the skin in the wound area or delayed wound healing.

Discussion

There have been many reports on wound healing (2, 3).Currently, the site of trauma is cooled to reduce swelling in acute-phase injury. An important problem in the healing

of wounds and associated fractures is how to suppress swelling and edema, and improvement of local swelling and edema is also crucial for the healing of ligament injury in sprained ankles. However, the use of LLLT for sprained ankles is controversial (4). Thermography has been used for evaluating the effect of LLLT (5). In the present thermographic evaluation, the surface temperature was high around the trauma site and low in the periphery, which indicated that local blood and lymph flow were impaired by swelling and edema, thus raising temperature. When LLLT was applied to these areas, it was found that skin temperature fell in the high temperature zone but

rose in the low temperature zone to approximately the normal temperature in both zones, suggesting improved blood and lymphatic circulation. Clinically, reduction of local swelling and edema was considered to have led to the improvement of blood and lymph flow.

Conclusions

1: In acute-phase injury, skin temperature was elevated around the site of trauma, and reduced in the periphery on the day following the injury.

2: Immediately after irradiation, skin temperature fell by 3oC on the average in the high temperature zone around the trauma site, and rose by 3oC on the average reaching normal temperature in the low temperature zone at the periphery of the injury.

3: LLLT rapidly improved blood and lymphatic flow, which had been impaired by injury, and alleviated swelling and edema. LLLT was also useful in accelerating healing

of the surgical wound.

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a b c

2. Contusion of the right tibial shaft 1 day after injury: a) before irradiation,

a) Skin temperature is high at the trauma site, and low at the periphery.

b) At 10 minutes after LLLT:skin temperature fell at the trauma site, and rose slightly at the periphery. c) At 40 minutes after LLLT: skin temperature at the periphery reached a peak and nearly normal skin temperature

a b c

3. Fracture of the right tibia 2 days after removal of nailing: a) Before irradiation, skin temperature was high in the surgical wound, and low at the periphery. b) Immediately after LLLT, skin temperature was reduced in the high temperature zone, and elevated in the low temperature zone. c) At 40 minutes after LLLT, skin temperature at the periphery reached a peak.

a b

4. Spoke injury:

a) At 6 days after injury the left foot had been caught in the rear wheel of a bicycle, and this left a large skin defect on the back of the foot and a contusion, with marked swelling and edema.

b) After daily LLLT, epithelialization was observed and the wound healed at 23 days after injury.

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Results have suggested that the pain relieving properties of LLLT have been the most consistent benefit. The duration of benefit has varied from one hour to one week, and seems to increase as treatment progresses.

Other areas of improvement were not as clear. Improvement in sleep was observed with some regularity although this was undoubtedly due in part to decreased pain. The "non-restorative" sleep complaints were less regularly improved. Improvement with regard to abnormal sensations in the limbs (paresthesia and subjective swelling) appears to be fairly consistent. Improvements in fatigue, mood and headache.

Although the pilot study is incomplete, I believe that these early findings warrant the further investigation of laser therapy for patients with fibromyalgia. This is further supported by the relatively few and harmless side effects of this therapy, the fact that equipment and operating costs are reasonable, and the reality that there are few effective alternative treatments for fibromyalgia patients.

Carpal Tunnel Study Results Released

Laser Focus World

A physician at UMDNJ-Robert Wood Johnson Medical School is evaluating a "cold" laser to treat patients with carpal tunnel syndrome, a debilitating nerve condition that causes severe pain and numbness in the hand.

Clinical results of a double-blind study of 11 patients afflicted with carpal tunnel syndrome who were treated with a diode-laser device manufactured by Lasermedics (Missouri City, TX) showed that after six to 15 treatments, nine of the 11 patients experienced relief of pain and other associated symptoms as well as normalization of abnormal latencies.

The study was conducted by Michael L. Weintraub, a neurologist from Briarcliff, NY, and reported in the February 1996 issue of Neurology.

The patients all used a 30mW 830nm, a hand-held, battery-operated, nonsurgical laser device that employs the process of photo-biostimulation.

Dr. Weintraub concluded that the results of his study support the efficacy and safety of laser-light treatment in carpal tunnel syndrome.

Physiotherapist Shows Lasers Relieve Pain.

A physiotherapist at Royal Brisbane Hospital (Australia) recently received a PhD from the University of Queensland for demonstrating that laser treatment prompts the release of endorphins into the bloodstream. Endorphins are a type of natural morphine that dulls pain. Physiotherapist Liisa Laakso studied the effects of lasers on 56 people who suffered myofascial pain syndrome, a chronic hypersensitivity often secondary to a person's primary painful affliction, such as arthritis. Previous experiments linking endorphin release and lasers have only been done on rats.

In the study, Laakso applied different doses and wavelengths of a laser diode to "trigger points" on the body and took blood samples measuring endorphin levels in these subjects and a control group. The control group reported some pain relief – most likely a placebo effect – but endorphins were present. Those patients that underwent laser treatment reported pain reduction of up to 78%, and endorphins were present in their blood.

The effect of infra-red laser irradiation on the duration and severity of postoperative pain: a double blind trial.

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This trial was designed to test the hypothesis that LLLT reduces the extent and duration of post-operative pain. Twenty consecutive patients for elective cholecystectomy were randomly allocated for either LLLT or as controls. The trial was double blind. Patients for LLLT received 6-8-min treatment (GaAlAs: 830 nm: 60 mW CW: CM) to the wound area immediately following skin closure prior to emergence from GA. All patients were prescribed on demand post-operative analgesia (IM or oral according to pain severity). Recordings of pain scores (0-10) and analgesic requirements were noted by an independent assessor. There was a significant difference in the number of doses of narcotic analgesic (IM) required between the two groups.

Controls n = 5.5: LLLT n = 2.5.

No patient in the LLLT group required IM analgesia after 24 h. Similarly the requirement for oral analgesia was reduced in the LLLT group.

Controls n = 9: LLLT n = 4.

Control patients assessed their overall pain as moderate to severe compared with mild to moderate in the LLLT group.

The results justify further evaluation on a larger trial population.

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0898-5901/92/040145-05 $07.50

Efficacy of laser irradiation on the area near the stellate ganglion is dose-dependent: A double-blind crossover placebo-controlled study.

Toshikazu Hashimoto, Osamu Kemmotsu, Hiroshi Otsuka, Rie Numazawa, and Yoshihiro Ohta, Department of Anaesthesia, Hokkaido University Hospital, Sapporo, Japan

In the present study we evaluate the effects of laser irradiation on the area near the stellate ganglion on regional skin temperature and pain intensity in patients with postherpetic neuralgia. A double blind, crossover and placebo-controlled study was designed to deny the placebo effect of laser irradiation.

Eight inpatients (male 6, female 2) receiving laser therapy for pain attenuation were enrolled in the study after institutional approval and informed consent. Each patient received three sessions of treatment on a separate day in a randomised fashion. Three minutes irradiation with a 150 mW laser (session 1), 3 minutes irradiation with a 60 mW laser (session 2), and 3 minutes placebo treatment without laser irradiation. Neither the patient nor the therapist was aware which session type was being applied until the end of the study. Regional skin temperature was evaluated by thermography of the forehead, and pain intensity was recorded using a visual analogue scale (VAS). Measurements were performed before treatment, immediately after (0 minutes) then 5, 10, 15, and 30 min after treatment. Regional skin temperature increased following both 150 mW and 60mW laser irradiation, whereas no changes were obtained by placebo treatment. VAS decreased following both 150 mW and 60 mW laser treatments, but no changes in

VAS were obtained by placebo treatment. These changes in the temperature and VAS were further dependent on the energy density, i.e. the dose.

Results demonstrate that laser irradiation near the stellate ganglion produces effects similar to stellate ganglion block. Our results clearly indicate that they are not placebo effects but true effects of laser irradiation.

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LASER THERAPY 1997:9:7-12

Successful management of female office workers with "repetitive stress injury" or"carpal tunnel syndrome" by a new treatment modality- application of low level lasers for pain

E. Wong G LEE J. Zu CHERMAN and D. P. MASON

Western Heart Institute and St. Mary's Spine Center St. Mary's Medical Center. San Francisco. CA. USA and Head and Neck Pain Center, Honolulu HL. USA

Abstract

Female office workers with desk jobs who are incapacitated by pain and tingling in the hands and fingers are often diagnosed by physicians as "repetitive stress injury" (RSI) or "carpal tunnel syndrome" (CTS). These patients usually have poor posture with their head and neck stooped forward and shoulders rounded; upon palpation. they have pain and tenderness at the spinous processes C5 – T1 and the medial angle of the scapula. In 35 such patients we focused the treatment primarily at the posterior neck area and not the wrists and hands. A low level laser (100 mW) was used and directed at the tips of the spinous processes C5 – Tl.

The laser rapidly alleviated the pain and tingling in the arms, hands and fingers, and diminished tenderness at the involved spinous processes. Thereby, it has become apparent that many patients labelled as having RSI or CTS have predominantly cervical radicular dysfunction resulting in pain to the upper extremities which can be managed by low level laser.

Successful long-term management involves treating the soft tissue lesions in the neck combined with correcting the abnormal head, neck and shoulder posture by taping. Cervical collars, and clavicle harnesses as well as improved work ergonomics.

LASER THERAPY, 1997:9: 131- 136 09/97 Physiological responses in chronic pain patients. LLLT protocol. Scott D. Fender and David Diffee

Pain Research Group, Arvada, Colorado, U.S.A.

Use of Low Reactive Level Laser Therapy (LLLT) utilising helium-neon lasers has increased lately especially in pain control. New protocols are being developed aimed at a complex of primary and secondary symptomologies. One of these protocols Stellate Ganglion Stimulation has shown in our research a unique set of developments. Targeting the area of the stellate ganglion is showing great promise in the rehabilitation of patients with a history

of chronic musculoskeletal pain syndromes, but several patients with pre-existing psychological symptomology have exacerbated during the initial stages of utilization of this protocol.

Patients with a history of psychological diagnosis for dysthymia, anxiety, post traumatic stress disorder or minor diffuse brain injury have shown an exacerbation of these symptomologies during the initial phases of stimulation treatment. Overall, response to this form of therapy seems to be positive but some patients require dermatomal and/or site-specific therapy to maximize outcome. With specific psychological treatment combined with a more conservative amount of stimulation initially the increase in these symptoms shows a tendency to remit with the pain response. Our continued research is currently focusing on the mechanisms for this type of response as well as protocol refinement to maximize its effectiveness.

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Mechanisms of the analgesic effects of therapeutic lasers in vivo.

L Navratil (1)and I Dylevsky(2)

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2: Department of Functional Anatomy, Second Medical Faculty and Faculty of Physical Education Charles University, Prague, Czech Republic

The analgesic effects in the course of application of therapeutic lasers to affected tissue have been described in a number of works in the literature. Although a few scientific-based reports have appeared, those on laser-induced analgesia are mainly clinical works describing the effect of the therapy which, however, do not study the mechanism of the laser action. There are several different possible responses induced by non-invasive low level laser therapy (LLLT).

The purpose of the present communication is to review the arrangement and characterisation of these responses. By being aware of these effects, the laser therapist can acquire a physiological and morphological scheme making possible the appropriate choice of the site of application of LLLT, choice of the irradiation technique, and selection of appropriate doses.

Address for Correspondence:

Leos Navratil MD PhD, Department of Clinical Radiahiology, Institute of Biophysics, First Medical Faculty, Charles University Saln1ovska 3, CZ 120 00, Prague 2, Czech Republic. 03/97 Rep. US 5 10 12 14 LASER THERAPY 1997:9:33-40 Experimental Physiology (1994) 79. 227-234 Printed in Great Britain

Can low reactive-level laser therapy be used in the treatment of neurogenic facial pain? A double-blind, placebo controlled investigation of patients with trigeminal neuralgia.

ArneEckerdal and Lehmann Bastian. Department of Oral and Maxillofacial Surgery and Oral Medicine, Odense University Hospital, Denmark

Neurogenic facial pain has been one of the more difficult conditions to treat, but the introduction of laser therapy now permits a residual group of patients hitherto untreatable to achieve a life free from or with less pain. The present investigation was designed as a double-blind, placebo controlled study to determine whether low reactive-level laser therapy (LLLT) is effective for the treatment of trigeminal neuralgia. Two groups of patients (14 and 16) were treated with two probes. Neither the patients nor the dental surgeon were aware of which was the laser probe until the investigation had been completed. Each patient was treated weekly for five weeks.

The results demonstrate that of 16 patients treated with the laser probe, 10 were free from pain after completing treatment and 2 had noticeably less pain, while in 4 there was little or no change. After a one year follow-up, 6 patients were still entirely free from pain. In the group treated with the placebo system, i.e. the non-laser probe, one was free from pain, 4 had less pain, and the remaining 9 patients had little or no recovery. After one year only one patient was still completely free from pain. The use of analgesics was recorded and the figures confirmed the fact that LLLT is effective in the treatment of trigeminal neuralgia. It is concluded that the present

study clearly shows that LLLT treatment, given as described, is an effective method and an excellent supplement to conventional therapies used in the treatment of trigeminal neuralgia.

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Double-blind crossover trial of low level laser therapy in the treatment of post-herpetic neuralgia.

Kevin C Moore, Naru Hira. Parswanath S. Kramer, Copparam S. Jayakumar and Toshio Ohshiro

Post herpetic neuralgia can he an extremely painful condition which in many cases proves resistant to all the accepted forms of treatment. It is frequently most severe in the elderly and may persist for years with no predictable course.

This trial was designed as a double blind assessment of the efficacy of low level laser therapy in the relief of the pain of post herpetic neuralgia with patients acting as their own controls. Admission to the trial was limited to patients with established post herpetic neuralgia of at least six months duration and who had shown little or no response to conventional methods of treatment. Measurements of pain intensity and distribution were noted over a period of eight treatments in two groups of patients each of which received four consecutive laser treatments.

The results demonstrate a significant reduction in both pain intensity and distribution following a course of low level laser therapy. John Wiley & Sons. Ltd.

Efficacy of low-level laser therapy for pain attenuation of post-herpetic neuralgia.

Osamu Kemmotsu, Kenichi Sato,Hitoshi Furumido, Koji Harada, Chizuko Takigawa, Shigeo Kaseno, Sho Yokota, Yukari Hanaoka and Takeyasu Yamamura

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The efficacy of low reactive-level laser therapy (LLLT) for pain attenuation in patients with postherpetic neuralgia (PHN) was evaluated in 63 patients (25 males. 38 females with an average age of 69 years) managed at our pain clinic over the past four years. A double blind assessment of LLLT was also performed in 12 PHN patients. The LLLT system is a gallium aluminium arsenide (GaAlAs) diode laser (830 nm, 60 mW continuous wave). Pain scores (PS) were obtained using a linear analogue scale (1 to 10) before and after LLLT.

The immediate effect after the initial LLLT was very good (PS: <3) in 26, and good (PS: 7-4) in 30 patients. The long-term effect at the end of LLLT (the average number of treatments 36 + 12) resulted in no pain (PS: 0) in 12 patients and slight pain (PS: 1-4) in 46 patients. No complications attributable to LLLT occurred. Although a placebo effect was observed, decreases in pain scores and increases of the body surface temperature by LLLT were significantly greater than those that occurred with the placebo treatment. Our results indicate that LLLT is a useful modality for pain attenuation in PHN patients and because LLLT is a non-invasive, painless and safe method of therapy, it is well acceptable by patients.

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Mechanistic approach to GaAIAs diode laser effects on production of reactive oxygen species from human neutrophils as a model for therapeutic modality at cellular level.

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There have been many reports on the applications of low reactive level laser (LLL) therapy for pain attenuation or pain removal. Our group has reported previously on the effects of in vitro irradiation of LLLT particularly on the phagocytic activity of human Neutrophils, using luminol-dependent chemiluminescence (LmCL) for measurement of reactive oxygen species (ROS) production from human Neutrophils. However, the mechanisms of the attenuation of phagocytic activity of NEUTROPHILS by LLL irradiation is not yet fully understood.

In this study. we used luminol-dependent and lucigenin-dependent chemiluminescence (LgCL) for detection of affected ROS producing process of human Neutrophils by LLL irradiation. Two soluble action stimuli, N-formyl-Met-Leu-Phc (fMLP) and phorbol myristate acetate (PMA) were used to avoid the possible influence of lag-time from recognition to uptake of particles at the ROS production.

In case of using fMLP as a stimulus, the maximum luminescence intensity of LULL was increased hut LgCL luminescence was decreased by LLL irradiation. When PMA was used as a stimulus, the times to reach the maximum luminescence intensity of LmCL and LgCL were shortened by LLL irradiation, but there was no effect on the maximum luminescence intensity of both.

These results suggest that LLL irradiation enhances the ROS production activity of human Neutrophils by the activation of the superoxide converting system, the active clement in which is mainly myeloperoxidase. LLL irradiation enabled a more rapid activation of the superoxide production system, NADPH -oxidase.

0898-5901/93/03011 1-06 $08.00 LASER THERAPY 1993: 5: 111-116

Laser therapy takes pain, discomfort out of post-cancer condition

LOW-LEVEL laser therapy promises to be a valuable weapon in the fight against lymphoedema, the painful and permanent swelling of an arm which frequently follows breast cancer operations. Doctors at Adelaide's Flinders University (FU) have conducted trials which have produced the first clinical evidence that infra-red laser can improve tissue conditions rapidly in the affected area.

Associate professor Neil Piller told the university magazine, Flinders Journal that loosening the tissue encouraged the regrowth of lymph vessels. The results are very exciting," Dr Piller said. "This is the first time anyone specifically has set out to trial lasers in this way. Previously, information about the possible efficacy of lasers has come as a by-product of research into such areas as wound treatment and arthritic conditions, and even then there has been very little work done."

Lymphoedema results from deliberate or accidental removal of lymph nodes or vessels. It affects about 15 per cent of women sometime after a breast cancer operation. In the FU trials, 15 women with prolonged or severe lymphoedema were given 16 half-hour laser treatments over 10 weeks. "All had arms swollen to between 140 and 180 per cent of normal volume. A scanning laser, focusing 2-4 joules of power to each square centimetre, was applied to the entire arm.

In all cases, the treatment reduced the amount of oedema, the volume of fluid and the circumference of the arm above the elbow. Tissues in the upper and lower arm were softened and patients reported less pain, tightness and heaviness, and far greater mobility. "Giving them 16 treatments actually was overkill," Dr Piller said. "Since the trial ended, we have achieved significant results from just three or four treatments, or in some cases one or two."

Diode Laser in Cervical Myofascial Pain: A Double-Blind Study versus Placebo

* F. Ceccherelli, * L. Altafini, * G. Lo Castro, * A. Avila, *F. Ambrosio, and * G. P. Giron

*Institute of Anesthesiology and Intensive Care, University of Padua, and the Associazione Italiana per la Ricerca e, l'Aggiornamento Scientif co, Padua, Italy

Summary

We present a double-blind trial in which a pulsed infrared beam was compared with a placebo in the treatment of myofascial pain in the cervical region. The patients were submitted to 12 sessions on alternate days to a total energy dose of 5 J each. At each session, the four most painful muscular trigger points and five bilateral homometameric acupuncture points were irradiated. Those in the placebo group submitted to the same number of sessions following an identical procedure, the only difference being that the laser apparatus was

nonoperational. Pain was monitored using the Italian version of the McGill pain questionnaire and the Scott Huskisson visual analogue scale.

The results show a pain attenuation in the treated group and a statistically significant difference between the two groups of patients, both at the end of therapy and at the 3-month follow-up examination.

Address correspondence and repent requests to: Dr. F. Ceccherelli at the Istituto di Anestesiologiae Rianimazione, via C. Battisti 267, 35121 Padova, Italia.

The Clinical journal of Pain 5:301-304

 Wave- length Power Energy Density Power Density Energy per point Pulses 904nm 5mW av (25Wpeak) (not given) (not given) 1 J 1KHz x 200nS

Pain scores and side effects in response to low level laser therapy (LLLT) for physical trigger points.

E Liisa Laakso Carolyn Richardson, and Tess Cramond

1: Physiotherapy Department, Royal Brisbane Hospital, Brisbane; 2: Physiotherapy Department, University of Queensland, Brisbane; and 3: Pain Clinic, Royal Brisbane Hospital, Brisbane, Queensland, Australia.

Clinically, Low Level Laser Therapy – LLLT has been used successfully in the treatment of chronic pain but many have questioned the scientific basis for its use. Many studies have been poorly designed or poorly controlled.

A double-blind, placebo-controlled, random allocation study was designed to analyse the effect of second daily infrared (JR) laser (820 nm, 25 mW) and visible red laser (670 nm, 10 mW) at 1 J/cm2 and 5 J/cm2 on chronic pain. Forty-one consenting subjects with chronic pain conditions exhibiting myofascial trigger points in the neck and upper trunk region underwent five treatment sessions over a two week period. To assess progress, pain scores were measured using visual analogue scales before and after each treatment. The incidence of side effects was recorded.

All groups demonstrated significant reductions in pain over the duration of the study with those groups which received infrared (820 nm) laser at I J/cm2 and 5 J/cm2. Demonstrating the most significant effects ($p < 0.001$). Only those subjects who had active laser treatment experienced side effects.

Results indicated that responses to LLLT at the parameters used in this study are subject to placebo and may be dependent on power output, dose and/or wavelength.

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Two wavelengths studied.

Best results with the higher powered infrared laser compared with the lower powered red laser Wave- length Average Power Energy Density Power Density Energy Pulses Time Beam Spot size 820 25mW 5 J/Cm2 0.89 W/Cm2 0.14 J 5,000Hz 5.62 secs 0.89Cm2

Low level laser therapy (LLLT) of tendinitis and myofacial pains a randomized, double-blind, controlled study.Mimmi Logdberg-Anderssont (1), Sture Mutzell (2), and Ake Hazel (3) 1: Akersberga Health Care Centre, 2: Danderyd University Hospital, Danderyd, and 3: Vaxholm Health Care Centre, Stockholm, Sweden.

The purpose of this randomised, double-blind study was to examine the effect of GaAs laser therapy for tendonitis and myofascial pain in a sample from the general population of Akersberga in the northern part of Greater Stockholm.

176 patients (of an original group of 200) completed the scheduled course of treatment. The patients were assigned randomly to either a laser group (92 patients, of whom 74 had tendonitis, completed the study) or a placebo group (84 patients, of whom 68 had tendonitis, completed the study). All 176 patients received six

treatments during a period of 3-4 weeks. Their pain was estimated objectively using a pain threshold meter, and subjectively with a visual analogue scale before, at the end of, and four weeks after the end of treatment.

Laser therapy had a significant, positive effect compared with placebo measured from the first assessment to the third assessment, four weeks after the end of treatment. Laser treatment was most effective on acute tendonitis.

Address for Correspondence Sture Mutzell, Danderyd University Hospital 5-182 87 Danderyd, Sweden. 03/07 Rep US 10-12-14, 1997 By LT Publishers, U.K., Ltd.

LASER THERAPY, 1997:9: 79-86 Wave- length Power Energy Density Power Density Energy per point Pulses 904nm 8mW av (10Wpeak) 0.5-1.0 J/Cm2 (not given) 1J 4KHz x 180nS

The efficady of laser therapy for musculoskeletal and skin disorders: a criteria-based meta-analysis of randomized clinical trials.

Beckerman H, de Bie RA, Bouter LM, et al.

The efficacy of laser therapy for musculoskeletal and skin disorders has been assessed on the basis of the results of 36 randomized clinical trials (RCTs) involving 1,704 patients. For this purpose, a criteria-based meta-analysis that took into account the methodological quality of the individual trials was used. The studies with a positive outcome were generally of a better quality than the studies with a negative outcome. No clear relationship could be demonstrated between the laser dosage applied and the efficacy of laser therapy, or between the dosage and the methodological score.

In general, the methodological quality of these studies appeared to be rather low. Consequently, no definite conclusions can be drawn about the efficacy of laser therapy for skin disorders. The efficacy of laser therapy for musculoskeletal disorders seems, on average, to be larger than the efficacy of a placebo treatment. More specifically, for rheumatoid arthritis, post-traumatic joint disorders, and myofascial pain, laser therapy seems to have a substantial specific therapeutic effect.

Further RCTs, avoiding the most prevalent methodological errors, are needed in order to enable the benefits of laser therapy to be more precisely and validly evaluated.

Physical Therapy. 72(7):483-91, 1992 Jul. (60 ref)

LLLT using a diode laser in successful treatment of a herniated lumbar/sacral disc, with magnetic resonance imaging (MRI) assessment: a case report.

Tatsuhide Abe

Abe Orthopaedic Clinic Futuoka City Fukuoka Prefecture Japan X12′ A 40-year-old woman presented at the Abe Orthopedic Clinic with a 2-year history of lower hack pain and pain in the left hip and leg diagnosed as a ruptured disc between the 5th lumbar/lst sacral vertebrae. The condition had failed to respond to conventional treatment methods including pelvic traction, nonsteroid anti-inflammatory drugs and aural block anesthetic injections.

MRI scans were made of the affected disc, showing it protruding on the left side through the aural membrane. The gallium aluminum arsenide (GaAlAs) diode laser (830 nm, 60 mW) was used in outpatient therapy and after 7 months, the patient’s condition had dramatically improved demonstrated by motility exercises. This improvement was confirmed by further MRI scans, which showed clearly the normal condition of the previously herniated L5/SI disc.

Physiological responses in chronic pain patients LLLT protocol.

Scott D. Fender and David Diffee, Pain Research Group, Arvada, Colorado, U.S.A.

Use of Low Reactive Level Laser Therapy (LLLT) utilising helium-neon lasers has increased lately especially in pain control. New protocols are being developed aimed at a complex of primary and secondary symptomologies. One of these protocols, Stellate Ganglion Stimulation, has shown in our research a unique set of developments.

Targeting the area of the stellate ganglion is showing great promise in the rehabilitation of patients with a history of chronic musculoskeletal pain syndromes, but several patients with preexisting psychological symptomology have exacerbated during the initial stages of utilization of this protocol. Patients with a history of psychological diagnosis for dysthymia, anxiety, post traumatic stress disorder or minor diffuse brain injury have shown an exacerbation of these symptomologies during the initial phases of stimulation treatment.

Overall, response to this form of therapy seems to be positive but some patients require dermatomal and/or site-specific therapy to maximize outcome. With specific psychological treatment combined with a more conservative amount of stimulation initially the increase in these symptoms shows a tendency to remit with the pain response. Our continued research is currently focusing on the mechanisms for this type of response as well as protocol refinement to maximize its effectiveness.

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Clinical application of GaAIAs 830 NM diode, low level laser therapy in treatment of Rheumatoid Arthritis.

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Department of Orthopaedic Surgery, Osaka City University Medical School, Japan

The authors have been involved in the treatment of rheumatoid arthritis (RA), in particular chronic poly-arthritis and the associated pain complaints. The biggest problem facing such patients is joint contracture, leading to bony ankylosis. This in turn severely restricts the range of motion (ROM) of the RA-affected joints, thereby seriously restricting the patient's quality of life (QOL). The authors have determined that in these cases, daily rehabilitation practice is necessary to maintain the patient's QOL at a reasonable level.

The greatest problem in the rehabilitation practice is the severe pain associated with RA-affected joints, which inhibits restoration of mobility and improved ROM. LLLT or low reactive level laser therapy has been recognized in the literature as having been effective in pain removal and attenuation. The authors accordingly designed a clinical trial to assess the effectiveness of LLLT in RA related pain (subjective self-assessment) and ROM improvement (objective documented data).

From July 1988 to June 1990, 170 patients with a total of 411 affected joints were treated using a GaAlAs diode laser system (830 nm, 60 mW C/W). Patients mean age was 61 years, with a ratio of males: females of 1: 5.25 (16%: 84%). Effectiveness was graded under three categories: excellent (remarkable improvement), good (clearly apparent improvement), and unchanged (little or no improvement).

For pain attenuation, scores were: excellent – 59.6%; good – 30.4%; unchanged – 10%.

For ROM improvement the scores were: excellent – 12.6%; good – 43.7%; unchanged – 43.7%. This gave a total effective rating for pain attenuation of 90%, and for ROM improvement of 56.3%.

0898-5901/91/020077-06 $05.00

Mechanisms of the analgesic effect of therapeutic lasers in vivo.

L Navratil (1) and I Dylevsky (2)

1: Outpatient Department of Radiobiology, Institute of Biophysics, First Medical Faculty, and 2: Department of Functional Anatomy, Second Medical Faculty and Faculty of Physical Education Charles University, Prague, Czech Republic

The analgesic effects in the course of application of therapeutic lasers to affected tissue have been described in a number of works in the literature. Although a few scientific-based reports have appeared, those on laser-induced analgesia are mainly clinical works describing the effect of the therapy which, however, do not study the mechanism of the laser action.

There are several different possible responses induced by non-invasive low level laser therapy (LLLT). The purpose of the present communication is to review the arrangement and characterisation of these responses. By being aware of these effects, the laser therapist can acquire a physiological and morphological scheme making possible the appropriate choice of the site of application of LLLT, choice of the irradiation technique, and selection of appropriate doses.

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LASER THERAPY 1997:9 : 33-40

Experimental Physiology (1994) 79. 227-234 Printed in Great Britain

Laser's Effect on Bone and Cartilage Change Induced by Joint Immobilization An Experiment with Animal Model.

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Objective:

Influence of low-level (810nm, Ga-Al-As semiconductor) laser on bone and cartilage during joint immobilization was examined with rats' knee model.

Materials and Methods:

The hind limbs of 42 young Wistar rats were operated on in order to immobilise the knee joint. One week after operation they were assigned to three groups; irradiance 3.9W/cm2, 5.8W/cm2, and sham treatment. After 6 times of treatment for another 2 weeks both hind legs were prepared for 1) indentation of the articular surface of the knee (stiffness and loss tangent), and for 2) dual energy X-ray absorptiometry (bone mineral density) of the focused regions.

Results and Conclusions:

The indentation test revealed preservation of articular cartilage stiffness with 3.9 and 5.8W/cm2 therapy. Soft laser treatment has a possibility for prevention of biomechanical changes by immobilisation.

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Lasers Surg. Med. 21:480-484, 1997.

Histological and Clinical Responses of Articular Cartilage to Low-level Laser Therapy: Experimental Study.

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Abstract

This study was carried out to evaluate the effects of low-level laser irradiation on experimental lesions of articular cartilage.

A standard lesion was practiced on the femoral trochlea of both hind limbs of 20 clinically normal Californian rabbits. These animals were divided into two groups of 10 individuals each, depending on the laser equipment used for treatment. One group was treated with HeNe laser (8 J cm – 2, 632.8 nm wavelength) and the other with infra-red (JR) laser (8 J cm – 2, 904 nm wavelength). In both groups, five points of irradiation to the right limb alone were irradiated per session for a total of 13 sessions, applied with an interval of 24 h between sessions. These points were the following: left and right femoral epicondyles, left and right tibial condyles and the centre of articulation. The distance between these points was approximately 1 cm. The untreated left limb was left as a control. During treatment, extension angle and periarticular thickness were considered. At the end of the treatment, samples were collected for histopathological study and stained with: Haematoxylin-Eosin, PAS and Done.

The results show a statistically higher anti-inflammatory capacity of the IR laser ($p<0.0001$). The functional recovery was statistically similar for both treatments ($p<0.176$). Histological study showed, at the end of the treatment, hyaline cartilage in the IR group, fibrocartilage in the HeNe group and granulation tissue in the control limbs. Clinical and histological results indicated that this laser treatment had a clear anti-inflammatory effect that provided a fast recuperation and regeneration of the articular cartilage.

Lasers in Medical Science 1997, 12:117-121

THERMOGRAPHIC STUDY OF LOW LEVEL LASER THERAPY FOR ACUTE-PHASE INJURY.

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Acute-phase injury is generally treated by localized cooling of the region, and rarely by theactive use of low level laser therapy (LLLT) in Japan. Thermographic studies of acutephase injury revealed that circulatory disturbances at the site of trauma occurred due to swelling and edema on the day following the injury, and that skin temperature was high at the site of the trauma and low at the periphery. Following LLLT, circulatory disturbances rapidly improved, while temperature in the high temperature zone around the site of trauma fell by 3 degrees on the average, but at the periphery the low temperature rose by 3 degrees on the average to nearly normal skin temperature. Clinically, swelling and edema improved. LLLT was also useful in treating necrosis of the skin in the wound area and in accelerating healing of surgical wounds of paralytic feet, which are prone to delayed, wound healing and also wounds due to spoke injury. LLLT is useful in treating swelling and edema in acutephase injury and in accelerating healing of surgical wounds**.**

Key words: Laser therapy, acute-phase injury, thermography, ankle joint sprain

Introduction

It has not been clearly defined to date if LLLT is indicated for acute-phase injury with swelling and calor. Yet it is frequently considered to be contraindicated in acute-phase injury. We have previously reported that, in patients with cerebral palsy with reduced peripheral skin temperature, the skin surface temperature was elevated to normal after LLLT

(1). in this study, we used thermography to examine changes in skin temperature following LLLT chie fly inacute-phase injury.

Patients and Methods

Subjects were 7 patients with sprains of the ankle joint, two patients with fractures of the tibial shaft, and one patient with dislocation of the elbow joint. LLLT was also used in orthopedic surgery for disorders of the distal lower extremity such as talipes varus, which is frequently followed by postoperative necrosis of the skin in the wound area as well as delayed wound healing, and pre- and postoperative treatment of paralytic feet with circulatory disturbances. The procedure was as follows. Room temperature was maintained at 25oC. After acclimatization for 20 minutes, continuous irradiation with a GaAlAr semiconductor laser (JQ305, Minato Medical Science Co., Ltd., Japan) with the wavelength adjusted to 810 nm and the output to 100mW was applied using the contact method.

The spot size on the tissue was 0.56cm2 with a power density of 17.86W/cm2 at 100mW, the energy density per point being 107.5J/cm2. The area surrounding the site of trauma was irradiated for 3 to 5 minutes in total, one minute per spot, and changes in the skin surface temperature were followed using Thermotracer TH1106. The test was performed from immediately after injury till 5 days post-trauma, an average of two days after injury.

Results

Immediately after injury, the skin surface temperature was elevated to about 34 degrees at and around the site of trauma (Fig. 1). On the day following the injury, skin temperature remained elevated around the site of trauma to the same degree as immediately after injury, but was markedly reduced to about 29 degrees at its periphery (Fig. 2). Skin temperature began to fall in the high temperature zone and began to rise in the peripheral low temperature zone immediately following LLLT, and the peripheral skin temperature reached a peak or became almost normal at about 40 minutes after the initiation of irradiation (Fig. 3). Changes in post-LLLT skin temperature in all patients

a b c

Fig. 1. Sprain of the right ankle joint immediately after injury:

a) Before irradiation, a high temperature zone extends over the trauma site and a wide area around it.

b) At 10 minutes after LLLT,skin temperature fell at the trauma site, and rose in the toes at the periphery.

c) At 20 minutes after LLLT,skin temperature was re-elevated at the trauma site.

31 Laser Therapy Vol. 12 Official Journal of the World Association for Laser Therapy (WALT) showed that skin temperature fell by an average of 3degrees in the high temperature zone around the site of trauma, and rose by an average of 3 degrees in the peripheral low temperature zone, both to approximately normal skin temperature. Clinically, swelling and edema were diminished and repeated irradiation suppressed exacerbation of swelling and edema.Patients receiving pre- and post-operative application of LLLT for such conditions as talipes varus, in which postoperative necrosis of skin in the wound area and delayed wound healing are frequent, spoke injury produced when the foot is caught in a bicycle's spokes (Fig. 4), and paralytic feet with distal circulatory failure due to spin bifida or cerebral palsy, we have not seen any necrosis of the skin in the wound area or delayed wound healing.

Discussion

There have been many reports on wound healing (2, 3).Currently, the site of trauma is cooled to reduce swelling in acute-phase injury. An important problem in the healing

of wounds and associated fractures is how to suppress swelling and edema, and improvement of local swelling and edema is also crucial for the healing of ligament injury in sprained ankles. However, the use of LLLT for sprained ankles is controversial (4). Thermography has been used for evaluating the effect of LLLT (5). In the present thermographic evaluation, the surface temperature was high around the trauma site and low in the periphery, which indicated that local blood and lymph flow were impaired by swelling and edema, thus raising temperature. When LLLT was applied to these areas, it was found that skin temperature fell in the high temperature zone but

rose in the low temperature zone to approximately the normal temperature in both zones, suggesting improved blood and lymphatic circulation. Clinically, reduction of local swelling and edema was considered to have led to the improvement of blood and lymph flow.

Conclusions

1: In acute-phase injury, skin temperature was elevated around the site of trauma, and reduced in the periphery on the day following the injury.

2: Immediately after irradiation, skin temperature fell by 3oC on the average in the high temperature zone around the trauma site, and rose by 3oC on the average reaching normal temperature in the low temperature zone at the periphery of the injury.

3: LLLT rapidly improved blood and lymphatic flow, which had been impaired by injury, and alleviated swelling and edema. LLLT was also useful in accelerating healing of the surgical wound.

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a b c

Fig. 2. Contusion of the right tibial shaft 1 day after injury: a) before irradiation,

Skin temperature is high at the trauma site, and low at the periphery.

b) At 10 minutes after LLLT:skin temperature fell at the trauma site, and rose slightly at the periphery. c) At 40 minutes after LLLT: skin temperature at the periphery reached a peak and nearly normal skin temperature

a b c

3. Fracture of the right tibia 2 days after removal of nailing:

a) Before irradiation, skin temperature was high in the surgical wound and low at the periphery.

b) Immediately after LLLT, skin temperature was reduced in the high temperature zone, and elevated in the low temperature zone.

c) At 40 minutes after LLLT, skin temperature at the periphery reached a peak.

a b

4. Spoke injury:

a) At 6 days after injury the left foot had been caught in the rear wheel of a bicycle, and this left a large skin defect on the back of the foot and a contusion, with marked swelling and edema.

b) After daily LLLT, epithelialization was observed and the wound healed at 23 days after injury.

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Lower Back Pain, Low Level Laser Therapy (LLLT) Research.

Abstract

Objective:The aim of this study was to investigate the clinical effects of low-level laser therapy (LLLT) in patients with acute low back pain (LBP) with radiculopathy.

Background Data : Acute LBP with radiculopathy is associated with pain and disability and the important pathogenic role of inflammation. LLLT has shown significant anti-inflammatory effects in many studies.

Materials and Methods: A randomized, double-blind, placebo-controlled trial was performed on 546 patients. Group A (182 patients) was treated with nimesulide 200 mg/day and additionally with active LLLT; group B (182 patients) was treated only with nimesulide; and group C (182 patients) was treated with nimesulide and placebo LLLT. LLLT was applied behind the involved spine segment using a stationary skin-contact method. Patients were treated 5 times weekly, for a total of 15 treatments, with the following parameters: wavelength 904 nm; frequency 5000 Hz; 100-mW average diode power; power density of 20 mW/cm^2 and dose of 3 J/cm^2; treatment time 150 sec at whole doses of 12 J/cm^2. The outcomes were pain intensity measured with a visual analog scale (VAS); lumbar movement, with a modified Schober test; pain disability, with Oswestry disability score; and quality of life, with a 12-item short-form health survey questionnaire (SF-12). Subjects were evaluated before and after treatment. Statistical analyses were done with SPSS 11.5.

Results: Statistically significant differences were found in all outcomes measured ($p < 0.001$), but were larger in group A than in B ($p < 0.0005$) and C ($p < 0.0005$). The results in group C were better than in group B ($p < 0.0005$). ***Conclusions:*** The results of this study show significant improvement in acute LBP treated with LLLT used as additional therapy.

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Chiropractic Treatment

Chiropractic addresses the function of central nervous system which is the “master system” of the body controlling ad regulating function of all other subsystems including musculoskeletal system. Properly aligned skeletal system would improve performance, reduce the risk of injury and improve healing of existing injuries.

Chiropractors specialize in the non-drug treatment of musculoskeletal problems, including joint sprains and disc injuries. To some extent, the chiropractic approach to sports injuries is similar to that of traditional medical care.

Usually chiropractor’s initial examination would include standard orthopaedic and neurological tests to diagnose whether a particular pain is due to a strain, sprain, or disc problem. X-ray examination is also performed to screen for fractures and other bone disorders, such as osteoporosis.

Chiropractic management of sports injuries often includes widely used physical therapies such as ice, Low Level laser therapy (LLLT) to reduce swelling and inflammation, or electronic muscle stimulation for muscle strains and spasms.

Importance of Restoring Structural Body Balance.

Chiropractic management of sport injuries has an emphasis on adjustment and improving function of spinal and other joints through manipulation as well as restoring overall structural balance of the body. Chiropractor assess the effect of the muscle injury on the rest of the body as it would cause tightening of other muscle and joints in

order to maintain general balance. Chiropractic adjustments help to restore the natural balance that was present before the injury.

Cold or Low level Laser Therapy Coventry

The lasers used are certified as Cold Laser. For the past 30 years the technology of Cold Laser Therapy (also known as **Low Level Laser Therapy**) has been formally accepted in North America and in many other parts of the world such as Europe, Russia and Japan. In all this time there have been no recorded long-term adverse effects from low level laser therapy. It is considered to be non-invasive, painless and safe.

Cold or Low Level Therapy uses laser light energy to stimulate cells to function optimally. In the body, light sensitive chromophores and other elements within the cell absorb energy, initiating a series of important photochemical changes such as increased production of ATP. The mitochondria and Kreb's Cycle stimulation initiates the production of ATP, providing the cell with the extra energy needed to accelerate the healing process and positively influence pain. These activities can occur in all types of cells and includes ligament, nerves, cartilage and muscle.

Cold or Low Level Laser Therapy is a treatment where by a cold laser is utilized to treat chronic and acute pain. Cold or Low level laser therapy may be used for patients suffering from back and neck pain, musculoskeletal pain, joint pain associated with arthritis, fibromyalgia, tendonitis, bursitis, neuropathy, Achilles tendonitis, migraine headaches, sprains and strains, carpal tunnel syndrome and other associated pains. Cold or low level laser therapy also treats conditions such as TMJ, reflex sympathetic dystrophy (RSD) and other inflammatory and scarring conditions. By increasing serotonin levels, cold laser therapy contributes to the body's own healing process. Non-thermal and non-invasive, cold or low level laser therapy involves a combination of cold laser and electric stimulation and is one of the most effective healing therapies. Completed in ten to twelve sessions, cold laser therapy can significantly reduce treatment time and costs.

Cold or **Low Level Laser Therapy** (LLLT) is a Handheld, non-invasive, light-emitting medical device which is used over different areas of the body. It provides an unmatched advantage in the treatment of conditions such as:

- Athletic and sports Injuries, Soft Tissue Injuries including Sprains and Strains, Tendonitis and Haematomas
- Lower leg (calf pain) inflammation, Shin splints, Hamstring, Achilles tendonitis, Bursitis, conditions and disorders
- Ankle sprains, injury, and fractures, inflammation conditions and disorders
- Heel and foot injury, pain, Bursitis, Achilles Tendonitis, Plantar fasciitis, conditions and disorders
- Knee pain, injuries, tears, ligament, Tendon injury, ruptures, Runners Knee, inflammation, Bursitis, conditions and disorders
- Shoulder injury, pain, Shoulder tears, fractures inflammation, Tenosynovitis Tendonitis, Bursitis, conditions such as frozen shoulder, and disorders
- Neck injury, Neck Pain, Neck sprain, Whiplash injury.
- Back Injury, Lower back pain, Sciatica, slipped discs, prolapsed disc, herniated / bulging discs, Trapped nerves, and inflammation.
- Elbow, Wrist and Hand injury, Tendonitis, inflammation, fractures, conditions and disorders, such as Tennis Elbow,(Golfers Elbow) Carpal Tunnel Syndrome,
- Hip injury and pain, Sacroiliac Joint inflammation, groin and thigh strain (pull), sports hernia, Hip Bursitis/Tendonitis, Trochanteric Bursitis, conditions and disorders
- Muscle sprain and spasms, Cramps, Joint Pain and stiff Joints.
- Pain Relief, including Arthritic pain relief.
- Wound Management including Skin Ulcers, Pressure Sores and Burns, Skin infections
- Chronic pain such as Trigeminal Neuralgia and Chronic Neck and Back pain.

Conditions treated with Low Level Laser Therapy

- Repetitive stress injury
- Carpal tunnel syndrome
- Rotator cuff tear
- Epicondylitis

- Fibromyalgia
- Reflex sympathetic dystrophy
- Temporo-mandibular joint dysfunction
- Ligament and tendon tears
- Fractures with associated soft tissue injuries
- Facet joint syndrome
- Bulging and herniated discs
- Contusions
- Tendonitis
- Myositis
- Synovitis
- Bursitis
- Plantar fasciitis
- Rheumatoid arthritis

Injuries treated with Low Level Laser Therapy

- Ligament and tendon tears
- Fractures with associated soft tissue injuries
- Facet joint syndrome
- Bulging Prolapsed Slipped and herniated discs
- Contusions

Inflammatory conditions treated

- Tendonitis
- Myositis
- Synovitis
- Bursitis
- Plantar fasciitis
- Rheumatoid arthritis

Low Level Laser Therapy Safety

Low level laser therapy is not harmful. Lasers used for tissue stimulation have insufficient strength to damage cells. 30 years of clinical studies and clinical use have shown no adverse effects whatsoever.

The Advantages of Low Level Laser Therapy

- Non-invasive
- Non-toxic
- Easily applied
- Highly effective
- Cure rate > 95%
- No known negative side effects

Mechanism of Action

Therapeutic lasers work by supplying energy to the body in the form of photons of light. The tissues and cells then absorb this energy, where it is used to accelerate the normal rate of tissue healing.

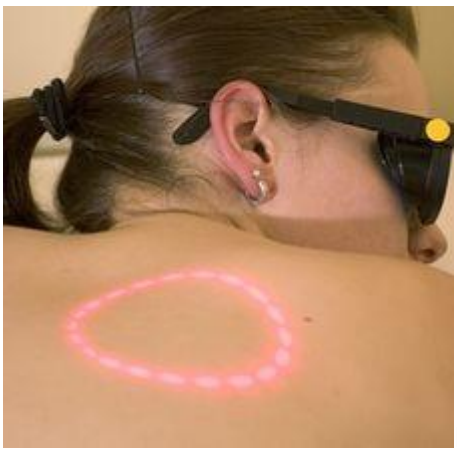
Therapeutic Benefits of Laser Therapy:

- Anti-inflammatory Action: Laser light reduces swelling, leading to decreased pain, less stiffness, and a faster return to normal joint and muscle function.
- Rapid Cell Growth: Laser light accelerates cellular reproduction and growth.

- Faster Wound Healing: Laser light stimulates fibroblast development and accelerates collagen synthesis in damaged tissue.
- Reduced Fibrous Tissue Formation: Laser light reduces formation of scar tissue, leading to more complete healing, with less chance of weakness and re-injury later.
- Increased Vascular Activity: Laser light increases blood flow to the injured area.
- Stimulated Nerve Function: Laser light speeds nerve cell processes which may decrease pain and numbness associated with nerve-related conditions.
- Frequency of Treatments
- While some patients get immediate results, others require 6-10 treatments before seeing a lasting effect. Less severe or acute injuries will require fewer treatments than chronic or severe conditions

How Do I Become a Low Level Laser Therapist?

After graduating with a journalism degree from Emerson College in 1989, James Dryden went to work immediately in the publishing industry, first as a type-setter then as a copy editor, layout artist, writer, photographer and proofreader. By James Dryden, eHow Contributor


Low level laser therapy uses photons that come from the infrared light spectrum.

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Low-level laser therapy uses photons that come from the infrared light spectrum, which penetrate the skin without heat so it will not damage or cause side effects, as the light beam travels in a straight line to focus on a certain spot or area, according to lowlevelaser.info. A therapist administers this type of treatment in 10-minute sessions. This noninvasive type of therapy is being used worldwide to treat and cure various conditions. Training to become a low-level laser therapist is generally offered in health care professional centers.

1. Modalities and Training

- To become certified in low-level laser therapy, you would first choose from the modalities such as insomnia laser therapy, pain relief laser therapy, weight loss laser therapy, cosmetic laser therapy and more. Depending on if you choose one modality or more, your training will involve topics such as laser safety, an overview of laser physics, laser

biological responses, vitamin therapy, behavior science, hands-on experience and more, according to matrixths.com.

Duration of Training and Restrictions

- Each modality consists of two to three days classes at six hours a day. Certain modalities may only be available to licensed and medical health care professionals, such as tissue/wound healing and anxiety/panic disorders. There is also post-training support in some centers such as the Matrix (see References). You will receive your certificate upon completion of the course.

Where to Train

- The Matrix offers training in a variety of modalities at their center as well as offering businesses the ability to come to them. Should that not be convenient for your particular needs, you may wish to look into a center such as THOR, which offers training courses all over the world. In the U.S., for example, THOR travels from state to state over a period of six months out of the year, according to thorlaser.com.

References

- Low Level Laser: Healing with Low Level laser Therapy
- Matrixths: Laser Therapy Training
- THOR Laser: THOR Training Course

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We may also have an interest free payment plan on this course, please click on the fees tab for more information.

Electro-therapy has been used within physiotherapy and sports injuries clinics for many years. It has proved to be one of the greatest aids in the treatment of sports type injuries in the last 25 years and has aided the speedy recovery of many conditions that previously would have taken weeks or months to return to normal function.

This course will aim to show you the fundamentals of electro-therapy, its application and benefits.

Course Syllabus

- Qualifications
- Fees
- Professional Membership
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- Study Options

Benefits

- Related Courses
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Syllabus

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Requirements for Entry

There is no experience or previous qualifications required for enrolment on this course. It is available to all students, of all academic backgrounds.