

## NEWS

# Low Level Laser Therapy used in successfully treating musculoskeletal sports injuries and degenerative conditions.



Photo: low level laser

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### What is Low Level Laser Therapy (LLLT)?

The use of LLLT is the application of targeted low power laser beams or light energy to the cells. Light with a wavelength in the red to near infrared region of the spectrum is used as these wavelengths have the ability to penetrate skin and soft or hard tissues. The therapy is painless and produces no sensation or cause the skin to burn. Due to the fact that LLLT does not produce heat it is also known as cold laser therapy. The beam penetrates deep into tissues without temperature elevation - and produces a photobiostimulative (regenerative) effect. The absorbed laser energy provides stimulation to the molecules and atoms of cells in the injured area.

Low Level Laser Therapy treats the underlying cause of pain resulting from a painful injury - unlike medication which may only mask the pain. It has no side effects and can be combined with other forms of treatment that may be recommended by a physician. LLLT is an extremely effective treatment option for pain relief due to sports injuries and other strenuous physical activities. Among the advantages of LLLT is that it is a non-invasive procedure and is easily administered with fewer complications - and does not require medication. LLLT relieves and potentially eliminates pain in the affected area. LLLT enables faster recovery from injury and an earlier resumption of sporting activities.

### **How does Low Level Laser Therapy work?**

Low-level lasers beams are non-invasive and do not cut into tissue. LLLT uses pulse or continuous-wave emission that enhances cellular function, nerve regeneration, reduces inflammation and expedites recovery. Red beam or near infra-red lasers are used in LLLT. The effectiveness of LLLT is governed by wavelength, treatment duration, dosage and site of application. Clinical results will vary according to the depth of target tissue (Chow et al ,2009; Surendranath et al ,2013).

Extensive clinical evidence has proven that Low Level laser Therapy has many remedial benefits; a reduction in pain by stimulation of the body's natural pain killers or endorphins; reduced inflammation and swelling by the suppression of inflammatory enzymes; Lymphatic drainage is improved to increase circulation and accelerate the healing process; the tightness in muscles following an injury is relaxed to provide improved mobility; there is an increase in the speed and quality of wound healing and tissue repair; bone repair is facilitated by stimulating fibroplastic and osteoblastic production; The immune system and nerve function is improved.

### **The treatment of sports injuries using Low Level Laser Therapy.**

When sports injuries are sustained these are often painful and a complete recovery may take some time. There can be extensive soft tissue injuries involving ligaments, tendons and muscles. The pain endured (especially when sports training is continued) can compromise the healing process and impact current and future physical performance. The body's response to trauma is inflammation characterized by partial or complete loss of function as a result of the injury. The inflammatory stage is the first stage of healing and initiates cell proliferation and tissue regeneration. However, an excessive response slows down the healing process. In the treatment of an injury, LLLT mediates and resolves the inflammatory phase and accelerates the entire healing process to expedite and improve function and mobility.

Sport injuries are often the result of overuse or acute injuries sustained during participation in high impact and intensity sports (physically demanding non-sporting activities can result in similar injuries). The wide range of sports injuries that respond well to Low Laser Light Therapy include; jumpers knee, frozen shoulder, tennis elbow, muscle strain and ligament damage, bursitis, and inflammation of the tendon sheath. In Tendinopathy, research has found that Low Level Laser Therapy provides consistent results.

There are many sporting activities where active participation can result in injury; these include, golf, martial arts, basketball, running, aerobics, dance, tennis, squash, volleyball, football, rugby and cricket to name a few. What most of these sports have in common is that they are activities that require repetitive movements with forces and loads that increase the risk of injury. For example golfers can experience tendinitis in their elbows or knees due to the constant need to stabilize the rotation of the hip axis at the beginning of a swing. Lower back injuries in Golf and are often due to the bend over stance along with pivoting and twisting motions.

### **What causes tendonitis?**

Overuse of the tendon or frequent repetitive movements can injure the tendon. Injuries can result from active sports participation and recreational running to strenuous work activities such as painting and scrubbing. Activities with repeated motions or awkward

positioning can be the cause of injury. Lack of fitness and not stretching before exercise is often a contributory factor. Lifestyle factors such as irregular exercise patterns i.e intensive activities at the end of the week and not as a general fitness regime Monday to Friday, can result in strain and injury. In addition, an age related decline in the elasticity of tendons make tendons prone to injury.

## What are the symptoms of Tendonitis?

Tendonitis is often felt with a sharp and sudden onset of pain. Or dull aching pain that worsens with movement. There is a loss of motion and stiffness with the affected area tender to touch. There could also be fever and swelling, redness and warmth.

When injured the healing process may take weeks or months. During this period the tendon is exposed to the possibility of a total rupture due to a reduction in collagen fibres.

Long periods of immobilization following a tendon injury can be avoided with the use of Low Level Laser Therapy. LLLT works by increasing the deposition of collagen (thick fibres) and accelerates regeneration of the tendon. Functional rehabilitation is also improved and further complications minimized (Nogueira,2015). LLLT may be combined with an exercise programme to complement regeneration of the tendon. Instant or long-lasting relief cannot be guaranteed as results will vary for each patient and the type of injury. Factors that need to be taken into account in the healing and recovery process are, age, health condition, injury type, patient's lifestyle, and any concurrent treatments.

## Achilles Tendonitis

Achilles tendonitis is a common sports injury among athletes and effects some 15% of runners. It is a debilitating condition and may even make walking painful and difficult.

The injury often occurs in the older age groups of recreational runners and is a symptom of reduced flexibility due to age. It can be caused by overuse, over pronation of the foot, a change in running routine, being overweight or even new footwear can be the trigger. Posterior heel pain is the primary presenting symptom. Repeated episodes of Achilles tendonitis can lead to a degenerative condition known as Tendinosis. This condition results from the tendon tearing or rupturing. Therefore it is important to receive treatment and Low Level Laser Therapy for Achilles tendonitis as early as possible in minimizing the risk of tendinosis. The success rate using Low Level Laser Therap in the treatment of Achilles tendonitis has been proven to be exceptionally high (Morimoto et al,2013)..

## Treating Tennis & Golfers elbow (lateral epicondylitis) with Low Level Laser Therapy

In the treatment of tennis and golfers elbow Low Level Laser Therapy can provide significant long-term improvement. Total relief of pain with improved functional ability, is the conclusion of clinical research into the effectiveness of Low Level Laser Therapy in treating chronic and acute cases of tennis elbow. LLLT was also found to significantly improve grip strength in tennis and golfers elbow (Simunovic,1998;Lam et al,2007).

## How effective is LLLT in treating other conditions?

Low Level Laser Therapy is successfully used to relieve pain and accelerate recovery in many orthopaedic conditions (*orthopaedic relates to the human musculoskeletal system and the body's connective tissues, tendons and ligaments*). These conditions include sprains and strains, whiplash injuries, muscular back pain, tendonitis. Chronic conditions where LLLT is effective include conditions such as osteoarthritis (Rashoud,2014),rheumatoid arthritis, frozen shoulder, neck and back pain, epicondylitis, carpal tunnel syndrome, tendinopathy, fibromyalgia, plantar fasciitis, post tibial fracture surgery, herpetic neuralgia, trigeminal neuralgia and diabetic neuropathy (Cotler et al,2015).

## Low Level Laser Therapy in alleviating lower back pain

LLLT is extremely effective in treating nonspecific chronic low back pain (NSCLBP) - one of the most common musculoskeletal disorders (Malliaropoulos,2010). NSCLBP is a leading cause of disability worldwide and affects two thirds of people during their lifetime (Huang et al 2015). Apart from providing significant pain relief, patients also experience a greater range of motion following treatment using Low Level Laser Therapy.

## Low Level Laser Therapy in neck pain

Chronic neck pain can be the result of an isolated sports injury, however, it is expected to reach epidemic proportions during the next 30 years as ageing populations increase in developed countries. Some 10 -24% of the population will be effected by neck pain. Clinical studies have shown that LLLT is extremely effective, and can provide immediate and long lasting relief from acute neck pain. LLLT in acute or chronic neck pain, aids tissue repair, relieves the pain, improves mobility and stimulates acupoints (Chow et al ,2009) *Acupoints are pressure points identified in TCM (Traditional Chinese Medicine) for the flow of energy (chi or qi) through neural pathways.*

## Chronic Headache relief and Low Level Laser Therapy

Chronic headaches may effect up to 2.5% of the global population. LLLT as an alternative to pain killers may provide benefits to sufferers of recurrent headaches. LLLT has been found to modulate serotonin levels and regulate the blood flow in sufferers of chronic headaches. Serotonin is a chemical produced in the body by nerve cells and is considered a mood stabilizer. Studies have shown that following Low Level Laser Therapy there is a probable 'increase in the temporal artery diameter leading to lower pressure inside the vessel'. This is significant as an increase in blood flow during tensional headaches is one of the symptoms observed in patients (Magalhaes,2016).

## Low Level Laser Therapy used in Stroke recovery

LLLT helps prevent tissue death when used in regenerative medicine. LLLT is found to have an application in some long-term chronic diseases such as stroke. Research has shown that transcranial LLLT can significantly 'improve outcome in acute human stroke patients when applied approximately 18 hours after the stroke occurs over the entire surface of the head' (Hashmi et al 2010). In other research involving stroke patients - and lower limb spasticity, it was found that Low Level Laser Therapy may work in the same way as it does with athletes to increase the recruitment of muscle fibres. This results in less intensity of pain with reduced stiffness and muscle fatigue (Neves et al,2016).

## Low Level Laser Therapy and smoking cessation

LLLT is widely used in treatment for smoking cessation and is consistently successful in outcome. It is proven to be considerably more effective than hypnotherapy, gum or nicotine patches according to the results of various trials.

Smoking tobacco is not only harmful to our health (and that of passive smokers through second-hand smoke) but is no longer socially acceptable. Tobacco usage is linked to many chronic diseases, these include asthma, COPD (chronic obstructive pulmonary disease) lung cancer and heart disease.

The habit of smoking is through the smoker's growing dependency on nicotine for the relief of tension and alleviation of tiredness to improve concentration. When a habitual smoker tries to quit smoking they are faced with intense withdrawal symptoms. These physiological effects relate to cell receptor sites once blocked by nicotine that need to be freed and replaced by the natural substance 'endorphins'. Endorphins inhibit the transmission of pain and without them the pleasurable effects of nicotine absorption are replaced by effects such as headaches, drowsiness, irritability, insomnia and lack of concentration (Kerr et al,2008).

## How can Low Level Laser Therapy result in smoking cessation?



In smoking cessation LLLT works by modifying the physical symptoms of withdrawal to enable patients to counteract the mental and physical resistance in overcoming their nicotine addiction. LLLT is directed towards the stimulation of ear and body acupoints to reduce the cravings for tobacco cigarette smokers habitually experience. This is replaced with a sense of calm and a reduction in anxiety and the need to 'light up'.

Following use of LLLT in treating smoking cessation, patients often report a mild sense of euphoria as the release of endorphins are stimulated. In addition, LLLT stimulates the body's ability to detoxify and rid itself of the harmful effects of long term tobacco use. Studies have found that LLLT can be an effective treatment for smoking cessation within just 3 or 4 clinical sessions (Kerr et al,2008).

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