

## **A BRIEF SYNOPSIS OF THE RESEARCH ON COLD LASER THERAPY (LOW LEVEL LASER THERAPY)**

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Light therapy has been shown in over 40 years of independent research worldwide in more than 1200 studies to deliver powerful therapeutic benefits to living tissues and organisms. Both visible red and invisible infrared light have been shown to affect at least 24 different positive changes at a cellular level. Einstein even touted the benefits of light on the human body in 1918.

Cold or Low Level Laser Therapy (LLLT) has proven to be a very effective treatment for many conditions including those that have not responded well to traditional methods, including surgery. In many instances, it can also be a viable alternative to surgery and long-term use of pain medications.

*Below are some selected research references in the field of Cold Laser Therapy:*

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### **FDA Approves Cold (or Low Level) Laser Therapy for Carpal Tunnel Syndrome**

Carpal Tunnel Syndrome is a serious ailment that affects the quality of life for millions of people each year. Medical science has searched diligently for affordable, non-surgical carpal tunnel treatment modalities. But until low level laser was approved as a safe and effective carpal tunnel treatment, few options were available.

In 2002 (February 6<sup>th</sup>), the FDA finally approved old laser (or low level laser) for use with Carpal Tunnel Syndrome.

*FDA Approves The Effectiveness Of The Use Of The Patented 830Laser Treatment On Carpal Tunnel Syndrome! - GM Study, Anderson et. al. (1995)*

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### **Cold Laser Successfully Treats Carpal Tunnel Syndrome**

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

*E. Wong G Lee, J. Zu Cherman and D.P. Mason; Western Heart Institute and St. Mary's Spine Center, San Francisco, CA, and Head and Neck Pain Center, Honolulu, HI*

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. In 35 such patients we focused the treatment primarily at the

posterior neck area and not the wrists and hands. The [low level] laser rapidly alleviated the pain and tingling in the arms, hands and fingers and diminished tenderness at the involved spinous processes.

*Laser Therapy, 1997:9:131-136*

“With low level laser treatment, complete resolution of pretreatment symptoms and abnormal physical findings was achieved in 77% of cases. It is a safe, cost-effective therapy producing a 77% success rate and appears to be an attractive substitute for surgery.” Noninvasive Laser Neurolysis in Carpal Tunnel Syndrome.

*Muscle and Nerve, 20:1029-1031, 1997.*

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## **General Motors and Baylor University Study Show Cold Laser Is Effective For Carpal Tunnel Syndrome!**

General Motors (GM) conducted a 7-month, double-blind study to determine the effectiveness of low level laser therapy in treating Carpal Tunnel Syndrome, (CTS) as well as a seven-year study on its use in managing other types of chronic pain. The FDA recently approved the therapy, which may be effective in reducing the tissue inflammation that causes the symptoms of CTS. Involved in the study were several medical practitioners from General Motors as well as Baylor University.

General Motors, in 1995 had spent a total of \$2 billion on the treatment of Worker’s Compensation claims related to Carpal Tunnel Syndrome. They conducted a study of 119 patients randomly assigned to two groups, one receiving physical therapy coupled with low level laser, the other half received physical therapy along with a placebo laser treatment.

### Results

- \* Return to work following treatment was 72% higher for the active laser treated group (72% vs. 41%)
- \* Pinch and grip strength was significantly higher in the active laser treated group.
- \* Range of motion improved significantly greater for the active laser treated group. Overall conclusion is that using low level laser for carpal tunnel treatment combined with physical therapy improves functional measures of wrist-hand work performance and results in greater probability of return to work than physical therapy alone.

*MORE...*

Johnson began following the development of low level laser after its clinical trials years ago. General Motors and one of Baylor University’s medical centers both tested the device. “GM in 10 years spent \$2 billion on Carpal Tunnel Syndrome alone, between lost production, re-education of employees, medical costs and employee replacements,” Johnson said. “They conducted trials of the laser and found it to be 70 to 80 percent effective - nearly 80 percent of the people in the study went back to work full-duty, while the other 20 percent had some improvement but did not have full resolution.”

“They considered full resolution to be total elimination of pain and limitations, and 80 percent of the people achieve that,” he said. "That's a big deal. They weren't testing a small group - they tested every employee who was diagnosed with Carpal Tunnel Syndrome.”

“We had a client who suffered Carpal Tunnel for 14 years, as a result of cutting hair and working at Target,” Johnson said. “She was seriously debilitated. After two treatments, she had full range of motion and was sleeping through the night again.”

"Another patient in our building went from 30 pounds of grip strength to 60 pounds of grip strength in three treatments. We also treated a guy who had flexor tendinitis, and he went from 30 pounds of grip strength to 130 pounds in three treatments."

Because they wanted to test the laser's capabilities, Johnson and Maleyko both underwent laser therapy themselves. They were eager to experience the laser from a patient's point of view.

“It's a lot like ultrasound - you don't feel it,” Johnson said. “Occasionally you can feel a tingle. There's no heat. It's very comfortable. I had tendinitis in my elbow horribly bad, from keyboarding because of a big proposal I'd been working on. The laser eliminated the pain. Ray had tendinitis from playing guitar and baseball, and it worked with him, too.”

Although the laser is approved by the FDA only for treatment of CTS, patients can opt to take part in clinical investigations and undergo low-level laser therapy on other parts of their body. Johnson said he has used the laser on nearly every part of himself and found positive results each time.

Maleyko pointed out what he feels is one of the laser's most significant achievements: It works on diabetic patients as quickly as non-diabetic patients.

“There's so much potential here,” he said. “Our short-term and long-term goals are to do solid research on other applications, including lateral epicondylitis as well as the effects of low-level laser therapy on diabetic wound healing.”

“This laser is not a cure-all,” Maleyko added, “but it is certainly doing amazing things.”

Johnson said the therapy does more than simply relieve pain. “Like any modality, if you continue the insulting activity, your going to continue to have the problem,” he said. “But the laser causes healing rather than pain blockage. This does have a lasting effect. The problem is, if you continue to do the activity that led to your problem and you don't modify it through ergonomics, you'll develop it again.”

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## **Cold Laser Therapy Shown Effective in Reducing Pain, Muscle Spasm and Tenderness Associated with Fibromyalgia.**

A randomized, single-blind, placebo-controlled study was conducted to evaluate the efficacy of low-energy laser therapy in 40 female patients with fibromyalgia.

Patients with fibromyalgia syndrome were randomly allocated to active laser or placebo laser treatment daily for two weeks except weekends. Both the laser and placebo laser groups were evaluated for the improvement in pain, number of tender points, skinfold tenderness, stiffness, sleep disturbance, fatigue, and muscular spasm.

There were no significant differences in either group prior to therapy in any pain category measured. However, there was significant improvement observed in the active laser treated group with respect to

pain, muscle spasm, morning stiffness and tender point numbers associated with fibromyalgia syndrome. No patients reported any side effects.

This suggests that laser therapy is effective on pain, muscle spasm, morning stiffness, and total tender point number in fibromyalgia symptoms. The study further suggests laser therapy is a safe and effective means of treating fibromyalgia treatment.

The study suggests laser therapy is effective on:

1. Pain.
2. Morning stiffness
3. Total tender point number.

Laser Therapy is a safe and effective means of fibromyalgia treatment.

*Research Shows Laser Therapy Effective in Reducing Pain, Muscle Spasm and Tenderness Associated with Fibromyalgia. Gur et. al. (2002) - Gur et. al. (2002)*

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## **Cold Laser Therapy Effective with Myofascial / Trigger Point Disorders**

62 patients with myofascial pain syndrome with a trigger point in the neck or upper back region were randomly divided into two equal groups according to therapy applied.

- Laser Therapy plus stretching exercises
- Stretching exercises only

The outcome measures were pain measured with visual analogue scale (VAS), algometry on the trigger point, algometric difference, thermographic difference and thermal asymmetry. Comparison was made within and between the groups pre- and post-therapeutically and three weeks after therapy.

Treatment was applied during 10 daily sessions with a low level laser. The evaluation of the patients was performed three times; before the treatment, at the end of the treatment and 3 weeks after the treatment ended by a physician unaware of the therapy applied. The parameters evaluated were quantified by VAS, algometry, and thermography.

All five pain-related and thermographic parameters were observed to improve in group 1 patients in the first evaluation after therapy and this significant improvement persisted in the second evaluation 3 weeks after the treatment. However, only spontaneous pain and algometric value were found to improve in the patients belonging to the group that did not receive laser treatment.

A prominent college of medicine in Houston, Texas, conducted a later double-blind study in 2000. That study showed 70% improvement in the active group using laser therapy.

*Aching Muscles Got You Pained? Study Shows Cold Laser Treatment Can Reduce It! – Gur et. al. (2004)*

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## **Cold Laser Therapy Shown Successful In Treating Osteoarthritis!**

### Osteoarthritis Study

In 2003 a doubled blind, randomized, 14-week controlled study was conducted on 90 patients needing arthritis pain relief. Each group was randomly placed into one of three treatment groups. The purpose of the study was to determine the effectiveness of the low level laser in treating arthritis pain in the knee.

The three arthritis pain treatment groups were treated as follows: Group A received 10 laser treatments of 5 minutes each over a two-week period of time. Group B received the same number of treatments for arthritis pain relief over the same period only the treatments were only 3 minutes in length. Group C was the control and received treatment from a placebo laser for the same time period.

There were 30 patients in each group each experiencing similar needs for arthritis pain relief. All patients received a total of 10 laser treatments (over 2 weeks) and 14 weeks of exercise. Follow up measures 4-8-12 weeks after last laser treatment.

### Osteoarthritis Study Results

\* Patients in group A (5 min laser treatment)

- Doubled the pain-free walking distance (and time) after treatment
- Reduced morning joint stiffness from arthritis pain time from 12 to 2 minutes
- Increased knee flexion by 10 degrees
- Reduced WOMAC score from 55 to 30

\* Group B (3 minute treatment)

- -Improved but not as much as Group A

\* Little arthritis pain relief was noted in the control Group C

*Research Shows 830Laser Is Successful In Treating Painful Osteoarthritis In The Knee - Gur et. al. (2003) . Arthritis Pain Relief*

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## **Cold Laser Effective With Rheumatoid Arthritis**

A recent meta-analysis in the *Journal of Rheumatology* for rheumatoid arthritis, low-level laser therapy reduced pain by 70% relative to placebo, reduced morning stiffness, and increased flexibility. Brosseau L, Welch V, Wells G, et al. Low level laser therapy for osteoarthritis and rheumatoid arthritis: a meta-analysis.

*J Rheumatol. 2000; 27:1961-1969*

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## **Cold Laser Therapy Utilized In Sports Injuries**

Increasingly, athletic trainers from professional teams to little league are adopting treatments using lasers in physical therapy of their injured athletes. Many have found that laser therapy is the easiest, fastest and most effective means of keeping athletes in the game instead of the injured list. We are fortunate to have medical devices such as lasers to keep competitors competing.

Two certified athletic trainers are among a handful of people in the United States comprising an initial group of professionals certified to use a new low-level laser. The device, they say, offers amazing relief for people with Carpal Tunnel Syndrome, and it also represents a wealth of research opportunity.

Doug Johnson, ATC, co-owner of Sports and Industrial Rehab in Taylor, Mich., and Ray Maleyto, ATC, a Sports and Industrial Rehab employee, both are certified to use low-level laser, which gained U.S. Food and Drug Administration approval in February 2002 for treatment of carpal tunnel syndrome.

"Canada has had this technology since 1994, but the United States is just now getting it," Johnson said. "It is scary how well this laser works. It's the first thing in therapy that can actually help heal the tissue."

*-By Valerie Hunt, NATA News. Oct. 15, 2002*

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## **Cold Laser Therapy Shown Effective with Migraine Headaches**

Migraine headaches are one of man's common afflictions. Despite voluminous articles that have been written about migraines, little is known about its causes.

32 patients (10 males and 22 females) with a mean age of 44.1 years (range from 21 to 67 years), with ongoing migraines and migraine-type headaches were evaluated.

Many patients had histories and signs of muscle-tendon and ligament injuries in the head and neck areas from automobile accidents, sport injuries and other trauma which often cause migraine headaches.

The soft tissue injuries were aggravated by their poor posture or by prolonged desk work. Most patients had pressure and/or pulsating pain around the head and in the frontal and temporal areas.

Following informed consent, migraine treatment consisted of a low power laser (wavelength 830 nm) was directed at the soft tissue lesion sites using 30 to 100 mW for 1 - 2 minutes per site.

Low power laser directed at these key anatomical areas along the NL, SP, and STY markedly diminished or totally abolished pain and tenderness in all patients. There was reduction of edema at tender sites and relaxation of muscles within 1-5 minutes. No adverse effects were observed.

It is believed that the laser stimulated removal of noxious chemicals via lymphatics. Thus low power laser treatment at appropriate anatomic areas can effectively and safely provide migraine relief.

*Research Shows Pain from Migraine Headaches Effectively Treated With 830Laser Therapy – Lee et. al.*

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### **Cold Laser Helps Tennis & Golfer's Elbow**

One study of 324 patients obtained total pain relief in 82% of the acute cases and 66% in the chronic cases of tennis and golfer's elbow.

*Clinical Laser Medicine & Surgery, 1998; 16 (3): 145-151.*

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### **Cold Laser Effective with a Variety of Soft Tissue Problems.**

“... results obtained after low level laser therapy (LLLT) treatment of more than 200 patients (headaches, facial pain, musculoskeletal, myogenic neck pain, shoulder and arm pain, epicondylitis, tenosynovitis, low back and radicular pain, Achilles tendonitis) were better than we had ever expected...mobility is restored (functional recovery), pain decreases or disappears...”

*Low Level Laser Therapy with trigger points technique: a clinical study on 243 patients. Journal of Clinical Lasers in Medicine and Surgery, 1996 Aug; 14(4):163-7*

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### **Cold Laser Stimulates Circulation and Helps with Pain**

“ LLLT improves local microcirculation and improves oxygen supply to hypoxic cells...normalization of microcirculation, due to laser applications, interrupts the “circulus vitosus: of the pain and its development.””

*Low Level Laser Therapy with trigger points technique: a clinical study on 243 patients. Journal of Clinical Lasers in Medicine and Surgery, 1996 Aug; 14(4):163-7*

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### **Cold Laser Better Than Drugs, Study Shows**

“ acute pain, diminished more than 70%; chronic pain more than 60%...use of analgesic drugs could be reduced or completely excluded. LLLT can be used as monotherapy or supplementary treatment to other therapeutic procedures for pain treatment.”

*Low Level Laser Therapy with trigger points technique: a clinical study on 243 patients. Journal of Clinical Lasers in Medicine and Surgery, 1996 Aug; 14(4):163-7*

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### **Cold Laser Lowers Pain & Increases Range of Motion**

Utilizing low level laser treatment on with an average patient age of 61. “This gave a total effective rating for pain attenuation of 90%, and for ROM [range of motion] improvement of 56.3%.”

*Clinical Application of GaAIA's 830NM Diode Laser in Treatment of Rheumatoid Arthritis, Department of Orthopaedic Surgery, Osaka City University Medical School, Japan.*

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## **Cold Laser Provides a “Substantial Therapeutic Effect”**

The Efficacy of Laser Therapy for Musculoskeletal and Skin Disorders: A Criteria-Based Meta-Analysis of Randomized Clinical Trials, Beckerman H, deBie 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. More specifically, for rheumatoid arthritis, post-traumatic joint disorders, and myofascial pain, laser therapy seems to have a substantial specific therapeutic effect. For this purpose, a criteria-based meta-analysis that took into account the methodological quality of the individual trials was used.

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

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**Elbow Pain (Epicondylitis / Tennis Elbow)**- Simunovic treated 324 patients... complete pain relief and restored functional ability were achieved in 82% of the acute patients and 66% of the chronic cases. *J Clin Laser Med & Surg. 1998; 16 (3): 145-151.*

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**Low Back Pain**- Soriano performed a double-blind trial with elderly people suffering from chronic low back pain. Treatment was effective in 71% of the laser group and 36% of the placebo group. The pain disappeared completely in 45% of the laser group and 15% of the placebo group. *Lasers Surg Med. 1998 Suppl 10, p. 6*

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**Shoulder Pain (Rotator Cuff Injuries)**- Low level laser therapy has been approved by the FDA as an adjunct treatment method for pain related to shoulder injuries.

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**Arthritis (Osteoarthritis / Rheumatism)**- Palmgren conducted a controlled double-blind study on 35 patients with rheumatoid arthritis of the hand. In the experimental group, grip strength and movement were improved while swelling, pain and morning stiffness were reduced. *Lasers in Medical Science, 1989; 4: 193*

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**Blood Pressure**- Umeda tested the effects of a low level laser on the control of blood pressure via energy administered via the medulla oblongata. The results from a group of 30 patients suffering from hypertension were positive in 80% of the patients. *Laser Therapy. 1990; 2(2): 59*

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**Headache / Migraine**- Wong treated 20 patients with migraine or symptoms resembling migraine. The pain disappeared after 1-5 minutes. *Proc 9<sup>th</sup> Congress Soc Laser Surgery and Medicine, Anaheim, CA: 2-6 Nov. 1991*

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**Fibromyalgia**- Longo treated 846 patients with fibromyositic rheumatism during a 15 year period. About 2/3 benefited from the treatment with regard to local pain, hypomobility and phlogosis. *J Clin Laser Med Surg. 1997; 15 (5): 217-220*

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**Allergies (Allergic Rhinitis)**- Neuman & Finkelstein studied 50 patients in a double-blind randomized study. Following treatment with a 660 nm red laser 72% of the treatment group reported improvement of symptoms as compared to 24% of the placebo group. *Ann Allergy Asthma Immunol 1997; 78:399-406*

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**Wound Healing**- Palmgrem investigated the effect of low level laser therapy on infected abdominal wounds after surgery. Healing time to half wound size was 6.8 days in the laser group compared to 14 days in the placebo group. *Lasers Surg Med 1991; Suppl 3:11*

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**Bacterial Infection**- In research led by Michael Hamblin of Mass. Gen. Hospital and Harvard Medical School, mice with surgically induced wounds were dosed with bioluminescent bacteria to create potentially lethal infections. Utilizing a 665 nm laser diode photodynamic therapy (low level laser therapy) the researchers found that “infected wounds healed significantly faster with the PDT method. PDT shows promise as a topical antimicrobial alternative that may work even faster than antibiotics.” *The Journal of Infectious Diseases, June 1, 2003, PP 1717-1725*

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**Acupuncture**- In addition, laser light can be used to stimulate acupuncture points in a non-invasive, pain-free manner. Low Level Laser Therapy Provides New Treatment Possibilities, *Dr. Melyni Worth Ph.D., World Equine Veterinary Review, Vol. 3, No. 3, 1998*