Introduction to Laser Acupuncture and its Clinical Application

Laser Basics for Laser Acupuncture
and
Clinical Applications of Laser Acupuncture
(Reducing Severity of Paralysis and Spasticity in Stroke, and Reducing Spasticity in SCI; and Treatment of Pain in Carpal Tunnel Syndrome)

Spinal Cord Injury Medicine 16th Educational Symposium
Sponsored by the VA Boston Healthcare System, West Roxbury Campus
November 2, 2007

This Handout includes parts of a report for the National Institutes of Health Consensus Development Conference on Acupuncture, November, 1997: Neurological Rehabilitation: Acupuncture and Laser Acupuncture to Treat Paralysis in Stroke and Other Paralytic Conditions (Cerebral Palsy, Spinal Cord Injury, and Peripheral Facial Paralysis - Bell's Palsy) and Pain in Carpal Tunnel Syndrome, by M. Naeser

No medical claims of cures are made.

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Table of Contents

Page

L.A.S.E.R. Terminology

L.A.S.E.R. - Light amplification by stimulated emission of radiation.

Radiation - The emission of photons (here, in relationship to low-level lasers).

Radiation has many forms including photons emitted from the sun, or even from light bulbs. There is ionizing radiation, which is cancer-causing in certain amounts; and non-ionizing radiation (not cancer-causing). The type of radiation emitted from low-level lasers in the red, or infrared wavelength range is non-ionizing radiation. It does not cause cancer.

Emission of photons - Each element contains an atom with a nucleus containing protons (positive charges) and neutrons. Outside the nucleus, there are electrons (negative charges). The electrons normally orbit around the nucleus in an inner ring. When electrical current is applied, the electrons become excited, and move into an outer ring of orbit. When the electrons return to their inner ring of orbit, they emit photons (light). Thus, photons are emitted when electrons are returning to their inner ring of orbit.

The photons which are produced by excitation of different elements (e.g., Helium, Neon, Gallium, Aluminum, Arsenide) have different wavelengths (colors) of light. The most common elements used in gas-tube low-level lasers are Helium and Neon, emitting a red light, or a red laser beam. A photon is a quantum of electromagnetic energy, generally regarded as a discrete particle having zero mass, no electric charge, and an indefinitely long lifetime. Thus, low-level lasers are considered to emit photons (electromagnetic energy).

The photons emitted with very short wavelengths, such as gamma rays, or x-rays, are cancer-causing (ionizing radiation). The eye cannot see these very short wavelengths. The workers at the Chernobyl nuclear accident were exposed to high levels of the these very short wavelengths which produced high incidences of cancer. The wavelengths in the visible spectrum, such as the red or near-red (infrared) wavelengths used in low-level lasers do not cause cancer (non-ionizing radiation). This lecture will focus on low-level lasers in the 600-1000 nanometer (nm) wavelength range, visible red-to-infrared.

The red-beam lasers (visible, 600-700 nm) have only a shallow, direct energy penetration into the skin (approximately 1 millimeter, mm). These red-beam lasers are generally used on shallow acupuncture points (the hand, the foot, the face, the ears, and on simple skin disorders; and with babies and children). However, the infrared-beam lasers (not visible to the human eye, 800-1000 nm) with longer wavelengths, have a deeper, direct energy penetration (approximately 1-2 centimeters, cm).

Laser light is different from other light sources (everyday light bulbs), because it is monochromatic (one color) and highly coherent in temporal and spatial planes (light from everyday light bulbs is much more random).

Low-level lasers - The red-beam lasers and infrared-beam lasers which are available today are 5-500 milliwatts (mW), class IIIb lasers. They are painless because only lasers which are greater than 500 mW will start to burn the skin. The class IV lasers which are used in surgical procedures, for example, are 100 watts (W) and higher. They are advantageous for surgery, in part, because they cauterize at the same time that they cut. Some lasers also vaporize the tissue away. The low-level lasers (less than 500 mW) are ideal to stimulate acupuncture points without any sensation whatsoever. They are especially easy to use with babies and children.

Risk of Injury from Low-level Lasers - There is no harm to the skin when using the low-level laser for the designated times. The low-level laser will harm the retina if you stare directly into the source of the laser beam. Do not stare into the source of the laser beam at any time, not even for a few seconds, as this can permanently harm the retina, by burning the retina (it is similar to staring directly at the sun).

How to Calculate the Number of Seconds Required to Produce 1 Joule of Energy

Three variables are listed below which you must know about a specific laser, before using it. You will also need to know the beam spot size in cm2, which is explained later.

1. The wavelength, in nanometers (nm, one billionth of a meter). For "laser acupuncture," the wavelength is usually in the red-to-infrared range of 600-1,000 nm. Otherwise, the hemoglobin or water may block the laser beam. The laser manufacturer supplies information on the nm wavelength for each laser.

2. The number of watts, or milliwatts (mw). Usually only 5 or 500 mw (always less than 500 mw). If the laser is greater than 500 mw, it will cause an "ouch" response, and will burn the skin. The laser manufacturer supplies information on the number of milliwatts for each laser.

3. The number of seconds exposure = 1 joule of energy (A "joule" is a unit of work energy - for example, the energy expended by a current of 1 ampere flowing for 1 second through a resistance of 1 ohm.)

Some low-level laser research or clinical papers are published showing only the number of Joules (J) used, per point on the skin. **It is better, however, to know treatment protocols in J/cm2, per point, or per cm2 on the skin,** as is explained on additional pages in this handout. When J/cm2 is calculated for a specific laser, the beam spot size must also be known (in cm2). It is important, however, to understand the basic concept of Joule, or unit of work energy.

$$1 \text{ Watt} = \frac{1 \text{ Joule}}{1 \text{ Second}}$$

Example. You have purchased a 670 nm wavelength laser. The laser beam is red and it is within the expected wavelength range of 600 to 1,000 nm wavelength. The maximum output is 5 milliwatts. You must now compute the number of seconds = 1 joule.

$$.005 \text{ W} = \frac{1 \text{ Joule}}{X \text{ Seconds}}$$

Power Output, in Watts: 5 mW (milliwatts) = .005 W (Watts)

$$.005 X = 1$$

$$X = \frac{1}{.005}$$

$$X = 200 \text{ Seconds}$$

Thus, for a 5 mW laser, it takes 200 Seconds to produce 1 Joule of energy.

Shortcut: $$\text{Number of Seconds} = \frac{1 \text{ Joule}}{\text{Power Output of Laser in Watts}}$$

$$X = \frac{1 \text{ Joule}}{.005 \text{ W}}$$

$$X = 200 \text{ Seconds}$$

Sample Laser Calculations for 1 Joule, for a 500 mW Laser

A Joule is a unit of work energy. For example, the energy expended by a current of 1 ampere flowing for 1 second through a resistance of 1 ohm.

Want to know how many seconds to hold the laser on a point, to deliver 1 Joule for a specific laser:

$$1 \text{ Watt} = \frac{1 \text{ Joule}}{1 \text{ Second}}$$

Power Output, in Watts: 500 mW (milliwatts) = .500 W (Watts)

$$.500 \text{ W} = \frac{1 \text{ Joule}}{X \text{ Seconds}}$$

$$.500\,X = 1$$

$$X = \frac{1}{.500}$$

$$X = 2 \text{ Seconds}$$

Thus, for a 500 mW laser, it takes 2 Seconds to produce 1 Joule of energy.

Shortcut: Number of Seconds = $\frac{1 \text{ Joule}}{\text{Power Output of Laser in Watts}}$

$$X = \frac{1 \text{ Joule}}{.500 \text{ W}}$$

$$X = 2 \text{ Seconds}$$

Energy Density Dosages (Joules/cm^2) for Various Treatment Effects

Table 4.

As a starting point and a recommendation to those new to this type of therapy, we should advise the following dosages:

- Analgesic effect: Muscular pain ——— 2 to 4 joules/cm²
  Joint pain ——— 4 to 8 joules/cm²
- Anti-inflammatory effect: Acute and subacute 1 to 6 joules/cm²
  Chronic ——— 4 to 8 joules/cm²
- Eutrophic effect: ——— 3 to 6 joules/cm²
- Circulatory effect: ——— 1 to 3 joules/cm²

These doses can be doubled in some cases with no risk or danger. Dr. Antoni Pallàs Isanta, Head of Rheumatology in the Corachan Clinic, Barcelona, published an extremely interesting report on his return from various Rheumatology Centres in the USSR where 25 mW He. Ne. lasers were used. More than 15 years of clinical experiments confirm the innocuous nature of the therapy, even at energy densities much higher than those cited here. Many doctors, in Spain and elsewhere, have made known to me their opinion on this subject, which has made me revise the prudent dosages I advised in the first edition of this book. However it should not be deduced from this that there is parallelism between dosage and therapeutic effectiveness. There should be a working margin of 1 to 15 joules/cm² and there would appear to be no increases in the speed of action at higher doses.

Source: Colls Cruanes J: Laser Therapy Today, Barcelona, Laser Documentation Center, S.A, Calle Dalmau 11 - 08014, 2nd Edition, November, 1985; ISBN 84-398-6137-0. Translated by Lucie Maguire

Information on Joules (Energy)

versus

Joules per cm^2 (Energy Density Dosage)

Why knowing *only* the number of joules used per point is not enough information. Why the Beam Spot Size is so important.

For a 5 mW laser, it takes 200 Seconds to produce 1 Joule of energy.

	1 Joule = 200 Sec	1 Joule = 200 Sec	1 Joule = 200 Sec
Laser Aperture *Diameter*	*1.14 cm*	*.5 cm*	*.1 cm*
Radius	.57	.25	.05
Beam Spot Size: π (3.14) x r^2	1.02 cm^2	0.196 cm^2	0.0078 cm^2
1 J/cm^2 = Spot Size / Power in W	1.02 cm^2 / .005	0.196 cm^2 / .005	0.0078 cm^2 / .005
1 J/cm^2	204 Sec	39.2 Sec	1.56 Sec
Used for 200 Sec.	200/204 = .98 J/cm^2	200/39.2 = 5.1 J/cm^2	200/1.56 = 128.2 J/cm^2

Information on Joules (Energy)

versus

Joules per cm^2 (Energy Density Dosage)

Why knowing *only* the number of joules used per point is not enough information. Why the Beam Spot Size is so important.

For a 500 mW laser, it takes 2 Seconds to produce 1 Joule of energy.

	1 Joule = 2 Sec	1 Joule = 2 Sec	1 Joule = 2 Sec
Laser Aperture *Diameter*	*1.14 cm*	*.5 cm*	*.1 cm*
Radius	**.57**	**.25**	**.05**
Beam Spot Size: π (3.14) x r^2	**1.02 cm^2**	**0.196 cm^2**	**0.0078 cm^2**
1 J/cm^2 = Spot Size / Power in W	**1.02 cm^2 / .500**	**0.196 cm^2 / .500**	**0.0078 cm^2 / .500**
1 J/cm^2	**2.04 Sec**	**.392 Sec**	**.0156 Sec**
Used for 2 Sec.	**2/2.04 = .98 J/cm^2**	**2/.392 = 5.1 J/cm^2**	**2/.0156 = 128.2 J/cm^2**

Some Low-Level Lasers and their Laser Parameters

ITO Lecture Pointer: 5mW, 670nm

Aperture: 5mm diameter

Beam Area: 0.196 cm^2

1 Joule = 200 Sec.

1 Joule per cm^2 = 39.2 Sec.

4 Joules per cm^2 = 156.8 Sec.
or 2 min. 36 Sec.

Lasotronic 45 mW, 660 nm
(Elliptical Beam)

Aperture: 1.5mm x 3.5mm

Beam Area: .0412 cm^2

1 Joule per cm^2 = .915 Sec.
or 1 Sec.

4 Joules per cm^2 = 4 Sec.

However, the manufacturer suggests using it for 16 seconds per point; there is a built-in beeping timer. Personal Observation.

Note, this laser has an Elliptical Beam Size in cm^2

1.5mm = .15cm /2 = .075 cm

3.5mm = .35cm /2 = .175 cm

3.14 x .075 x .175 = .0412 cm^2
(pi)

Luminex Laser, 500 mW, 867 nm

OR

Respond 2400 Laser 500mW, 904 nm

Aperture: 1.14 cm diameter

Beam Area: 1.03 cm^2

1 Joule = 2 Sec.

1 Joule per cm^2 = 2 Sec.

4 Joules per cm^2 = 8 Sec.

Thor-DD Laser 200mW 660 nm

Beam Area: .25 cm^2

1 Joule per cm^2 = 1.25 Sec.

4 Joules per cm^2 = 5 Sec.

(Note: There are five of these 200 mW lasers in the laser cluster head, with 1 1/4 inch diameter.)

Thor Supraluminous LEDs
(Light Emitting Diodes)

34 x 660 nm 10mW LEDs

35 x 950 nm 15 mW LEDs

(Total power = 865 mW)

4 Joules per cm^2 = 4.62 Minutes

LED Cluster head with 2 1/2 inch diameter

Some Pulse Rates used with Low-Level Lasers

Pulse Rates (Pulses per Second) and Indications, for each Rate

These Sample Pulse Rates are from the Luminex Laser, 867 nm;

and the Respond 2400 Laser, 904 nm

(P.F.M. Nogier, M.D., Lyon, France)

PULSE RATE		INDICATIONS
F 1	**73 pps**	**Acute injury, non-union fracture, Tonification of Acupuncture Points Wound Healing**
F 2	**146 pps**	**Sub-acute injury and yellow scar tissue**
F 3	**292 pps**	**For outermost layer of tissue (Ectodermal), Chronic conditions, Acupuncture Points, Arthritis, Scar Tissue**
F 4	**584 pps**	**For innermost layer of tissue (Endodermal), Circulatory Stimulation**
F 5	**1168 pps**	**For tissue of Mesodermal origin, Acupuncture Points on limbs, Scar tissue**
F 6	**3,500 pps**	**For chronic conditions, Pain control, Sedation of Acupuncture Points, Pain control**

Another source for many different frequencies, for many different, possible effects:
The Consolidated Annotated Frequency List (CAFL):

http://electroherbalism.com/Bioelectronics/FrequenciesandAnecdotes/CAFL.htm

OR, Google: CAFL
(CAFL includes, for example, 200 Hz, 10 Hz, or 7.64, for ...healing nerves. Source not documented.)

Table 1. Cellular Effects of Low-Energy Laser Irradation (Basford, 1989)

Phenomenon	Change and reported	Model	Laser
Collagen and protein synthesis Glassberg, Lask, Uitto, 1988 Simunovic, Ivankovich, 1988 Barabas, Bakos, Szabo, et al, 1988 Mester, Toth, Mester, 1982 Lyons, Abergel, White, Dwyer, Castel, Uitto, 1987 Herman, Khosla, 1987	Increase & decrease	Human fibroblasts, rabbit skin, human synovium, bovine cartilage	HeNe HeNe + GaAs Nd:PO_4 glass Nd:YAG
RNA synthesis Glassberg, Lask, Uitto, 1988 Simunovic, Ivankovich, 1988 Barabas, Bakos, Szabo, et al, 1988 Mester, Toth, Mester, 1982 Lyons, Abergel, White, Dwyer, Castel, Uitto, 1987 Herman, Khosla, 1987 Karu, 1987	Increase	Mouse skin	HeNe
Cell proliferation Hardy, Hardy, Fine, Sokal, 1967 Abergel, Dwyer, Meeker, lask, Kelly, Uitto, 1984	Increase & decrease	Mouse fibroblasts, human lymphocytes	Ruby HeNe GaAs
Cell granule release Trelles, Mayayo, Miro, Rigau, Baudin, 1988	Increase	Mouse mast cells	HeNe
Cell Motility Sato, Landthaler, Haina, Schiil, 1984	Increase	Human sperm	Kr
Membrane potential Passarella, Casamassima, Miolinan, Pastore, Quagliariello, Catalano, Cingolani, 1984 Passarella, 1988 Kubasova, Kovacs, Somosy, Unk, Kokai, 1984	Increase	Rat liver mitochondria, human fibroblasts	HeNe
Cell binding affinities Kubasova, Kovacs, Somosy, Unk, Kokai, 1984 Passarella, Casamassima, Quaglianello, Caretto, Jirillo, 1985	Increase	Human lymphocytes and fibroblasts	HeNe
Neurotransmitter release Vizi, Mester, Tizza, Mester, 1977	Increase	Acetylcholine (guinea pigs)	Ruby
Oxyhemoglobin dissociation Itzkan, Tang, Bourgelais, 1988	Increase		
Phagocytosis Mester, Mester, Mester, 1985	Increase	Human leukocytes	Ruby
ATP syntheses Passarella, Casamassima, Miolinari, Pastore, Quagliariello, Catalano, Cingolani, 1984 Passarella, 1988	Increase	Rat liver mitochondria,	HeNe
Intercellular matrix Yew, Wong, Chang, 1982	Increase	Mouse retina	HeNe
Prostaglandin synthesis Mester, Toth, Mester, 1982	Increase	Rat skin	HeNe

Basford JR: Low-Energy Laser Therapy: Controversies and New Research Findings. Lasers in Surgery and Medicine 1989; 9:1-5.

#1. Laser Basics – Principles of Low Intensity Laser Therapy (LILT)

Teaching Module Abstract presented at the 3rd Annual Meeting of the North American Association for Laser Therapy (NAALT), Uniformed Services University for the Health Sciences, Bethesda, MD, April 4, 2003. www.naalt.org

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INTRODUCTION:

Low Intensity Laser Therapy (LILT) involves the application of photic energy to the tissues with the object of augmentation of healing and/or the relief of pain.

PRINCIPLES OF USE:

1) The usual wavelengths are these which penetrate most deeply due to low absorption in the principal constituent in soft tissue namely water. Typical of these are:
   a) Gallium Aluminum Arsenide at around 820nm (0.82 microns) which is maximally penetrative. This modality is the most important one for treatment of pain but is also effective in healing, reaching well into connective tissue corium. Absorbed by cell wall chromophores.
   b) Visible Red at 633nm (0.633 microns) Helium Neon or 660nm (0.66 microns) Diode. These wavelengths have a propensity for healing particularly epithelial tissue and for laser acupuncture. Absorbed by mitochondrial cytochromes.
2) Dosimetry is all important in determining effect and in reporting a treatment episode. It is necessary to specify:
   a) Wavelength e.g.820nm
   b) Incident Power of Probe e.g.200mw (a good all around value)
   c) Energy Per Point e.g. 10-20 joules for myofascial pain or 2-4 joules for healing of an intractable ulcer. A 60 milliwatt probe generates 4 joules in one minute for example.
   d) Energy Density ("radiant exposure" or "fluence rate") this can be calculated easily by knowing the area of the beam spot and multiplying this as a fraction of a square centimeter by the energy per point e.g. energy per point of 4 joules with the spot which is an eight of a square centimeter will result in an energy density of 4X8=32 joules per square centimeter. It should be emphasized that this is a convention which does not exactly represent the way in which photic energy is scattered in tissue as revealed by CCD camera.
   A formula for more formal calculation of energy density is:

$$\text{Energy density (J/CM2)} = \frac{\text{Power (w)X time (s)}}{\text{area(cm2)of spot}}$$

   Where the power of the probe is in milliwatts divide by 1000 to convert to watts in the formula.

e) Power Density (or "irradiance" or "fluence")

A formula for calculation of power density (w/cm2) = Power(w) / area (cm2) of spot

This can be converted to milliwatts per square centimeter by multiplying by 1000.

f) Pulsing Characteristics and Duty Cycle Declare whether constant wave or pulsed.

g) Time of Treatment This is helpful to determine rate of energy application.

3) Mechanisms of Action may be summarized as:
   a) Energization of Depleted Enzymes. Enzymes may be denatured or depleted in areas of inflammation by hypoxia and acidosis. Important examples are:
      1) Sodium Potassium ATPASE: Vital for nerve polarization in transmission of an action potential. Low energies (less than around 4 joules per sq.cm. at the site) tend to increase concentrations and are logical for use in nerve regeneration e.g. in facial paralysis. High energies (more than around 4 joules per sq.cm. at site) tend to decrease concentrations being indicated for pain where the object is stabilization of sensitized pain fibres-nonmyelinated C fibres for slow dull pain and lightly myelinated A delta fibres for rapid sharp pain. This is the so-called **Arndt Schultz response where low energies stimulate and high energies suppress.**
      2) Superoxide Dysmutase (SOD). This enzyme breaks down free radicals which are a cause of pain in trigger areas in muscle in myofascial pain.
      3) Transforming Growth Factor Beta Fractions. Energization will help repair and heal. There are several fractions.
   b) Vascular Effects
      There is no doubt that laser energy is capable of initiating new vessel formation (angiogenesis) which is an important factor in healing e.g. with soft tissue flaps. It is often suggested that LILT causes an immediate augmentation of blood flow but there is no objective evidence of this unless energies are above normal therapeutic values sufficient to cause local healing (more than 150 joules per sq.cm).
   c) Immune Augmentation
      It seems likely that LILT can augment local and systemic immune mechanisms particularly if these are below par. Experience with irradiation of the blood has revealed a balancing effect where low rheology values are raised and high ones brought to normal values suggesting an important role for light in homeostasis.
   d) Cellular Energization
      Most cells after LILT demonstrate accumulation of energy molecules in the form of ATP.
   e) Overall Effect Overall, the laser energy shortens the inflammatory phase after tissue injury hastening repair and remodeling.

4) Models of Usage

   a) Local application to Nociceptive Foci. e.g. trigger points in muscle. Usually constant wave, adequate power rating for penetration and positive pressure to milk out excessive tissue fluid aiding penetration.

b) Entrainment of Bioresonances LILT in pulsed mode may be geared to correspond with central bioresonances. Various frequencies are suggested (Sisken & Walker) e.g.
2Hz Nerve regeneration, neurite outgrowth
7Hz Bone growth
10Hz Ligamentous healing
15, 20, 72, Hz Decreased skin necrosis, stimulation of capillary formation and fibroblast proliferation.

c) Ligamentous Healing Low energy

d) Nerve Regeneration

e) Laser Acupuncture Over acupuncture points or known nerve outflows. These points are highly reactive responding to low energies.

f) Component of Multi-Modality Treatment Regimens When treating pain the use of several methods each working through a different substantiated mechanism are more likely to be successful then single methods (Melzak & Wall). e.g.

1) May be combined with medication such as anticonvulsant and antidepressants in chronic pain thereby reducing dosage. Cortisone steroid however may negate LILT's immune enhancement.
2) May be used with other forms of **energy medicine** e.g
   Ultrasound
   Short Wave Diathermy
   Interferential Treatment
   Acupuncture
   Action Molecules (homeopathy)

g) Energization of Photodynamic Agents e.g. Toluidene Blue for bacterial reduction. This is an innovative which is in the experimental stage at the moment but which is likely to be increasingly important in the future in view of increasing resistance of bacteria to antibiotics.

Keywords: Acupuncture, laser acupuncture, low-energy laser, stroke, cerebrovascular disorders, paralysis, hemiplegia, computerized tomography

CLINICAL RESEARCH

Laser Acupuncture in the Treatment of Paralysis in Stroke Patients: A CT Scan Lesion Site Study

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Abstract: Seven stroke patients received 20, 40 or 60 low-energy laser acupuncture treatments beginning at 10 months to 6.5 years poststroke (n=6); or at one month poststroke (n=1). A 20 mW gallium-aluminum-arsenide infrared diode laser (780nm) was used directly on acupuncture points on the arm, leg, hand and/or face for 20 or 40 sec. per point. Five of the seven patients (71%) had improvement following laser treatments. The cases with arm/leg paralysis had improvement in knee flexion, knee extension and/or shoulder abduction; the cases with hand paresis had improvement in finger and hand strength. All patients with improvement had lesion on CT scan in <50% of the motor pathway areas (mild-moderate paralysis). Those with no improvement had lesion in >50% of the motor pathway areas (severe paralysis). These results are similar to our previous research in which needle acupuncture was used to treat paralysis in stroke patients.

In 1985, the first author (M.A.N.) observed the use of low-energy HeNe laser stimulation (as opposed to needle stimulation) on acupuncture points to treat paralysis in stroke patients at the Hua Shan Hospital, Shanghai Medical University, China. The following protocol was used: A 10 mW HeNe red-beam laser was applied for 4 minutes per acupuncture point (2.4 joules per point). Six points were used per treatment session on the paralyzed arm/leg, e.g., LI-4 (Hegu), LI-11 (Quchi), TW-9 (Sidu), ST-31 (Biguan), ST-36 (Zusanli), and GB-39 (Xuanzhong). The patient was treated every other day (3 times per week) for four weeks.

There are no controlled studies on the use of laser acupuncture in the treatment of

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This research was supported by the Robert Wood Johnson Foundation Grant No. 09052; Barnsider Management Corporation, Hamilton, Massachusetts.

This paper was presented at the Meetings of the Deutsche Artzegesellschaft fur Akupunktur, Freudenstadt, Germany, September 12, 1989.

Six patients began receiving the laser acupuncture treatments during the chronic phase poststroke, ranging from 10 months to 6.5 years poststroke. These times are well beyond the spontaneous recovery period of up to 6 months poststroke.[16,17] Because most patients were well beyond this period, each patient served as his/her own control; no sham laser treatments were administered. One patient (case P.R.), a hand paresis case, began receiving the laser acupuncture treatments during the acute phase, one month poststroke.

Five patients had received needle acupuncture treatments during a previous acupuncture study (cases C.P., S.H., M.R., M.J. and C.T.). These patients had improved on at least two tests during the needle acupuncture study, following 20 or 40 needle acupuncture treatments; however, full range of motion scores had not yet been obtained on all tests. The last needle acupuncture treatments were administered ranging from 3 months to 3 years prior to beginning the present low-energy laser study. For these five patients, this study examined whether *additional* improvement could be obtained with laser acupuncture treatments. One arm/leg patient (case F.J.) and one hand paresis patient (case P.R.) treated with laser acupuncture in the present study had not been part of the previous needle acupuncture study.

None of the stroke patients were receiving physical therapy or occupational therapy treatments during the course of the laser acupuncture treatments.

Laser Acupuncture Treatment Protocol

A 20 mW gallium-aluminum-arsenide (780 nm) infrared diode laser (Uni-laser, Denmark) was used for 20-40 seconds to irradiate each acupuncture point. With this Class III-b laser, 50 seconds of exposure is equivalent to one joule. The laser was applied for 20 seconds on shallow acupuncture points (hands and face) and for 40 seconds on deeper acupuncture points (arms and legs).

The following points were used on the paralyzed arm:

LI-4 (Hegu)
LI-11 (Quchi)
LI-15 (Jianyu)
TW-5 (Waiguan)
TW-9 (Sidu) and
Baxie points (located between the heads of the metacarpal bones)

Points used on the paralyzed leg:

ST-31 (Biguan)
ST-36 (Zusanli)
GB-34 (Yanglingquan)
GB-39 (Xuanzhong)
LV-3 (Taichong)

Points used on the non-paralyzed side:

LI-4 (Hegu)
ST-36 (Zusanli)

These are the same acupuncture points which were treated in our previous study utilizing needle acupuncture for paralysis in stroke patients.[13-15]

If facial paralysis was present, the laser was applied for 20 seconds on the following acupuncture points on the paralyzed side:

ST-4 (Dicang)
ST-6 (Jiache)
ST-7 (Xiaguan)
LI-20 (Yingxiang)
SI-18 Quanliao)

These points were located according to anatomic criteria described by O'Connor and Bensky.[18] Each laser treatment lasted approximately 30 minutes; subjects were treated 3 - 5 times per week as outpatients.

The 20 mW infrared laser which was used produces no sensation (neither heat nor pain) during its application to the skin. Institutional Review Board approval was obtained prior to use and informed consent was obtained from the patients.

Motor Evaluation

Arm/Leg Tests: A motor examination, the Boston Motor Inventory,[19] was designed for and used in all of our acupuncture research projects. This test measured the isolated active range of motion for four leg and three arm movements on the involved side,

Method of Laser Use:

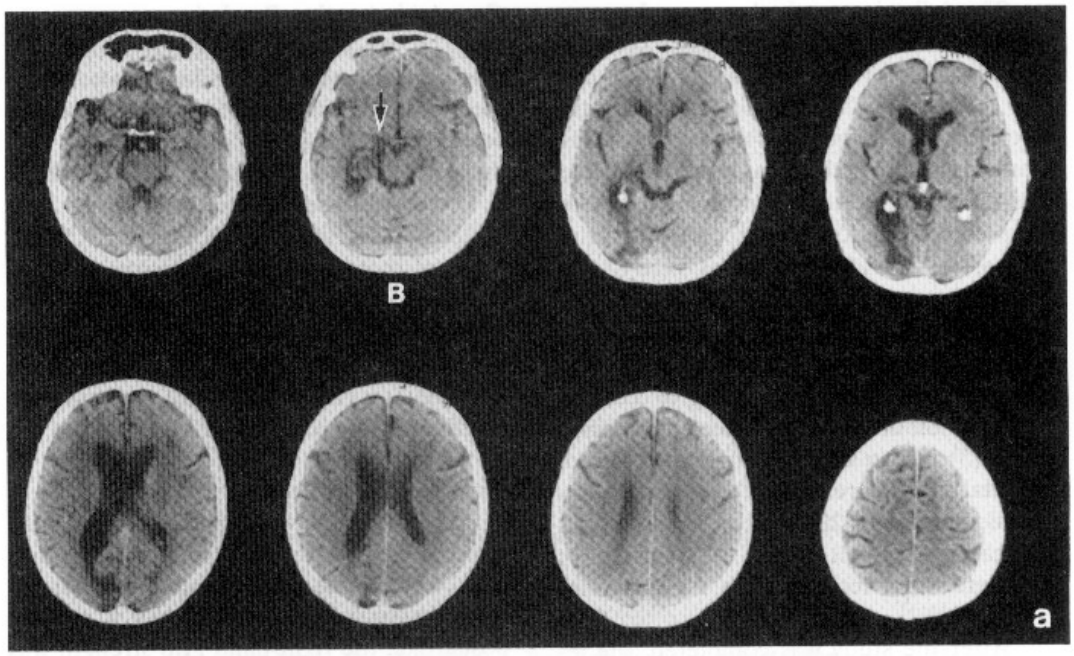
Laser:

20 mW Gallium Aluminum Arsenide
(780 nm), near infrared, CW, diode laser
(Unilaser, Denmark)
with 1 mm diameter aperture.

Treatment Parameters and Energy Densities:

20 Sec. On shallow acupuncture points
(hands and face)
51 J/cm^2

40 Sec. On deeper acupuncture points
(arms and legs)
103 J/cm^2



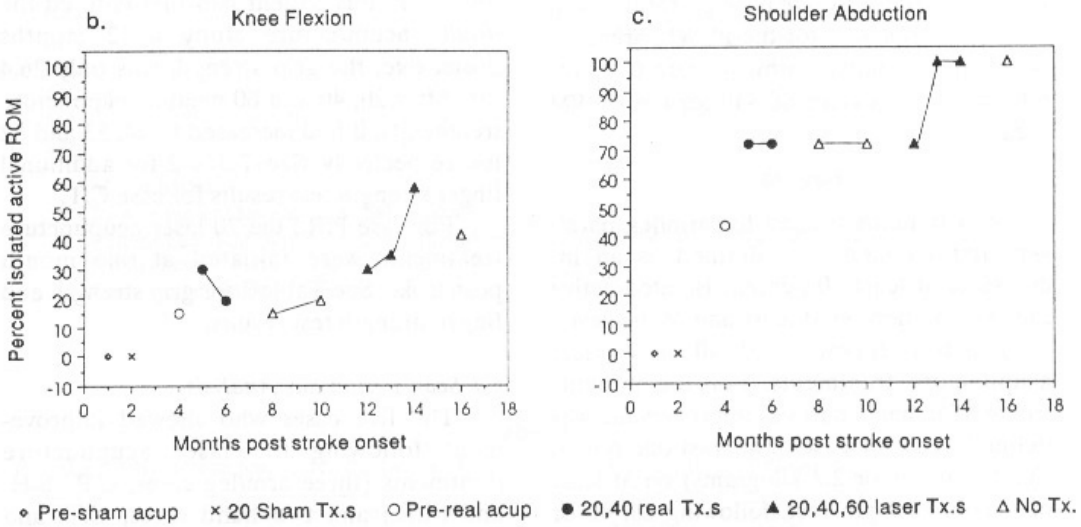
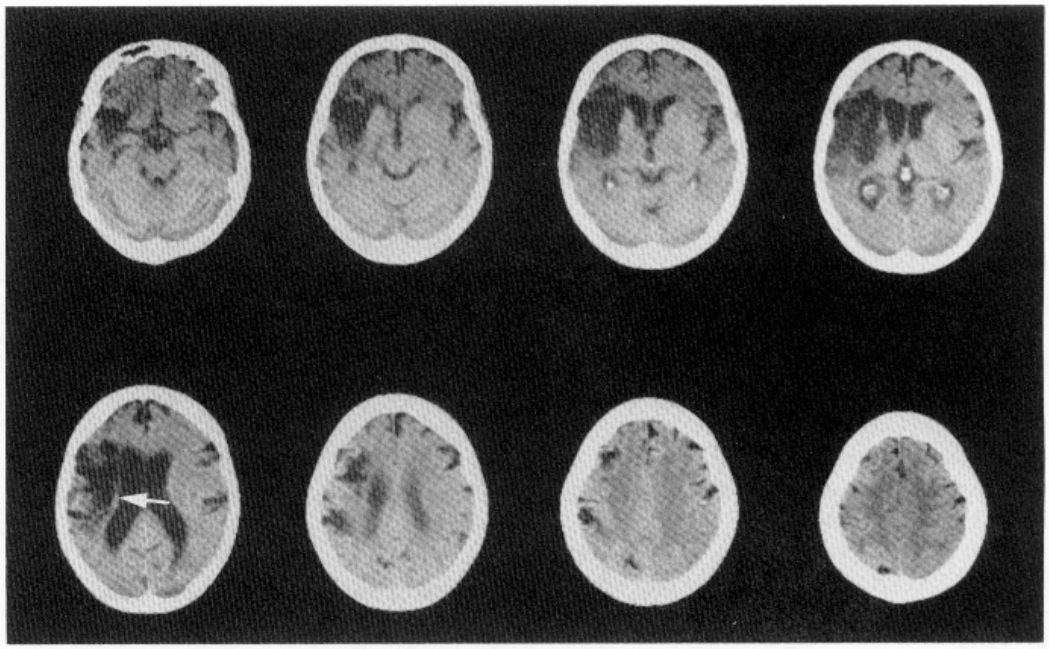


Figure 2.

(a) CT scan obtained 7 months poststroke for case C.P., a 54-year-old man. (The left hemisphere lesion is shown on the left side of the CT scan.) The paralysis is not associated with lesion in either the cortex or the subcortical PVWM area; it is associated with lesion in the cerebral peduncle (arrow, slice B).

(b and c) Case C.P. had improvement following 20, 40, and 60 laser acupuncture treatments beginning after 10 months poststroke. His knee flexion increased from 19% pre-laser, to 30, 35 and 58% following 20, 40 and 60 laser acupuncture treatments. Although the score for knee flexion was slightly decreased at 2 months post the last laser treatment (see b), the improvement in shoulder abduction remained stable following the last laser treatment (see c).



a.

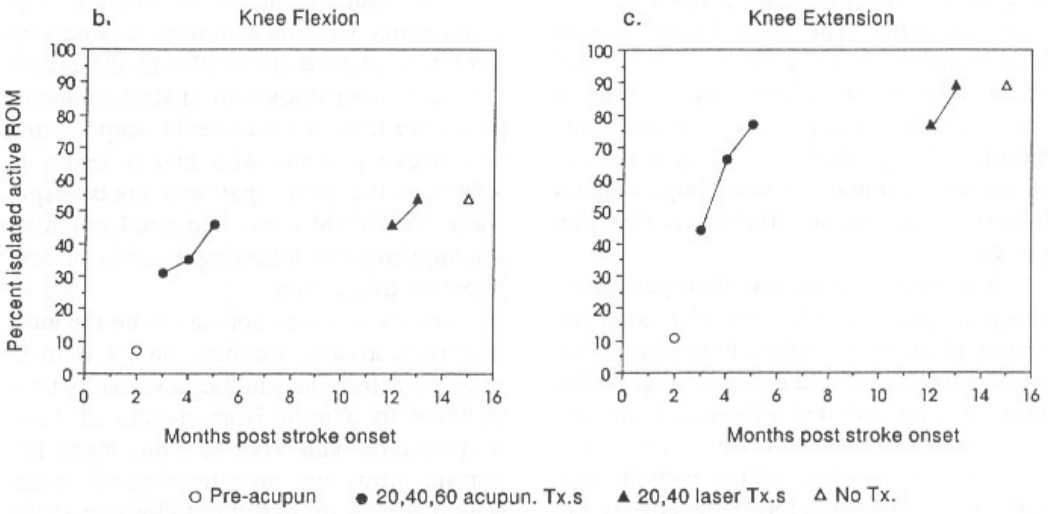


Figure 3.

(a) CT scan obtained at 5 months poststroke for case S.H., a 65-year-old woman. The CT scan shows sparing of only the deepest PVWM pathways on slice SM (arrow), i.e., sparing of some leg fibers. The arm fibers are more lateral and anterior, where extensive lesion was present. The arm paralysis was severe with scores of 0% on all arm testing throughout the study.

(b and c) This patient showed improvement only in leg testing. Her knee extension increased from 77% to 89%, following 40 laser treatments. Her husband reported that following the laser treatments, for the first time since her stroke (13 months earlier), she was able to climb up and down stairs. These improved scores remained stable at 2 months post the last laser treatment (15 months poststroke).

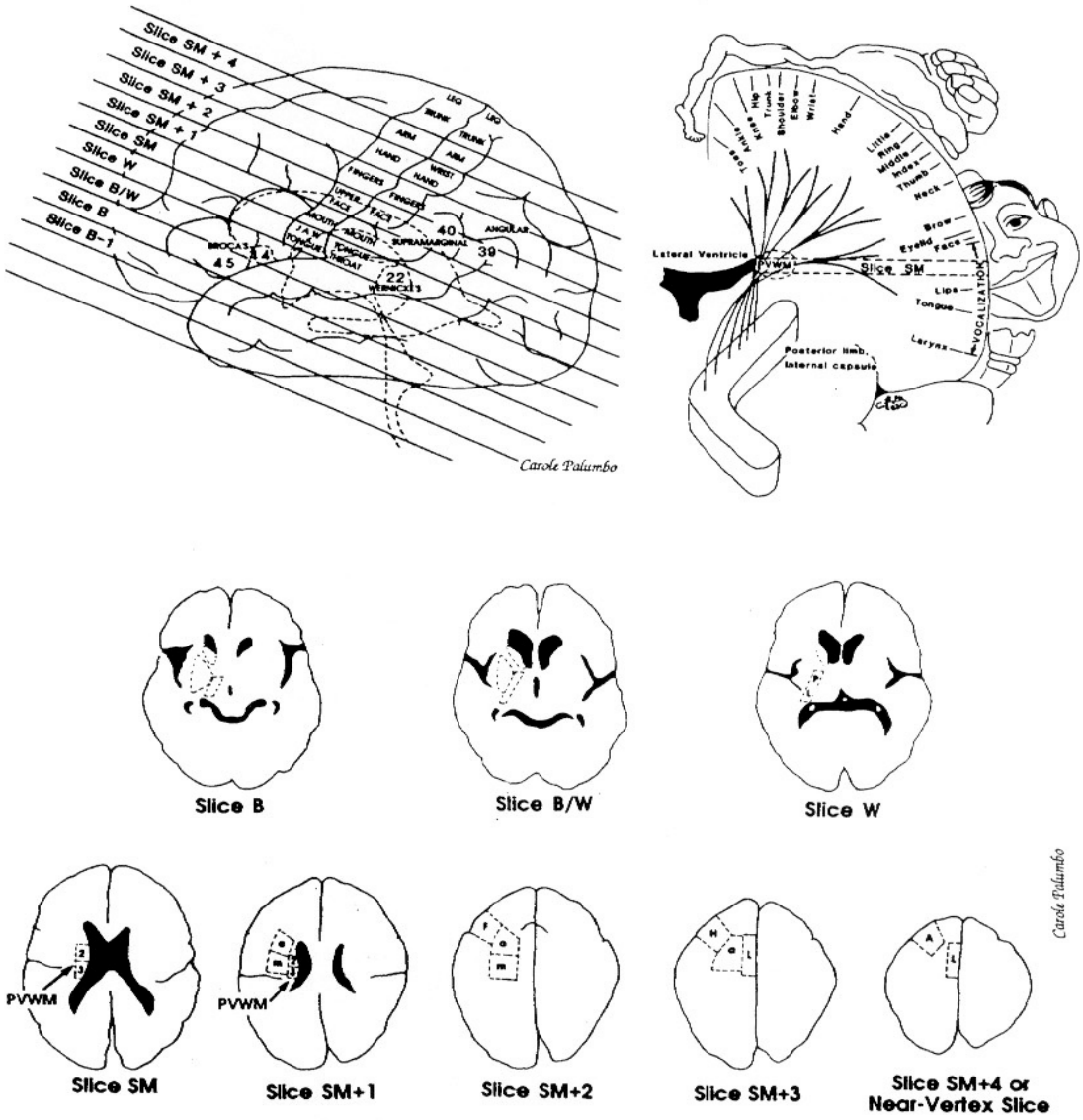


Figure 1. Lateral, coronal, and cross-sectional diagrams showing location of neuroanatomical areas visually assessed for extent of lesion (amount of infarction) on CT scan, containing, in part, descending pyramidal tract pathways. The deep, subcortical periventricular white matter area (PVWM) is outlined in the upper right coronal diagram and shown on CT scan slices SM and SM+1 (arrows). The total extent of lesion in the second and third quarters of the PVWM area was related to good response, versus poor response, following real acupuncture treatments. Key to abbreviations: L = leg cortex area; A = arm cortex area; H = hand cortex area; F = fingers cortex area; a = anterior white matter area; m = middle white matter area; 2 = second quarter PVWM; 3 = third quarter PVWM; PL = posterior limb, internal capsule (continues on slices B and B/W). The head of the caudate and putamen were also assessed for extent of lesion. (CT scan angle is approximately 15–20 degrees to the cantho-meatal line.)

Naeser MA, Alexander MP, Stiassy-Eder D, Galler V, Hobbs J, Bachman D: Real versus Sham Acupuncture in the Treatment of Paralysis in Acute Stroke Patients – A CT Scan Lesion Site Study. Journal of Neurologic Rehabilitation. 1992;6:163-173.

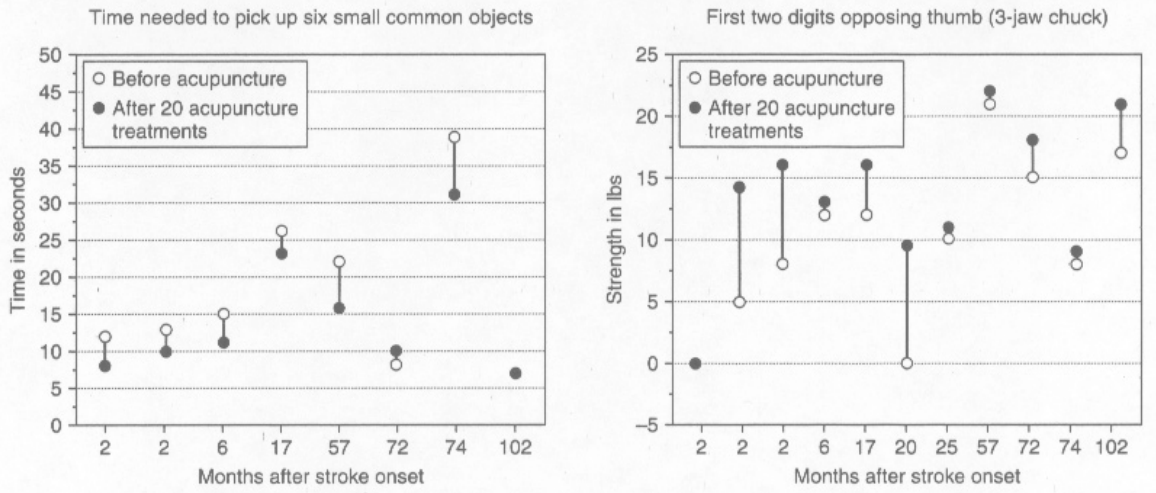


Figure 19-2 Hand dexterity and strength data obtained before and after 20 acupuncture treatments in stroke patients where acupuncture was initiated, ranging from 2 months after stroke to 102 months after stroke.

Naeser MA. Acupuncture and Laser Acupuncture to Treat Paralysis in Stroke, Cerebral Palsy, Spinal Cord Injury and Bell's Palsy. Chapter 19 in Claire M. Cassidy (Ed.). Contemporary Chinese Medicine and Acupuncture. Churchill-Livingstone, Philadelphia, PA, 350-372, 2002. Page 359.

Naeser MA, Alexander MP, Stiassny-Eder D, Nobles L, Bachman D: Acupuncture in the Treatment of Hand Paresis in Chronic and Acute Stroke Patients: Improvement Observed in all Cases. Clinical Rehabilitation 8:127-141, 1994.

(L) Fish Take air out of the water.

Time required to write: 32.5 seconds

Five years following stroke onset
Pre-acupuncture

(R) Fish take air out of the water.

Time required to write: 16.5 seconds

Five years following stroke onset
Post-acupuncture
(20 treatments over a 1-month period)

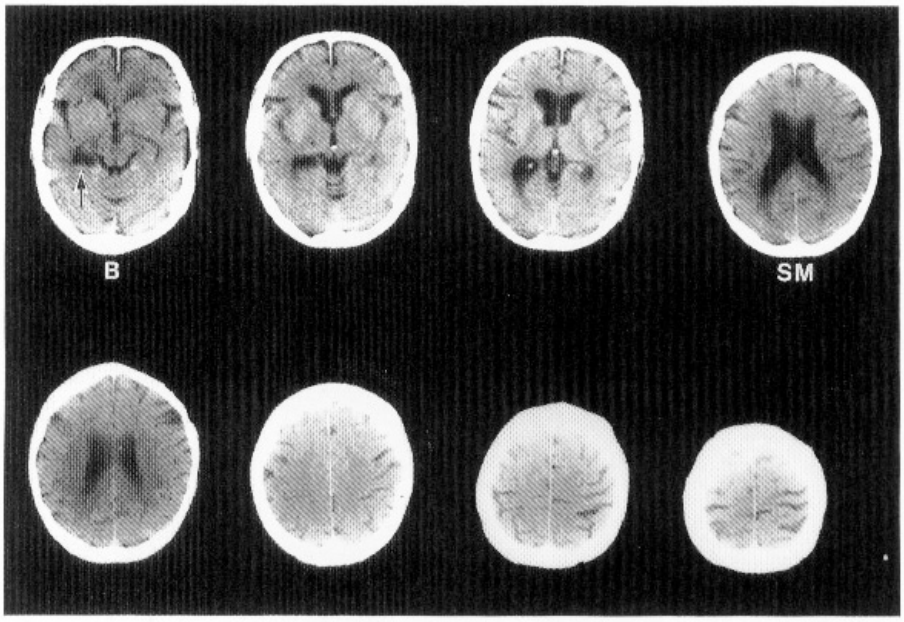


Figure 5 *Top*: Handwriting samples written with the right hand, pre- and post- 20 acupuncture treatments for case LW, aged 66, who entered the study at five years postonset. There was a reduction in the time necessary to copy the sentence. Pre-treatment it was 32.5 seconds; post-20 treatments, 16.5 seconds; and post-40 treatments, 14.5 seconds. This reduction in time was associated with a reduction in the chronic pain in the right hand and arm.
Bottom: CT scan for case LW; lesion is present in the left hippocampus area (slice B, arrow), and possibly in white matter deep to the sensory cortex area (slice SM). CT scan is five years postonset.

Naeser MA, Alexander MP, Stiassny-Eder D, Nobles L, Bachman D: Acupuncture in the Treatment of Hand Paresis in Chronic and Acute Stroke Patients: Improvement Observed in all Cases. Clinical Rehabilitation 8:127-141, 1994.

Naeser Laser Home Treatment Program for the HAND

Carpal Tunnel Syndrome Pain or Hand Paresis in Stroke Treated with Laser Acupuncture and Microamps TENS

www.bu.edu/naeser/acupuncture

Teaching Module Abstract presented at the 3rd Annual Meeting of the North American Association for Laser Therapy (NAALT), Uniformed Services University for the Health Sciences, Bethesda, MD, April 4, 2003. www.naalt.org

Margaret A. Naeser, Ph.D., Lic.Ac., Department of Neurology Boston University School of Medicine and V.A. Boston Healthcare System. Psychology Research (116-B), VA Boston Healthcare System, 150 So. Huntington Ave., Boston, MA 02130 mnaeser@bu.edu

This program may be used with Carpal Tunnel Syndrome (CTS). It may also be used to treat mild-moderate hand paresis (weak, clumsy hand) in stroke patients or other CNS disorders (head injury, encephalitis, spinal cord injury or M.S.). Patients with hand paresis may have some *improved hand function* after 3 months of treatment. If there is hand spasticity ("fisted" hand in flexion) there may be some *reduction in hand spasticity* (in stroke, SCI, Stiff-person Syndrome; Locked-in Syndrome); improved hand function is variable, and is related to severity. This program may also be used with Raynaud's, or peripheral neuropathy in the hands (earlier stages), rheumatoid or osteoarthritis (earlier stages). Treat 3-6 times per week. For CTS cases, treat every 48 hours, for 5 weeks. This protocol includes *both* microamps TENS and red-beam low-level laser. For CTS cases, infra-red laser is also recommended on deeper acupuncture points at cervical paraspinal areas C5 - C8, T1; and shoulder, elbow and forearm areas where radiating pain may be present. No medical claims are made.

Some lasers which have been used include:

Red-beam Lasers (for shallow acupuncture points).

Lasotronic Pocket Therapy Laser, 45 mW, 660 nm, CW. Elliptical beam, 1.5 mm x 3.5 mm. Beam spot size: 0.0412 cm2. 1 Joule/cm2 = .915 sec. or 1 sec. 4 Joules/cm2 = 4 sec.

Ito Laser Pointer, 5mW, 670 nm. CW. Aperture: 5 mm diameter.
Beam spot size: 0.196 cm2 1 Joule = 200 sec. 1 Joule/cm2 = 39.2 sec.
4 Joules/cm2 = 156.9 sec. or 2 Min. 36 sec.

Infrared Lasers (for deeper acupuncture points).

Respond 2400XL Laser (Now, Luminex), 500 mW, 904 nm, CW. Aperture: 1.14 cm diam.
Beam spot size: 1.03 cm2 1 Joule = 0.5 sec. 1 Joule/cm2 = 2 sec. 4 Joules/cm2 = 8 sec

Microamps TENS Device:

MicroStim 100 TENS (580 μA to 3.5 mA) with 2 circular electrodes, where each electrode has a copper-coated surface, with four embedded, tiny, red LEDs (not laser light).

MicroStim 100 TENS Device (TENS may not be used in pregnancy, nor with a pacemaker.)

1. Be sure the hand and fingers of the patient are clean and dry; no perspiration or hand lotion, etc. Wipe the areas where the acupuncture points are located with an alcohol pad. See attached Diagram.
2. Set switch to the "square wave" on the MicroStim 100 TENS device.
3. There are 2 circular electrodes, each has a copper-coated surface, with four embedded, tiny red LED lights. Place one double-sided sticky CLEAR circular conducting patch onto the copper surface of each circular electrode.
4. For CTS cases, PC 7 is first treated at an energy density of 32 Joules/cm2 with red-beam laser - see #1 below, under Low-Level Laser Treatment. For CTS cases, after PC 7 has been treated with the laser, place one circular electrode with attached sticky patch over PC 7 and place the second circular electrode over TW 4 on the dorsum of the wrist, so that the two circular electrodes are placed opposite to each other (TW 4 and PC 7), to enable treatment through the wrist with the MicroStim 100 TENS. (Ignore grounding pad shown on diagram, use circular electrode, instead.)

For stroke patients, place one circular electrode with attached sticky patch, onto the palm of the hand, so that at least a portion of it COVERS acupuncture points Hrt 8 and PC 8. Place the second circular electrode over LI 4 or TW 5.

5. Set the frequency switch on the top of the MicroStim 100 TENS to F4 (292 Hz) for the first frequency to use.
6. Turn the round power control knob to "On," and SLOWLY turn up the power until the patient reports feeling a "tingling sensation" from either electrode which is in place. Now, turn the power down, until the PATIENT DOES NOT FEEL ANY STIMULUS AT ALL. This will be the correct setting (it should be around only 2 or 4 on the round power control knob). If the patient does not report any tingling sensation at all, even at the highest setting of 9, this is OK and just set the power to maximum. Leave the power setting at this subthreshold level, for 2 minutes.
7. After the first 2 minutes at F4, switch the frequency knob over to the lowest frequency setting of F1 (0.3 Hz) for 18 minutes. The MicroStim 100 TENS device turns itself off after 20 minutes. Discard both circular sticky patches; do not store the used patches on the LED surface, this would corrode the copper; do not re-use the sticky patches after one use. The total time required for the MicroStim 100 TENS treatment is 20 minutes.

Low-Level Laser Treatment

While the microamps TENS treatment is ongoing, a red-beam laser can be used to treat the Jing-Well points near the base of the fingernail beds, and other points on the hand, at an energy density of 4 J/cm2. The tip of the laser pointer should physically touch the skin, but do not press so hard that the tip leaves a very deep indentation on the skin. Hold the laser pointer at a right angle to the skin. These acupuncture points include:

1. If CTS is being treated, treat acupuncture point PC 7 (closest point to the median nerve at the wrist crease) with red-beam laser BEFORE placing the circular electrode of the TENS device on PC 7. Use 32 J/cm2 at PC 7 (for Lasotronic 45 mW Laser, 32J/cm2 = 32 sec.; for ITO 5 mW

laser, 32J/cm2 = 21 minutes). After this treatment with the laser, place the TENS electrodes on PC 7 and TW 4 to treat through the wrist, as explained in #4-#7, above.

2. While the TENS is in place, use the laser to treat the following acupuncture points: Lu 11, LI 1, PC 9, TW 1, Hrt 9, SI 1. See attached Diagram. These are important points. Each point is treated at 4 J/cm2 (for Lasotronic 45 mW laser, 4 J/cm2 = 4 sec.; for ITO 5 mW laser, 4 J/cm2 = 2 min. 36 sec.). These points are treated for all disorders, including CTS.

3. Lu 9, Hrt 7. These points located at the wrist crease, are important for CTS cases. See Diagram.

4. Optional points for severe finger cases (e.g., arthritis): Extra points at ends of major finger creases at the joints, on radial and ulnar side of fingers. These are the proximal and distal interphalangeal joints. There are 4 of these extra points on each finger, and 2 on each thumb. Each point is treated, 4 to 8 J/cm2.

5. Optional points are distal Ba Xie points in webspaces btwn. fingers; or proximal Ba Xie points.

6. Other hand points, LI 4 or TW 3. Use the red-beam laser to treat shallow points, on adults.

7. It is recommended that acupuncture needles or infrared laser be used to treat deeper points on adults, such as LI 11, LI 15, TW 9, and with CTS cases, the cervical paraspinal areas are treated lateral to C5 - C8 and T1 (Hwa To points). These points are treated at 4 - 8 J/cm2 (for Respond 2400XL 500mW laser, 4 - 8 J/cm2 = 8 - 16 sec. per point). If there are tender points on palpation (especially on the forearm), treat for 4 - 8 J/cm2, and then re-palpate that point/area, and treat again, until there is a change in the sensitivity level there.

When used with CTS patients, there was a success rate of 88% (Naeser, Hahn, Lieberman, Branco, 2002; controlled study) to 92% (Branco & Naeser, 1989; open protocol) where success was defined as a reduction of at least 50% in the pain level. Eligible CTS patients: NCS motor latency should not be greater than 7.0 msec (4.3 msec = WNL). For best results, treat 3 times per week for 5 weeks. Treatment results were stable at 1 – 6 year follow-up in 90% of the patients.

References

Branco K & Naeser MA: Carpal tunnel syndrome: Clinical outcome after low-level laser acupuncture, microamps transcutaneous electrical nerve stimulation, and other alternative therapies - an open protocol study. The Journal of Alternative and Complementary Medicine, 5(1): 5-26, 1999.

Naeser MA, Hahn K-A K, Lieberman BE, Branco KF. Carpal Tunnel Syndrome Pain Treated with Low-Level Laser and Microamps TENS, A Controlled Study. Archives of Physical Medicine and Rehabilitation, 2002;83:978-988.

Naeser MA. Photobiomodulation of Pain in Carpal Tunnel Syndrome: Review of Seven Laser Therapy Studies. Photomedicine and Laser Surgery, 2006; 24(2):101-110.

Naeser MA, Wei XB, Laser Acupuncture - Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders, Boston, Boston Chinese Medicine, 1994, p. 40. Available througth Lhasa OMS, www.LhasaOMS.com or 1-800-722-8775. Also through sales@spanda.com

Websites: www.bu.edu/naeser/acupuncture

http://gancao.net/ht/cts.shtml http://gancao.net/ht/laser.shtml

Some sources for devices mentioned here:

Lasotronic Pocket Therapy Laser, 45 mW, 660 nm. felix.kramer@gmx.ch (Zurich, Switzerland)

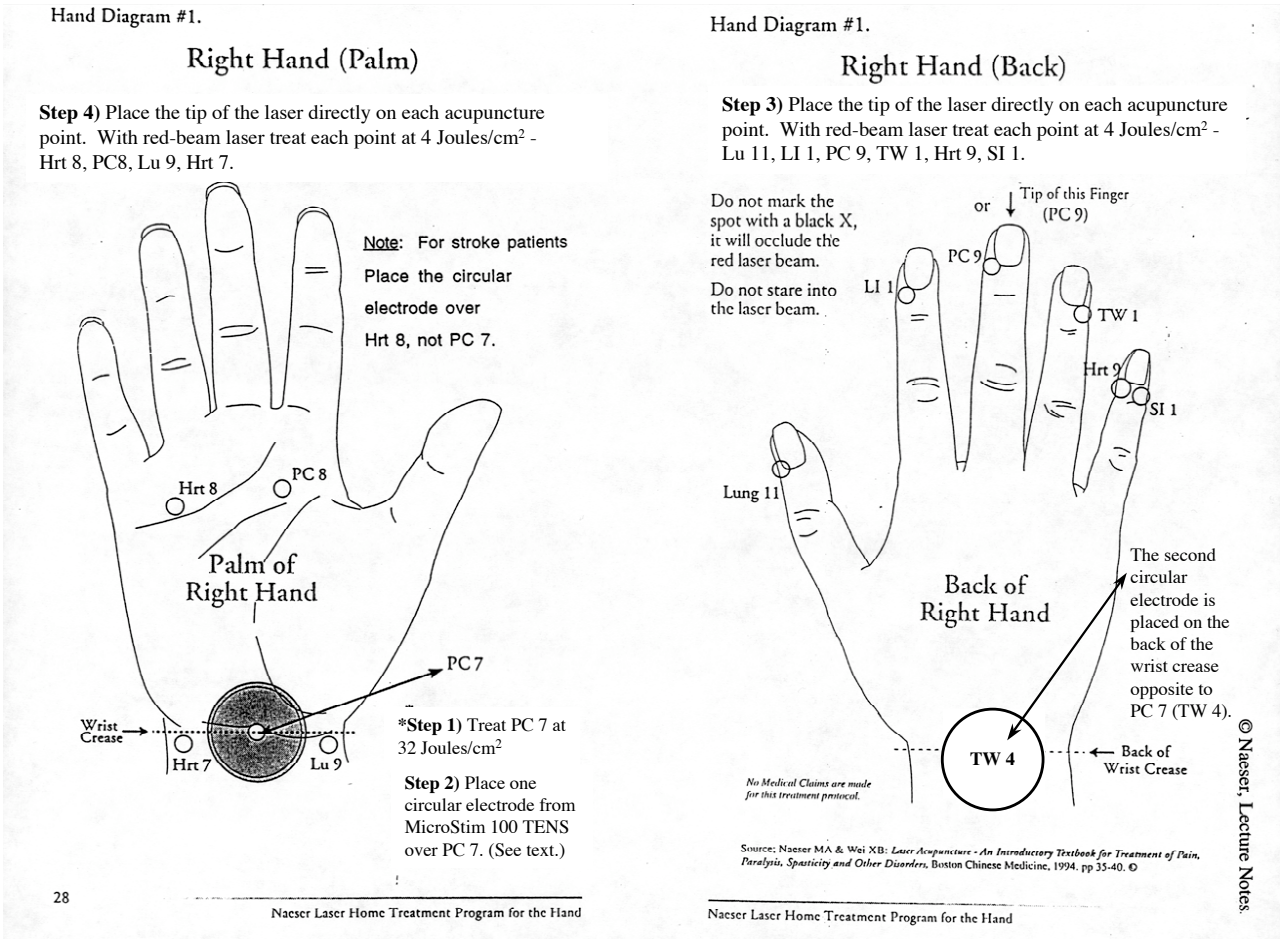
Ito Laser, 5mW, 670 nm, Lhasa Medical, Weymouth, MA 800-722-8775, www.LhasaOMS.com
$118.00, replace two AAA batteries after three hours of use. If 2 lasers purchased, cost $112/laser.

Luminex Laser, FDA Approved (Formerly Respond Laser), 500 mW, and four probes: 670 nm, 830 nm, 867 nm, 904 nm.Medical Laser Systems, Branford, CT 800-778-0836,
www.medicallasersystems.com Brian@medicallasersystems.com

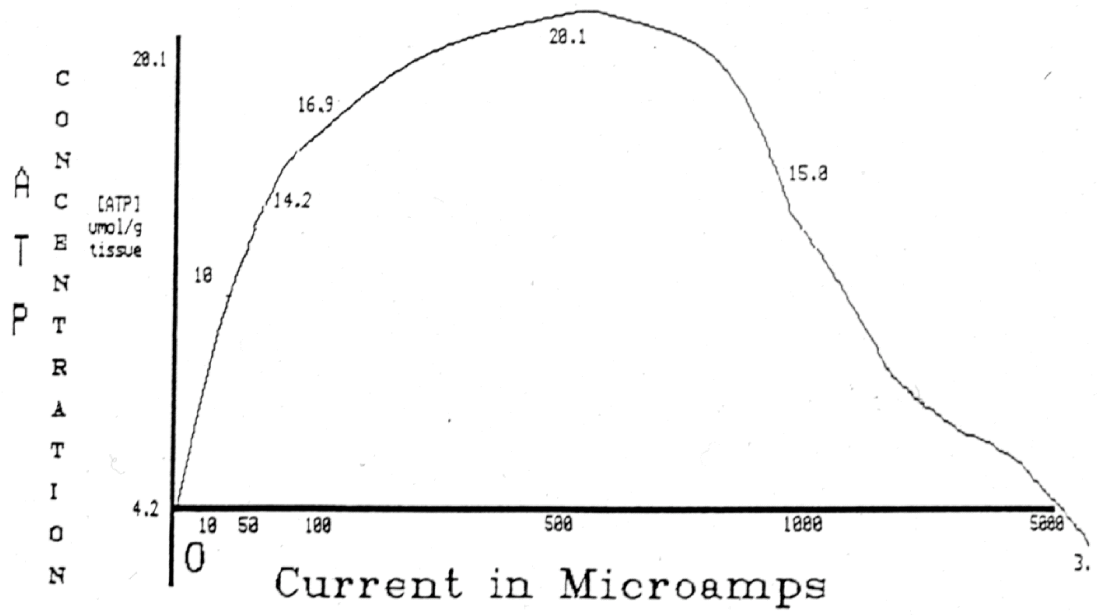
Thor Lasers, FDA Approved. Variety of laser cluster heads and single probes, red-beam and infrared.
Mark.Granic@Thorlaser.com 1-877-355-3151 Director of N. Am. Sales. He is in Toronto, Canada.
www.Thorlaser.com

MicroStim 100 TENS unit with 2 circular LED electrodes. MicroStim, Inc., Palm City, FL.
1-800-326-9119 or (954) 720-4383. Developed by Joel Rossen, DVM. jrossen@MicroStim.Com
info@microstim.com $295.00

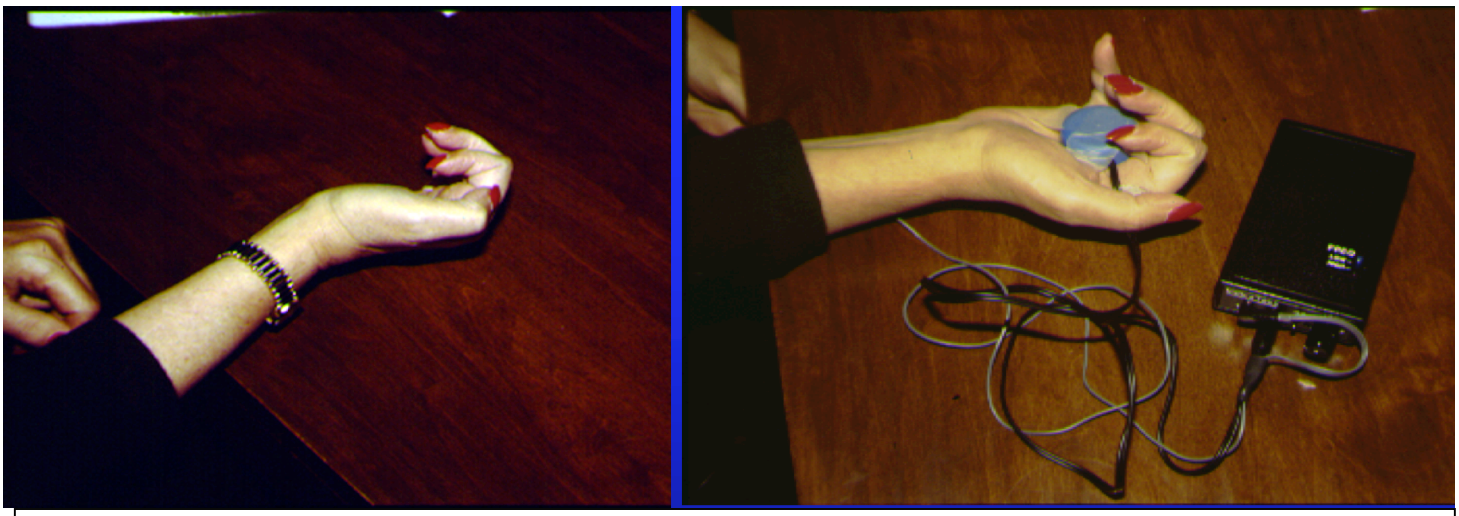
Note: With stroke patients and other CNS disorder patients, poor results are observed if the patient's wrist joint has recently been injected with Bo-Tox (within 3 months), or if the patient is taking steroids (prednisone). Ample time is required for these effects to have worn off, before using this program.



Naeser Laser HAND Treatment Protocol To Reduce Spasticity



This graph summarizes the effects of direct microcurrent on ATP concentration in Cheng's study. It displays that the increase in ATP concentration peaks at around 500μA with a 500% increase in the [ATP] as compared to the untreated control group. In addition, at currents above 6 Ma, the [ATP] dropped below that of the untreated control group (the baseline), indicating a long term decrease in [ATP] concentrations in patients treated with conventional (millicurrent) TENS. (Cheng et al., 1982)



BEFORE TREATMENT: Right Hand *spasticity still present*, 1.5 Yr. Poststroke

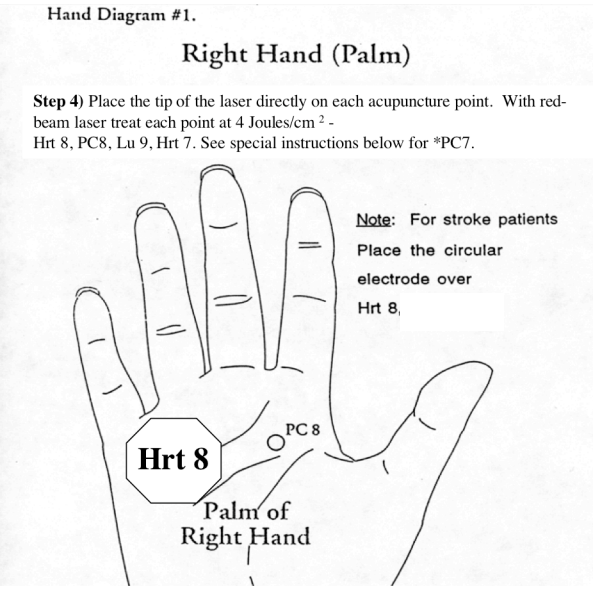
Microamps TENS device (MicroStim 100) will be used for 20 Minutes,

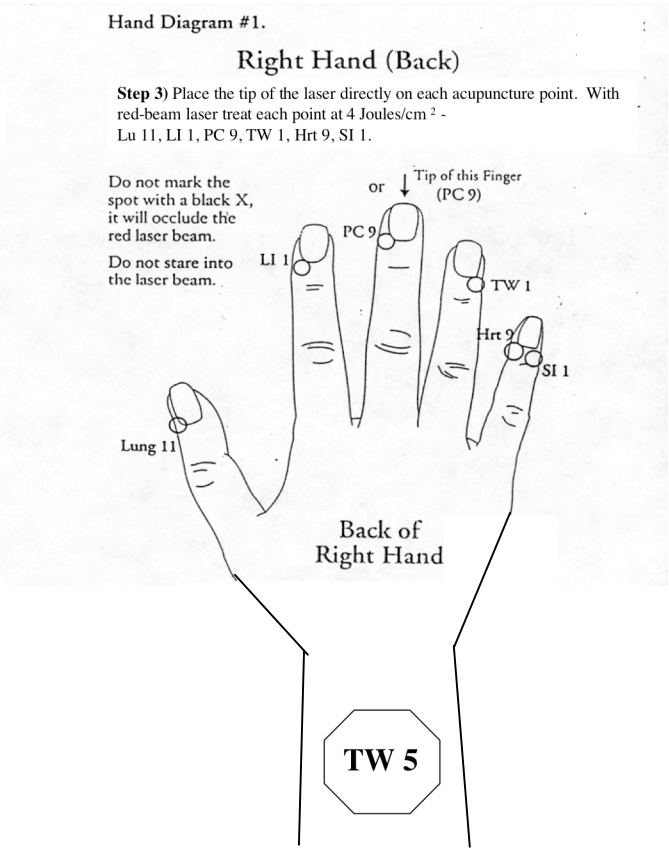
on two Acupuncture Points: HRT 8 and TW 5

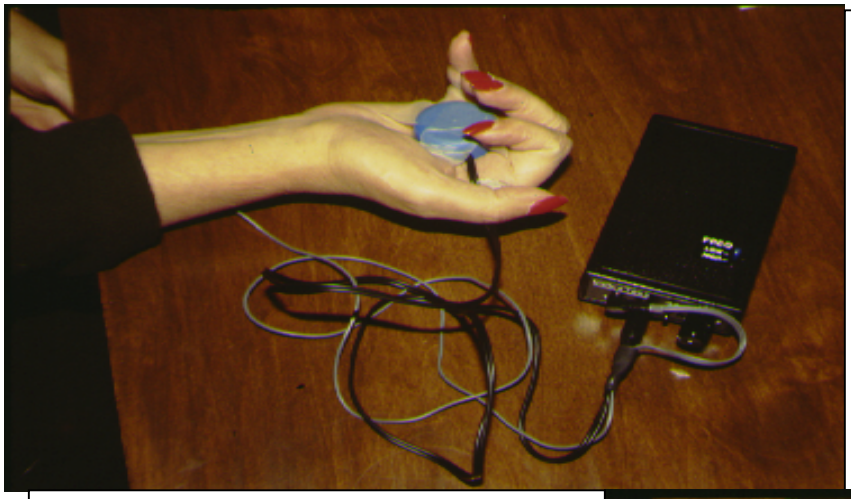
High Frequency, 292 Hz., 2 min. *(subthreshold)*

Low Frequency, 0.3 Hz., 18 min. *(subthreshold)*

PLUS, Red-Beam Laser Acupuncture on the finger tips, 4 J/cm^2 per point







BEFORE TREATMENT:

Hand spasticity still present
1.5 Yr. Poststroke

1st Treatment
Naeser Laser Hand Treatment

Microamps TENS (Hrt 8, TW 5)
and
Red-beam Laser (Jing-Well Pts.)

AFTER TREATMENT:

Post- 1st, 20-Minute Treatment

Hand opens
Fingers have more extension
and less spasticity

Requires more treatments,
to retain more lasting effect.

Patient can treat him/herself.

Naeser Laser Home Treatment Program for the FOOT
Peripheral Neuropathy and Poor Circulation in the Foot Treated with Laser Acupuncture and Microamps TENS -

Teaching Module Abstract presented at the 3rd Annual Meeting of the North American Association for Laser Therapy (NAALT), Uniformed Services University for the Health Sciences, Bethesda, MD, April 4, 2003. www.naalt.org

Margaret A. Naeser, Ph.D., Lic.Ac., Department of Neurology Boston University School of Medicine and V.A. Boston Healthcare System. Psychology Research (116-B), VA Boston Healthcare System, 150 So. Huntington Ave., Boston, MA 02130 email: mnaeser@bu.edu

May be used with peripheral neuropathy (of diabetic, AIDS, or neurological origin) or poor circulation to the feet, including foot ulcers. (AIDS patients taking certain medications can develop serious, painful, peripheral neuropathies in the ankles/feet.) This protocol could also be tried with stroke patients or M.S. patients with mild ankle dorsi-flexion problems ("foot drop"). It can also be used with *spinal cord injury patients to reduce clonus and spasticity* in the leg and foot muscles. Treat daily, or 3-6 times per week. This protocol includes *both* microamps TENS and red-beam low-level laser. No medical claims are made.

Some lasers which have been used include:

Red-beam Lasers (for shallow acupuncture points).

Lasotronic Pocket Therapy Laser, 45 mW, 660 nm, CW. Elliptical beam, 1.5 mm x 3.5 mm. Beam spot size: 0.0412 cm2. 1 Joule/cm2 = .915 sec. or 1 sec. 4 Joules/cm2 = 4 sec.

Ito Laser Pointer, 5mW, 670 nm. CW. Aperture: 5 mm diameter. Beam spot size: 0.196 cm2 1 Joule = 200 sec. 1 Joule/cm2 = 39.2 sec. 4 Joules/cm2 = 156.9 sec. or 2 Min. 36 sec.

Infrared Lasers (for deeper acupuncture points).

Respond 2400XL Laser (Now, Luminex), 500 mW, 904 nm, CW. Aperture: 1.14 cm diam. Beam spot size: 1.03 cm2 1 Joule = 0.5 sec. 1 Joule/cm2 = 2 sec. 4 Joules/cm2 = 8 sec

Microamps TENS Device:

MicroStim 100 TENS (580 μA to 3.5 mA) with 2 circular electrodes, where each electrode has a copper-coated surface, with four embedded, tiny, red LEDs (not laser light).

MicroStim 100 TENS Device (A TENS device may not be used with a patient who is pregnant, nor with a patient who has a pacemaker.)

1. Be sure the foot and toes of the patient are clean and dry; no perspiration or body lotion, etc. Wipe the areas where the acupuncture points are located with an alcohol pad. See Diagram on last page.
2. Set switch to the "square wave" on the MicroStim 100 TENS device.
3. There are 2 circular electrodes, each has a copper-coated surface, with four embedded, tiny red LED lights. Place one double-sided sticky CLEAR circular conducting patch onto the copper surface of each circular electrode.

4. Place one circular electrode with attached sticky patch, onto the top of the foot at Liv 3. Place the second circular electrode with attached sticky patch on the sole of the foot at Ki 1. See Diagram. Place this second circular electrode so that the two circular electrodes are placed opposite to each other, to enable treatment through the foot with the MicroStim 100 TENS device.

5. Set the frequency switch on the top of the MicroStim 100 TENS to F4 (292 Hz) for the first frequency to use.

6. Turn the round power control knob to "On," and SLOWLY turn up the power until the patient reports feeling a "tingling sensation" from either electrode which is in place. Now, turn the power down, until the PATIENT DOES NOT FEEL ANY STIMULUS AT ALL. This will be the correct setting (it should be around only 2 or 4 on the round power control knob). If the patient does not report any tingling sensation at all, even at the highest setting of 9, this is OK and just set the power to maximum. Leave the power setting at this subthreshold level, for 2 minutes.

7. After the first 2 minutes at F4, switch the frequency knob over to the lowest frequency setting of F1 (0.3 Hz) for 18 minutes. The MicroStim 100 TENS device turns itself off after 20 minutes. Discard both circular sticky patches; do not store the used patches on the LED surface, this would corrode the copper; do not re-use the sticky patches after one use. The total time required for the MicroStim 100 TENS treatment is 20 minutes.

Low-Level Laser Treatment

While the microamps TENS treatment is ongoing, a red-beam laser can be used to treat the Jing-Well points near the base of the toenail beds, and other points on the foot, at an energy density of 4 J/cm2. The tip of the laser pointer should physically touch the skin, but do not press so hard that the tip leaves a very deep indentation on the skin. Hold the laser pointer at a right angle to the skin. These acupuncture points include:

1. Sp 1, Liv 1, St 45, GB 44, Bl 67. These are the most important points; others are optional. See Diagram on last page.

2. Points in the web spaces between the toes.

3. Ki 6, Sp 5, Liv 4, St 41, GB 40; Ki 3, Bl 60; and/or other shallow ankle and foot points. These points are optional. They are located around the ankle. See an acupuncture textbook for their locations.

4. Use the red-beam laser only on shallow points, on adults.

5. The 5 mW red-beam laser may be used at increased J/cm2 (8 J/cm2), as necessary, on very painful joints/areas.

6. It is, of course, recommended that acupuncture needles or infrared laser also be used to treat other deeper acupuncture points on the leg, as appropriate, on adults.

7. The patient can perform this treatment on him/herself once a day, or every other day, until there is stable pain relief (or reduced spasticity over several days); then the treatments can be used only as necessary.

8. For cases with leg cramping and spasticity (especially spinal cord injury cases), also consider the use of a magnet cap developed by Agatha Colbert, M.D. The magnet cap appears to affect GV 20 and SiShenCong, reducing spasticity in the legs and reducing stomach spasms in spinal cord injury patients (Naeser, personal observation). The magnet cap may be purchased through Jayne Ronsicki, Lic.Ac., Hudson, MA. Silverbog@aol.com 1-877-527-1550 or 978-562-6389.

Steve Liu, Lic.Ac., Tucson, AZ has experience using this (or a similar) FOOT treatment program combining red-beam laser on acupuncture points and microamps TENS, in treatment of diabetic peripheral neuropathy (Liu, 2002 and personal communication). steveliu@hlahc.com

References

Liu, S. 2002. Treatment of Diabetic Peripheral Neuropathy with Low Power Laser Acupuncture. Poster presentation at the Society for Acupuncture Research Meetings, Seattle, Washington, October, 2002.

Naeser MA, Wei XB, Laser Acupuncture - Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders, Boston, Boston Chinese Medicine, 1994, p. 41. Available througth Lhasa OMS, www.LhasaOMS.com or 1-800-722-8775. Also through sales@spanda.com

Websites: www.bu.edu/naeser/acupuncture http://gancao.net/ht/laser.shtml

Some sources for devices mentioned here:

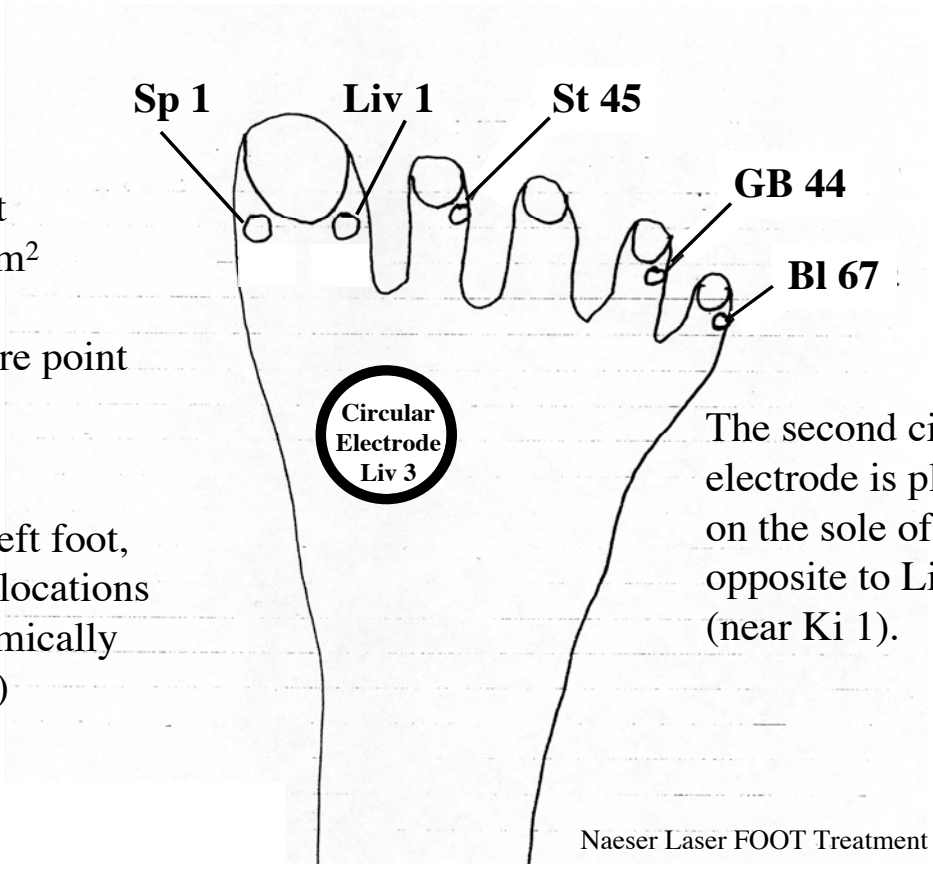
Lasotronic Pocket Therapy Laser, 45 mW, 660 nm. felix.kramer@gmx.ch (Zurich, Switzerland)

Ito Laser, 5mW, 670 nm, Lhasa Medical, Weymouth, MA 800-722-8775, www.LhasaOMS.com $118.00, replace two AAA batteries after three hours of use. If 2 lasers purchased, cost $112/laser.

Luminex Laser, FDA Approved (Formerly Respond Laser), 500 mW, and four probes: 670 nm, 830 nm, 867 nm, 904 nm. Medical Laser Systems, Branford, CT 800-778-0836, www.medicallasersystems.com Brian@medicallasersystems.com

Thor Lasers, FDA Approved. Variety of laser cluster heads and single probes, red-beam and infrared. Mark.Granic@Thorlaser.com 1-877-355-3151 Director of N. Am. Sales. He is in Toronto, Canada. www.Thorlaser.com

MicroStim 100 TENS unit with 2 circular LED electrodes. MicroStim, Inc., Palm City, FL. 1-800-326-9119 or (954) 720-4383. Developed by Joel Rossen, DVM. jrossen@MicroStim.Com info@microstim.com $295.00



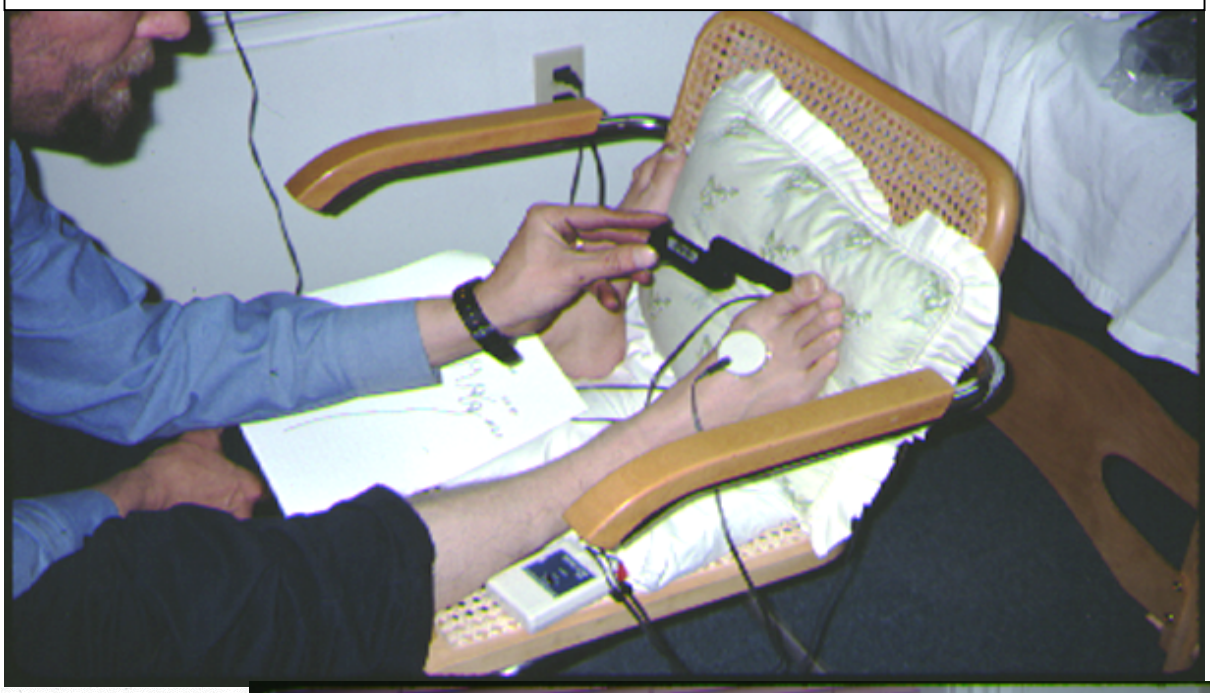
Right Foot
4 Joules/cm^2
on each
acupuncture point

(For the left foot, the point locations are anatomically identical.)

The second circular electrode is placed on the sole of the foot opposite to Liv 3 (near Ki 1).

Naeser Laser FOOT Treatment Program

Naeser Laser FOOT Treatment Protocol, with SCI



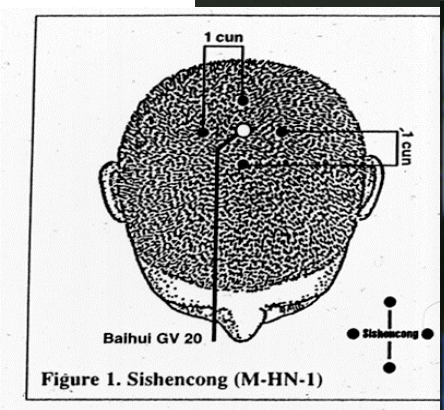


Figure 1. Sishencong (M-HN-1)

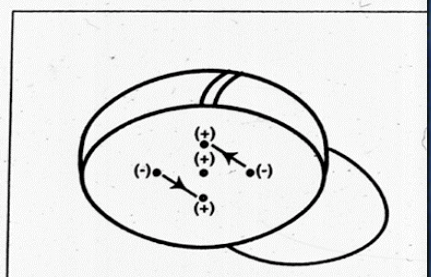


Figure 2. Sishencong Pattern With Magnets and Ion Pumping Cords.

Spinal Cord Injury, *reduction in leg clonus and spasticity,* post- 1st Laser FOOT Tx. and **Magnet cap. T6 bruising SCI Injury, 1 Year post-accident. Treatment performed by patient.**

Magnet cap: Jayne Ronsicki, L.Ac., Hudson, MA Silverbog@aol.com
Cap may be used for 10 minutes prior to transfers (bed/wheelchair) for less spasticity.
Magnet cap developed by Agatha Colbert, M.D., Portland, OR **See p. 63, Item 4.**

Book on Yamamoto New Scalp Needle Acupuncture (YNSA). (In my opinion, YNSA is the best acupuncture treatment program for paralysis in stroke.)

Yamamoto New Scalp Acupuncture

Contents

Yamamoto New Scalp Acupuncture "YNSA"

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Table 1. Acupuncture or Laser Acupuncture to Treat Paralysis in Stroke

Authors	No. Cases Real Acupuncture	Number Control Cases Sham or No Acptr.		Significance Level between Groups and/or Number of Cases with Outcome Level of Good Response/Markedly Effective
Naeser, Alexander, Stiassny-Eder, Galler, Hobbs, Bachman, 1992 Boston Univ. Sch. Med Boston VA Medical Ctr	10 Acute Arm/Leg Cases, Starting at 1 - 3 Months poststroke, 20 Real Tx.'s, 4 Wks.	6 Acute Arm/Leg Cases, 1 - 3 Mo.'s poststroke, 20 ShamTx.'s 4 Wks.		p < .013, with CT Scan Lesion Site as a Variable 4/10 Good Response, Real Acptr. 0/6 Good Response, Sham Acptr.
Naeser, Alexander, Stiassny-Eder, Galler, Hobbs, Bachman, 1994a Boston Univ. Sch. Med Boston VA Medical Ctr	10 Acute 10 Chronic Arm/Leg Cases, Starting Acute: 1 - 3 Mo. Chronic: 4 Mo. to 6 Yr. poststroke, 20 - 40 Tx.'s, 2 - 4 Months	Acute Arm/Leg Control Cases, see above study with Sham Acptr.	3 Chronic Arm/Leg Cases, No Acptr.	p < .003 (Chronic Cases), with CT Scan Lesion Site as a Variable 3/10 Good Response, Chronic Cases, Real Acptr. 0/3 Good Response, Chronic Cases, No Acptr. 5/10 Good Response, Acute Cases, Real Acptr. Isolated Active ROM for 8 Good Response Cases: -20 Tx.'s p level / -40 Tx.'s p level Shoulder Abd. +7 % < .04 / +12 % < .04 Knee Flexion +19 % < .02 / +22 % < .03 Knee Extens. +19 % n.s. / +28 % < .01
Naeser, Alexander, Stiassny -Eder, Lannin, Bachman, 1994b Boston Univ. Sch. Med Boston VA Medical Ctr	3 Acute 8 Chronic Hand Cases Acute: 1 - 3 Mo. Chronic: 4 Mo. - 8 Yr., 20 - 40 Tx.'s		2 Chronic Cases, No Acptr.	p < .022 (Chronic Cases) All Acptr. Cases, Good Response, 11/11 = 100% 0/2 Good Response, Chronic Cases, No Acptr. Finger Strength Testing for 8 Chronic Acptr.Cases Tip Pinch: +3 lbs., -40 Tx.'s, p < .04 Palmar Pinch: +3 lbs., -20 Tx's, p < .01
Johansson, Lindgren, Widner, Wiklund, Johansson, 1993 Lund Univ., Sweden	38 Acute Cases, 4 - 10 days poststroke, 20 Tx.'s (twice per week, 10 weeks) + P.T.		40 Acute Cases, 4-10 Days poststroke, P.T. Only	Savings of $26,000 per Acupuncture Patient due to reduced number of days in Rehab. Facilities p < .01 and beyond for: Walking and Balance at 1 Mo. and 3 Mo. Activities of Daily Living at 3 Mo. and 12 Mo. Quality Life, Mobility and Emotion at 3,6,12 Mo.
Magnusson, Johansson, Johansson, 1994 Lund Univ., Sweden	21 Acute Cases from above Johansson study		21 Acute Cases from above study	Follow-up on Postural Control 2 Yrs. later: p < .01, greater Postural Control for Cases Tx.'d with Acupuncture beginning 4 - 10 days poststroke
Sallstrom, Kjendahl, Osten, Stanghelle, Borchgrevink, 1995 Oslo, Norway	24 Subacute Cases, 40 days poststroke, 18 - 24 Tx.'s, 6 Weeks		21 Subacute Cases, 40 Days poststroke, P.T. Only	Cases who received Acupuncture were better after 6 weeks on the following: Motor Function, p = .002 Activities of Daily Living, p = .02 Quality Life, Nottingham Health Profile, p = .009
Hu, Chung, Liu, et al., 1993 Taipei, Taiwan	15 Acute Cases, Acupuncture Treatments started within 36 hours poststroke		15 Acute Cases, No Acptr.	Neurologic Outcome better at 1 Mo. p = .02, and at 3 Mo. p = .009 for Acute Cases Tx.'d with Acupuncture within 36 hours poststroke Results significant for Severe Subgroup at 1 Mo. p = .009, and at 3 Mo. p = .013; but not significant for Mild-Moderate Subgroup.

Table 1, Cont'd. Acupuncture or Laser Acupuncture to Treat Paralysis in Stroke

Authors	No. Cases Real Acupuncture	Number Control Cases Sham or No Acptr.		Significance Level between Groups and/or Number of Cases with Outcome Level of Good Response/Markedly Effective
Zhang, Li, Chen, Zhang, Wang, Fang, 1987 Shanghai Medical Univ. China	53 Acute and Chronic Cases, 24 Tx.'s, 6 Tx.'s per Week, for 6 Weeks		41 Acute and Chronic Cases	Acupuncture Group: 44/53 Cases, 83%, increased muscle strength by 1 - 2 grades at 6 joints: shoulder, elbow, wrist, hip, knee, ankle No-Acupuncture Group: 26/41 Cases, 63% Difference between Groups: $p < .05$
Li, Li, Wei, Zhao, Lu, 1989 Shanxi College Traditional Chinese Medicine, Shanxi, China	Acute Cerebral Hemorrhage, Two Groups Received Two Types of Acupuncture: Group 1 (n=46), Midline, base of skull, GV 16, GV 15, plus body points Group 2, (n=46), body points only 42 - 56 Tx.'s, daily			Cases were treated within 24 hours, to a week, post-hemorrhage. Most bleeding completed within 4 hours in acute cerebral hemorrhage cases. Group 1: 38/46 Cases, 82.6%, Markedly Effective Group 2: 17/46 Cases, 37%, Markedly Effective Difference between Groups: $p < .01$ Acupuncture points GV 15 and GV 16 highly recommended in acute cerebral hemorrhage cases.
Naeser, Alexander, Stiassny-Eder, Galler, Hobbs, Bachman, Lannin, 1995 Boston Univ. Sch. Med Boston VA Medical Ctr	Laser Acupuncture 5 Arm/Leg Cases, 2 Hand Cases, (6 Chronic, 10 Mo. to 6.5 Yr. poststroke; and 1 Acute Case), 20 - 60 Tx.'s, over 2 - 4 Mo., 20 mW, 780 nm 1 Joule per point			5/7 Cases (71%) Good Response Results similar to results with needle acupuncture where similar CT scan lesion sites were observed.

Overall, Good Response Post-Acupuncture, 128/193 Cases = 66.3%

Table 2. Acupuncture/Laser Acupuncture to Treat Cerebral Palsy in Babies and Children

Authors	No. Cases Real Acupuncture	Number Control Cases Sham or NoAcptr.		Significance Level between Groups and/or Number of Cases with Outcome Level of Good Response/Markedly Effective
Filipowicz, 1991 Warsaw, Poland Toronto, Canada	65 Babies and Children, age 40 days to 4 Years, Acupressure, Needle Acptr., Laser Acptr. (2-10 mW, red-beam Laser), Electroacptr., 2-3 Tx.'s per week, over a 5-Year period			65/65 Cases, 100%, Considerable Improvement 4 Cases, "Complete Recovery" when Acptr. Tx.'s started at less than 6 months of age. The earlier the Acptr. Tx.'s initiated, the greater the reduction in spasticity. Laser Acptr. especially effective to treat contractures of Achilles tendon; after 30 - 60 seconds of exposure, "considerable and immediate improvement."
Lao, 1992 New York City	10-month old baby, Needle Acptr., 50 Tx.'s, over a 5-Month period			Pre-Acptr: Unable to sit up (with or without assistance); Achilles tendons tight, bilaterally Post-10 Acptr. Tx.'s: Able to sit, started to crawl, spasticity alleviated Post-50 Acptr. Tx.'s: At 15 months of age, walking independently, similar to children his age.
Shi, Bu, Lin, 1992 Shanghai Medical Univ. Shanghai, China	117 children, age 6 Mo. to 10 Yr., 30 Acptr. Tx.'s, 4 - 5 Months			63/117 Cases, 53.8%, Markedly Improved or Better
Xiao & Meng, 1995 Beijing, China	30 children, age 1 - 14 Yr., 30 Tx.'s, 66-day period Ear Stimulation + Limb Massge.		30 children 1 - 14 Yr., 30 Tx.'s, 66-days, Only Limb Massage	Ear Stimulation + Massage: 16/30 Cases, 53%, Improved Massage Only: 4/30 Cases, 13.3%, Improved Difference between groups: $p < .01$
Ma & Zhang, 1995 Clinic of Lanzhou Brewery, Gansu, China	48 children, age 1 - 6 Yr.; and 12, over 6 Yr., Acptr. Tx.'s, 1 - 4 Months		9 children age 1-6 Yr, 3, >6 Yr. Vitamins and Herbs, 1-3 Month	Acptr. Group: 39/60 Cases, 65%, Markedly Improved Vitamins & Herbs Group: 2/12 Cases, 16.6%, Markedly Improved Difference between Groups: $p < .01$
Spears, 1979 Chatham, NJ	5, teenage 1 child, 4.8 Yr., ElectroAcptr., Ear Stimulation At least 8 Tx.'s			6/6 Cases, 100%, Less spasticity, loosened Achilles tendon, control of drooling
Lidicka & Hegyi, 1991 Prague, Czech Republic Budapest, Humgary	Laser Acupuncture 5 mW, red-beam 145 children, age 2 Wks. to 5 Yr., Tx'd for several Mo's.-Yr.'s.			Majority of Cases, Less Spasticity, Improved Motor Function for Sitting, Crawling, and Walking Recommend Laser Acptr. Tx.'s be used with babies likely to develop cerebral palsy, starting at 2 weeks post birth; 2 years of age is considered late to begin Acptr. Tx.'s.

Overall, Good Response Post-Acupuncture, 190/279 Cases = 68.1%

Additional Reference

Acupuncture or Laser Acupuncture to Treat Cerebal Palsy in Babies and Children

Asagai Y, Kanai H, Miura Y, Ohshiro T: Application of low reactive-level laser therapy (LLLT) in the functional training of cerebral palsy patients. Laser Therapy, 1994; 6: 195-202.

This study from the Shinano Handicapped Children's Hospital, Nagano, Japan involved 150 patients with spastic cerebral palsy, ages 10 months to 20 years. Two gallium aluminum arsenide diode, 60 mW or 100 mW, continuous wave, 810 nm wavelength (infrared) lasers were used for 15 to 30 seconds per point. The points chosen were standard points used for acupuncture or nerve blocks; local points on muscular hyperspasm were also used. All children received real LLLT, no sham treatments were administered.

In the majority of cases, spasm was successfully suppressed by LLLT, with the notable exception of those patients suffering from severe joint contracture. In 42 cases whose hands were normally involuntarily clenched, 34 cases (81%) were able to open their hands with less effort following LLLT.

The authors quote Kamikawa et al. (1982) who hypothesize that LLLT may cause vascular dilatation through the sympathetic nervous system, and reduce tonic muscle spasms in muscles which had been in a hypoxemic state. p. 200

"...Compared with conventional methodology, laser therapy has proved to be a simple, reliable and noninvasive method which enabled painless suppression of spasm...The effect of LLLT lasted from one to several hours in patients with severe spasticity...the authors feel that LLLT is particularly useful as a supplementary or adjunctive therapeutic modality to improve the overall efficacy of physical rehabilitation and functional training in children with cerebal palsy." p. 195

Kamikawa K, Ohnishi T, Suzuki M, Kanetani G, Shibamoto H: Laser therapy of pain. The Journal of Japan Society for Laser Medicine, 1982: 3: 345-348.

Naeser Laser Home Treatment Program

for Children with Cerebral Palsy and Motor Developmental Delay

In an ideal situation when treating cerebral palsy, start treatment 2 weeks post-birth, using the 5 mW red-beam ITO laser pen, Continuous Wave, for only 5 - 10 seconds per acupuncture point (Lidicka & Hegyi, 1991).

For a 4-year old child, for example, use the 5mW red-beam ITO laser pen, Continuous Wave, for about 30 seconds per acupuncture point. The 4-year old child we worked with liked to practice reciting the alphabet (about 30 seconds) per acupuncture point, while the mother was treating a point with the laser. Treat 3 – 6 times per week. Try to treat for only 10 minutes. Treat for years. The pediatric Chinese Herbal Medicine formula, Liu Wei Di Huang Wang is often used with children with developmental delay.

There are two basic sets of points (Extra Meridians), which are alternated between the treatments (Set A and Set B). Note the following, regarding the sequence of points to be treated:

On a male child, treat the Master Point first, on the left side, only.
On a male child, then treat the Coupled Point, on the right side, only.
On a female child, treat the Master Point first, on the right side, only.
On a female child, then treat the Coupled Point, on the left side, only.

Set A (Governing Vessel)
Master Point – SI 3; Coupled Point – BL 62

Set B (Dai Mai)
Master Point – GB 41; Coupled Point – TW 5

Note: The Yang Chiao Mai is also helpful to increase strength and agility in the feet, used with Motor Developmental Delay. Master Point - BL 62; Coupled Point - SI 3.

General Points to also Treat Every Day or Every Other Day

GV 15, and 16 (very important)
LI 11, and 4
BL 23, and 17
ST 36
LIV 3
GB 41 and TW 5 are the most important points to treat for long-term use

If child is agitated – LIV 3 and LI 4 (bi-lateral)
If leg turns outward – SP 5, KI 2, KI 6
If wrist turns outward – PC 6
If leg turns inward – GB 40, BL 62
If wrist turns inward – TW 5

Ear Points: (Treat ear points for less time). Corpus Callosum, Hypothalamus, Laterality Point, L; Oscillation Point (R and L).
Yamamoto New Scalp Needle Acupuncture Points: (Bilateral) Brain Point; Liver Point, temple area
Other Points: BL 57 (for spasms)
ST 40
GV 14
GB 34, and 39
KI 3

Dr. Michaela Lidicka, Prague, Czechoslovakia and Dr. Gabriella Hegyi, Budapest, Hungary. Papers presented at ICMART Meetings, Munich, Germany, June 14-17, 1991. Summarized in Naeser MA, Wei XB. Laser Acupuncture – An Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders. Boston, Boston Chinese Medicine, 1994, p. 77.

Acupuncture and Laser Acupuncture to Reduce Symptom Severity in Spinal Cord Injury

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World Health Organization Conference: Review of Emerging Therapeutic Options for Human Spinal Cord Injury, Reykjavik, Iceland, June 1-2, 2001

The National Institutes of Health (NIH), Bethesda, MD held a Consensus Development Conference on Acupuncture in November, 1997. Portions of the material included here are taken from my invited report for that conference, "Neurological Rehabilitation: Acupuncture and Laser Acupuncture to Treat Paralysis in Stroke and Other Paralytic Conditions and Pain in Carpal Tunnel Syndrome." The section "Other Paralytic Conditions" included Spinal Cord Injury. The conference was sponsored by the NIH Office of Alternative Medicine and the Office of Medical Applications of Research; the Proceedings were published by NIH in 1997 (pp. 93-109).

The attached Table summarizes results from three studies performed in China before 1997, where acupuncture was used to treat Spinal Cord Injury (Gao, 1984; Gao et al., 1996; Wang, 1992). None had a control group. Overall, 340/360 cases, 94.4%, had an outcome level of beneficial progress, including **reduction in muscle spasms, some increased level of sensation, improved bladder and bowel function**. Patients were treated ranging from 5 months to 2-3 years, or even for 5 years. Electroacupuncture along the Bladder meridian (paravertebral) area was especially recommended. Authors recommend beginning acupuncture as soon as possible after spinal cord injury, even during the acute stage of spinal cord shock, to help reduce the development of spasms. The acupuncture treatments were also helpful in the treatment of decubital ulcers.

Additional studies have been published which support these findings. Honjo et al., (2000) from Japan, observed that needle stimulation of Bladder 33 (third posterior sacral foramina) significantly improved bladder incontinence. Cheng et al., (1998) from Taiwan, observed that cases who received electroacupuncture (acupuncture points CV 3, 4 and Bladder 32) achieved balanced voiding in fewer days than cases who received no acupuncture. Cases treated with acupuncture starting within 3 weeks after injury required significantly fewer days of treatments, than those treated with acupuncture after 3 weeks. Cases with complete spinal cord injury, either with pronounced detrusor-sphincter dyssynergia in upper motor neuron lesion or with persistent areflexic bladder in lower motor neuron lesion, were not affected by acupuncture.

Yu (1993) from Beijing Medical University observed that 100 Hz electroacupuncture (EA) (2 times/day, 30 min/time) for 3 months had an antispastic effect on the limbs which was stable, but required additional long-term, follow-up treatments. He concluded that 100 Hz EA "decreased the excitability of the motor neurons in the anterior horns through the kappa opiate receptors, thus ameliorating the muscle spasticity of spinal origin."

Low-level laser therapy (LLLT) may be used on acupuncture points to help reduce spasticity (Naeser & Wei, 1994, pp. 40, 41). The term LLLT refers to low-level lasers (5-500 mW, red-beam or near infrared, 600-1000 nm wavelength) which when applied to the skin produce no sensation and do not burn the skin. They have been observed to increase cellular adenosine tri-phosphate (ATP). LLLT has been used in studies to treat pain for over two decades (reviewed in Tuner & Hode, 1999). LLLT has also been used to reduce paralysis in

stroke patients (Naeser et al., 1995). **Laser acupuncture (and microamps TENS) can be applied to the hands and feet, in a home treatment program to help reduce muscle spasms** (Naeser & Wei, 1994, pp. 40, 41). They may also be used to treat decubitus ulcers (p. 59).

Magnet Cap. Used to help reduce leg spasticity (or organ/stomach spasticity) in SCI patients (anecdotal experience, M. Naeser, Ph.D., Lic.Ac. with SCI patients). May be ordered from Jayne Ronsicki, Lic.Ac., Hudson, MA silverbog@aol.com 1-877-527-1550 or 978-562-6389. This cap was developed by Agatha Colbert, M.D., Eugene, Oregon. email: acolbert@ncnm.edu

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Tuner J, Hode L. 1999. Low Level Laser Therapy: Clinical Practice and Scientific Background. Edsbruk, Sweden: Prima Books.

Wang HJ. A survey of the treatment of traumatic paraplegia by traditional Chinese medicine. Journal of Chinese Medicine 1992;12(4):296-303.

Yu Y. Transcutaneous electric stimulation at acupoints in the treatment of spinal spasticity: effects and mechanism. Zhonghua Yi Xue Za Zhi 1993 Oct; 73(10):594-5, 637.

Summary Table. Acupuncture to Help Treat Paralysis in Spinal Cord Injury

From M. Naeser report: "Neurological Rehabilitation: Acupuncture and Laser Acupuncture to Treat Paralysis in Stroke and Other Paralytic Conditions and Pain in Carpal Tunnel Syndrome," NIH Office of Alternative Medicine and the Office of Medical Applications of Research; Proceedings published by NIH in 1997 (pp. 93-109).

Authors	No. Cases Real Acupuncture	Number Control Cases Sham or No Acptr.		Number of Cases with Outcome Level of Beneficial Progress
Gao, 1984 Yuci City Institute of Paralysis, Shanxi Province, China	17 Inpatients, with Complete Traumatic Paraplegia, Acute Cases, 1 Mo. postonset and Chronic Cases, 5 Yrs. postonset, Tx.'d over a 2 - 3 Yr. Period			15/17 Cases, 88% Includes improvement in the following: Reduction in muscle spasms Increased level of sensation Improved bladder and bowel function Recommends beginning acupuncture as soon as possible after spinal cord injury, even during early stage of spinal cord shock, in order to reduce occurrence of spasms. Younger patients had better outcome.
Wang, 1992 Institute Health Preserv. Beijing, China	82 Cases, Treated with Acupuncture/ ElectroAcptr., along the Bladder Meridian (paravertebral) for 5 Months			76/82 Cases, 93%, "Effective" Includes improvement in the following: Improvement in lower limb paralysis Improved bladder and bowel function
Gao, Gao, Gao, Han, Han, Han, Han, 1996 Yuci City Paralysis Institute, Shanxi Province, China	261 Cases, Treated beginning at 1 Mo. postonset to over 5 Yrs. postonset			249/261, 95%, "Effective" "Effective" defined as: <u>Basic Recovery of functions of the nervous system</u> with ability to walk freely, and almost voluntary urination (3% of cases). <u>Marked Effectiveness</u> with partial recovery of functions of nervous system, with ability to walk on crutches and restortion of urinary bladder reflex (35.2%). <u>Improvement of functions of nervous system</u> with some limb movement, defecation and/or urination (57.1%). Recommend beginning acupuncture as soon as possible after the spinal cord injury.

Overall, Beneficial Progress Post-Acupuncture, 340/360 Cases = 94.4%

Table 4. Acupuncture/Laser Acupuncture for Peripheral Facial Paralysis (Bell's Palsy)

Authors	No. Cases Real Acupuncture	Duration of Paralysis	Duration of Acupnctr Treatmnt	Number of Cases with Outcome Level of Cured or Markedly Improved
Gao & Chen, 1991 Beijing College of Traditional Chinese Medicine, Beijing, China	60 Cases Mild, n = 30 Severe, n = 30	3 Days to 30 Years < 2 Mo., n = 40 > 2 Mo., n = 20	10 Tx.'s, every other day	Overall, 59/60, 98% Mild Cases: Cured, 93%; Excellent, 7% Severe Cases: Cured, 70%; Excellent, 13%; Improved, 13%; Failed, 3%. < 2 Mo. Duration: Cured, 92.5%; Excellent, 5%; Improved, 2.5%; > 2 Mo. Duration: Cured, 60%; Excellent, 20%; Improved, 15%; Failed, 5% Recommend starting Acupuncture soon postonset
Cui, 1992 Tangshan Hospital of Traditional Chinese Medicine, Hebei Prvince, China	100 Cases 9 were Recurrent Cases	1 - 5 Days, n = 62 6-30 Days, n = 3 1 - 6 Mo., n = 6 > 6 Mo., n = 2	5 to 40 Tx.'s, Daily 94/100 Cases, Rec'd 30 Tx.'s over a 1-Month Period	90/100 Cases, 90%, Cured or Markedly Improved
Liu, 1995 Shandong College of Traditional Chinese Medicine, Jinan, China	718 Cases	All Cases, less than 4 Days	1 - 2 Months of Treatment	715/718 Cases, 99.6%, Cured or Marked Effect < 48 Hours: 572/572 Cases, 100% 2-3 Days: 112/112 Cases, 100% 3-4 Days: 31/34 Cases, 91.2%
Cheng, Zhao, Zhang, Yao, 1991 Chinese Academy of Traditional Chinese Medicine, Beijing, China	31 Cases 3 Mild 6 Moderate 22 Severe with Spasm eyelids, cheeks, both mouth corners	1 Week to 20 Years 27/31 Cases, >1 Year	Acptr. plus Laser Acptr Red-Beam 15 mW, HeNe Laser 20 Min., Spasmodic Area	26/31 Cases, 84%, Basically Controlled, Markedly Effective or Improved. Basically Controlled: 8/31 Cases, 25.8% Markedly Effective: 8/31 Cases, 25.8% Improved: 10/31 Cases, 32.3% Ineffective: 5/31 Cases, 16.1%
Wu, 1990 Puyang City People's Hospital, Henan Province, China	100 Cases	<3 Day, 39 <10 Day, 33 Cases 6 Mo., 6 < 1 Yr., 2	Laser Acptr Red-Beam 6 - 9 mW, HeNe Laser 2 - 4 Weeks	93/100 Cases, 93%, Cured Completely Recovered in 2 Weeks: 54/100, 54% Completely Recovered in 4 Weeks: 39/100, 39% With most severe cases, needle Acptr. also used

Overall, Cured or Markedly Improved Post-Acupuncture, 983/1009 Cases = 97.4%

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Neuroscience Letters 327 (2002) 53–56

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Functional magnetic resonance imaging detects activation of the visual association cortex during laser acupuncture of the foot in humans

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Received 21 January 2002; received in revised form 25 March 2002; accepted 11 April 2002

Abstract

The aim of this study was to investigate the effect of laser acupuncture on cerebral activation. Using functional magnetic imaging (fMRI) cortical activations during laser acupuncture at the left foot (Bladder 67) and dummy acupuncture, were compared employing a block design in ten healthy male volunteers. All experiments were done on a 1.5 Tesla magnetic resonance scanner equipped with a circular polarized head coil. During laser acupuncture, we found activation in the cuneus corresponding to Brodmann Area (BA) 18 and the medial occipital gyrus (BA 19) of the ipsilateral visual cortex. Placebo stimulation did not show any activation. We could demonstrate that laser acupuncture of a specific acupoint, empirically related to ophthalmic disorders, leads to activation of visual brain areas, whereas placebo acupuncture does not. These results indicate that fMRI has the potential to elucidate effects of acupuncture on brain activity.

Keywords: Laser acupuncture; Acupoint Bladder 67; Functional magnetic resonance imaging; Visual cortex

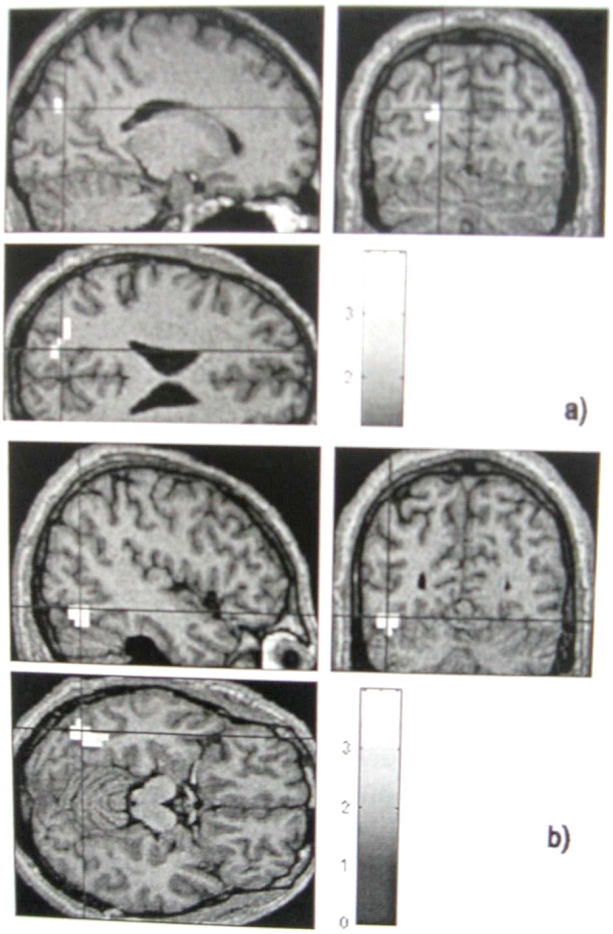

Fig. 2. Cerebral activation pattern induced by laser acupuncture.

Carpal Tunnel Syndrome Pain Treated With Low-Level Laser and Microamperes Transcutaneous Electric Nerve Stimulation: A Controlled Study

Margaret A. Naeser, PhD, LAc, Kyung-Ae K. Hahn, MD, Barbara E. Lieberman, OTR/L, Kenneth F. Branco, MA, LAc

ABSTRACT. Naeser MA, Hahn K-AK, Lieberman BE, Branco KF. Carpal tunnel syndrome pain treated with low-level laser and microamperes transcutaneous electric nerve stimulation: a controlled study. Arch Phys Med Rehabil 2002; 83:978-88.

Objective: To investigate whether real or sham low-level laser therapy (LLLT) plus microamperes transcutaneous electric nerve stimulation (TENS) applied to acupuncture points significantly reduces pain in carpal tunnel syndrome (CTS).

Design: Randomized, double-blind, placebo-control, crossover trial. Patients and staff administered outcome measures blinded.

Setting: Outpatient, university-affiliated Department of Veterans Affairs medical center.

Participants: Eleven mild to moderate CTS cases (nerve conduction study, clinical examination) who failed standard medical or surgical treatment for 3 to 30 months.

Intervention: Patients received real and sham treatment series (each for 3–4wk), in a randomized order. Real treatments used red-beam laser (continuous wave, 15mW, 632.8nm) on shallow acupuncture points on the affected hand, infrared laser (pulsed, 9.4W, 904nm) on deeper points on upper extremity and cervical paraspinal areas, and microamps TENS on the affected wrist. Devices were painless, noninvasive, and produced no sensation whether they were real or sham. The hand was treated behind a hanging black curtain without the patient knowing if devices were on (real) or off (sham).

Main Outcome Measures: McGill Pain Questionnaire (MPQ) score, sensory and motor latencies, and Phalen and Tinel signs.

Results: Significant decreases in MPQ score, median nerve sensory latency, and Phalen and Tinel signs after the real treatment series but not after the sham treatment series. Patients could perform their previous work (computer typist, handyman) and were stable for 1 to 3 years.

Conclusions: This new, conservative treatment was effective in treating CTS pain; larger studies are recommended.

Key Words: Acupuncture; Carpal tunnel syndrome; Lasers; Pain; Rehabilitation; Transcutaneous electric nerve stimulation.

CARPAL TUNNEL SYNDROME (CTS) is an entrapment neuropathy of the median nerve at the wrist caused by compression of the median nerve as it passes from the forearm to the palm beneath the transverse carpal ligament.[1] Signs and symptoms associated with CTS include paresthesias; numbness and tingling in the sensory distribution of the median nerve for thumb, index, middle, and radial side of the ring finger; Tinel sign; Phalen sign; hypoesthesia; nocturnal awakening; specific pain diagrams of the hand; and sometimes hand weakness.[2-4] Nerve conduction studies (NCSs) are the primary definitive test, although the exact millisecond latencies considered to be compatible with CTS vary across studies.[1,5-7]

The etiology of CTS is unknown; however, it occurs more commonly in workers with tasks involving repetitive hand movements (eg, computer keyboard typing, operating machinery, assembly line work). It may be the result of a concentration of workload on a few smaller groups of muscles.[3] In addition to ergonomic stressors, some systemic medical disorders (eg, diabetes mellitus, thyroid disease, rheumatoid arthritis, gout, obesity) and psychosocial factors may contribute to CTS. Between 1981 and 1991, the US Department of Labor, Bureau of Labor Statistics reported an almost 10-fold increase (from 23,000 to 223,600) in disorders "associated with repeated trauma."[8,9] In 1995, 50% of all workers with CTS missed ≥30 days of work.[10]

Current standard treatments for work-related CTS include, initially, conservative treatments and, later, if necessary, surgical release of the transverse carpal ligament. Conservative treatments include adjusting the work environment, and using wrist splints, and nonsteroidal anti-inflammatory drugs.[11] Direct injection of steroids into the carpal tunnel may provide relief for only 2 to 4 months,[12] and at 18 months, only 22% of patients may be free of symptoms.[13]

Surgical release of the transverse carpal ligament is performed in approximately 40% to 45% of CTS cases, with estimates of more than 460,000 procedures being performed each year, at a direct medical cost of more than $1.9 billion.[7] After surgery, approximately one third of patients continue to experience pain and functional loss[14]; only 40% regain normal function and 5% worsen.[15,16] Office workers return to work in a few weeks and people who work in heavier labor require 4 to 6 months of rehabilitation.

In 1993, the cost to treat 1 case of CTS without surgery in California was $5246; with surgery it was $20,925.[17] The average cost to treat 1 case of CTS nationwide was about

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Accepted July 16, 2001.

Supported in part by the American Association of Oriental Medicine. Equipment donated by the Dynatronics Corp, Respond Systems, and MicroStim Inc.

Presented in part at the American Society for Lasers in Surgery and Medicine's 16th Annual Meeting, April 15, 1996, Lake Buena Vista, FL; at the National Institutes of Health Consensus Development Conference on Acupuncture, November 4, 1997, Bethesda, MD; and at the 2nd World Congress Meeting of the World Association for Laser Therapies, September 5, 1998, Kansas City, MO.

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the authors or upon any organization with which the authors are associated.

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0003-9993/02/8307-6969$35.00/0
doi:10.1053/apmr.2002.33096

sistent with placebo response rates in which sham LLLT has been included in studies to treat pain.[30]

A comparison of MPQ scores for the remaining 8 subjects established that there was no change from pre- to postsham treatment ($t_7=-.89$, $P=.41$). Because 3 subjects who received the sham treatment series second were at floor after receiving the real treatment series (table 2), the sham effect was reexamined separately for the 5 subjects who received the sham treatment series first. The mean change for these 5 subjects was +4.2, because almost exclusively of a single patient (case 7). Paired t test analysis established that there was still no change postsham ($t_4=-.88$, $P=.48$, power=.75) (table 2).

Real treatment. It was necessary to know whether the 2 groups (real series first, real series second) entered the real treatment series with equivalent pain scores. Prereal, the mean pain score ± standard deviation (SD) for the real first was 21.3±5.69, and the mean pain score for the real second was 22.2±11.28 (table 2). An unpaired t test ($t_6=.12$, $P=.91$) established that the 2 groups had equivalent pain scores prereal. Therefore, data from the 2 groups could be pooled (n=8).

A paired t test was performed on pre- versus postreal pain scores for these 8 cases. There was a significant reduction in pain postreal treatment ($t=4.66$, $P=.0035$). For prereal treatment, the overall pain score was 21.87±9.06; for postreal treatment, it was only 3.75±6.52. There was a mean reduction of 18.13±10.45 points on the MPQ score or −88.78%± 28.27. This represented a 6-fold reduction in pain (table 2).

Overall, 7 of 8 cases reported greater than 50% pain reduction postreal treatment, a success rate of 87.5%. The remaining case showed a decrease in pain of 25%. Four of 8 cases (50%) reported an MPQ score of 0; and 6 of 8 cases (75%) reported a pain score of ≤2.

The mean MPQ scores for pre and post each real and sham treatment series are shown in figure 1, with placebo responders omitted.

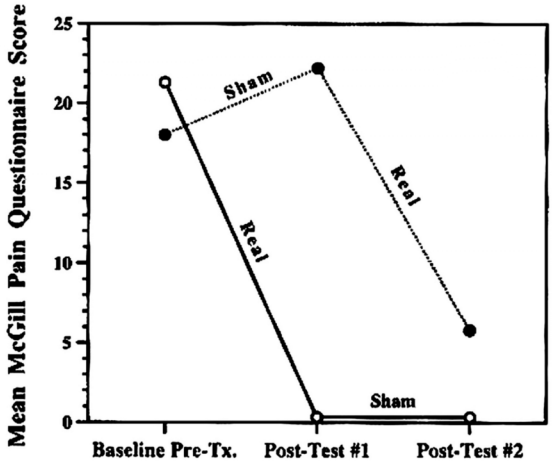

Fig 1. Mean MPQ scores for 8 CTS cases separated into 2 treatment groups (3 placebo responders have been omitted): (1) patients (n=3) who received the real treatment series first and the sham treatment second; and (2) patients (n=5) who received the sham treatment series first and the real treatment second. In the real first group, there was a 21-point decrease in pain (−98.7%) postreal, and in these cases postsham, no change. In the sham first group, there was a 2.62-point increase in pain (+17.99%) postsham, and in these cases postreal, a 16.4-point decrease in pain (−74.8%). In the pooled groups (n=8), there was a significant decrease in pain postreal ($P=.0035$) but not postsham ($P=.41$) (table 2). Legend: —○— , real treatment series first; --●--, sham treatment series first.

Sensory Latencies

Sham treatment. Pre- versus postsham data were compared for the 8 cases with complete data (table 3). The mean change was .003±.48ms ($t_7=-.02$, $P=.98$). It was felt that cases who received the sham treatment series second could have delayed effects after the real treatment series (first). For that reason, the sham effect was reanalyzed only for those subjects who received sham first. A paired t test for these 4 cases showed no significant change postsham ($t=-.41$, $P=.71$).

Real treatment. Cases with absent sensory latencies were excluded (cases 3, 9, 10). Prereal, the mean sensory latency for the real series first was 3.89±.38; and prereal, the mean sensory latency for the real series second was 3.95±.86. An unpaired t test ($t_6=-.11$, $P=.91$) established that the 2 groups had equivalent sensory latencies when entering the real treatment series. Therefore, the data from the 2 groups could be pooled.

A paired t test was performed on the pre- versus postreal sensory latencies for these 8 cases. There was a significant decrease in the mean sensory latency postreal treatment ($t=3.58$, $P=.009$). The mean decrease in sensory latency postreal treatment was −.215±.17ms. Seven of the 8 cases (87.5%) showed a decrease, and 1 case showed no change.

Motor Latencies

Sham treatment. Pre- versus postsham data were compared for all 11 cases. The mean change was −.209±.67ms ($t_{10}=1.04$, $P=.33$). In keeping with the previous statistical analyses, this comparison was repeated only for cases who were treated with the sham treatment series first (n=7). A paired t test showed no significant change in the motor latencies postsham ($t=1.49$, $P=.19$) (table 4).

Real treatment. The mean motor latency prereal for the real series first was 3.90±.53 and for the real series second, it was 4.20±1.10. An unpaired t test ($t_9=.46$, $P=.66$) established equivalence in motor latencies between these 2 groups.

A paired t test was performed on the pre- versus postreal motor latencies for these 11 cases. There was no significant change in the mean motor latency postreal treatment ($t=1.16$, $P=.27$). The mean motor latency prereal treatment was 4.07± .910) and the mean motor latency postreal treatment was 4.20±1.10.

The Phalen Sign

Sham treatment. Pre- and postsham data were compared for the 8 cases for whom there were complete data (table 5). Because the Phalen sign is scored either as positive (present) or negative (absent), the test for change from pre- to postsham was performed by the McNemar test for proportions and using the Yates correction for continuity.[53] There was no significant change in the number of cases who had a positive Phalen sign after the sham treatment series ($z=0.5$, $P=.96$). Presham treatment, 6 of 8 cases (75%) had a positive Phalen sign; postsham, 5 of 8 cases (62.5%) had a positive Phalen sign.

Real treatment. Prereal, 9 of 11 cases (81.8%) had a positive Phalen sign, and postreal treatment, only 2 cases (18.2%) had a positive sign. The McNemar test established that there

THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 5, Number 1, 1999, pp. 5–26
Mary Ann Liebert, Inc.

Carpal Tunnel Syndrome: Clinical Outcome After Low-Level Laser Acupuncture, Microamps Transcutaneous Electrical Nerve Stimulation, and Other Alternative Therapies–An Open Protocol Study

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and MARGARET A. NAESER, Ph.D., Lic.Ac., Dipl.Ac. (NCCAOM)[2]

ABSTRACT

Objective: Outcome for carpal tunnel syndrome (CTS) patients (who previously failed standard medical/surgical treatments) treated primarily with a painless, noninvasive technique utilizing red-beam, low-level laser acupuncture and microamps transcutaneous electrical nerve stimulation (TENS) on the affected hand; secondarily, with other alternative therapies.

Design: Open treatment protocol, patients diagnosed with CTS by their physicians.

Setting: Treatments performed by licensed acupuncturist in a private practice office.

Subjects: Total of 36 hands (from 22 women, 9 men), ages 24–84 years, median pain duration, 24 months. Fourteen hands failed 1–2 surgical release procedures.

Intervention/Treatment: Primary treatment: red-beam, 670 nm, continuous wave, 5 mW, diode laser pointer (1–7 J per point), and microamps TENS (<900 μA) on affected hands. Secondary treatment: infrared low-level laser (904 nm, pulsed, 10 W) and/or needle acupuncture on deeper acupuncture points; Chinese herbal medicine formulas and supplements, on case-by-case basis. Three treatments per week, 4–5 weeks.

Outcome Measures: Pre- and posttreatment Melzack pain scores; profession and employment status recorded.

Results: Posttreatment, pain significantly reduced ($p < .0001$), and 33 of 36 hands (91.6%) no pain, or pain reduced by more than 50%. The 14 hands that failed surgical release, successfully treated. Patients remained employed, if not retired. Follow-up after 1–2 years with cases less than age 60, only 2 of 23 hands (8.3%) pain returned, but successfully re-treated within a few weeks.

Conclusions: Possible mechanisms for effectiveness include increased adenosine triphosphate (ATP) on cellular level, decreased inflammation, temporary increase in serotonin. There are potential cost-savings with this treatment (current estimated cost per case, $12,000; this treatment, $1,000). Safe when applied by licensed acupuncturist trained in laser acupuncture; supplemental home treatments may be performed by patient under supervision of acupuncturist.

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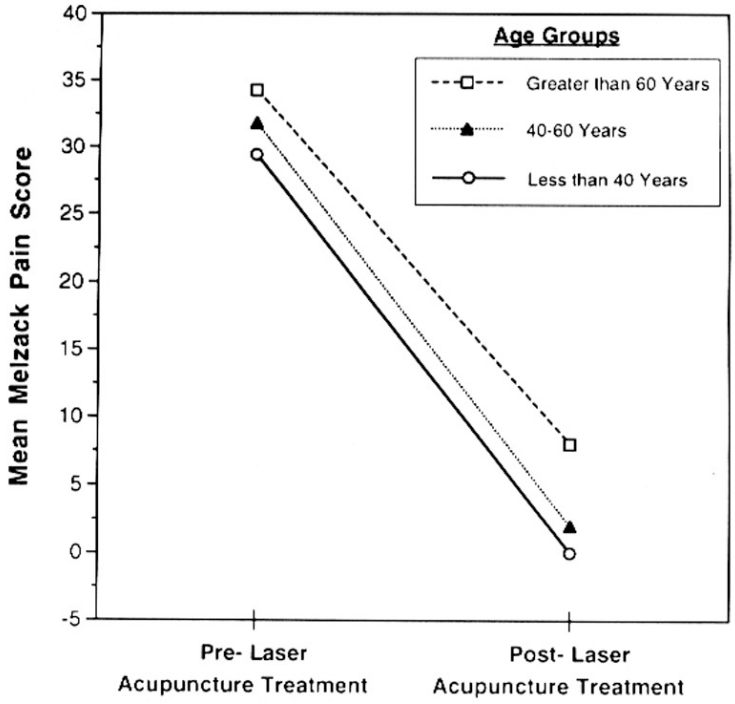

FIG. 2. Mean Melzack pain scores for three separate age groups, before and after this alternative therapy program including *primarily* red-beam, laser acupuncture and microamps transcutaneous electrical nerve stimulation (TENS) on the affected hand. A two-way, mixed design analysis of variance (ANOVA) showed a significant change in the Melzack pain scores posttreatment ($p < .0001$), but no effect of age group and no interaction between age group and treatment (see text).

Essence). These patients were given the formula, Astra Essence, in pill form (Health Concerns, Oakland, CA).

Supplements. In most cases, the dietary supplement, omega-3 fish oil capsules,[3] was also used, according to the protocol of Omura (Omura et al., 1992; Omura, 1994). Omura et al. (1992) has observed with bi-digital O-ring, resonance testing that many chronic pain patients present with a subclinical, viral infection in the area of pain; it is often herpes simplex type I virus on one side of the body, and type II, on the opposite side. None of the patients who participated in this clinical outcome study were examined by Dr. Omura, therefore it is not known if any of them had a subclinical, viral condition in the median nerve area, at the wrist. Patients were offered the option of trying the Omura treatment protocol with omega-3 fish oil capsules. Most patients used this for the duration of the treatments (4–5 weeks), in addition to the other treatments administered.

There were no negative side effects or untoward events observed with any aspects of this alternative treatment program.

[3]The omega-3 fish oil capsules (SDV, Boca Raton, FL or M.I.C. International, Jersey City, NJ) were used. Three times a day, the patient took one capsule with water, on an empty stomach, followed by 30 seconds of massage at the "wrist representation area" on the fingers (distal interphalangeal joint on the index and ring fingers), in order to promote vasodilation to the "wrist target organ." These "wrist representation areas" on the distal finger joints are an adaptation of the Korean Hand Acupuncture System (Yoo, 1988, p. 239, p. 245). The purpose of massage at the target "representation" areas (distal finger joints) was to increase vasodilation at the target sites (wrist areas), thus promoting increased blood flow with the supplements or herbs, to that target area. It would be too painful to massage the wrist area, directly. No endorsements of omega-3 fish oil, or medical claims are suggested for this experimental protocol.

Photomedicine and Laser Surgery
Volume 24, Number 2, 2006

Pp. 101–110

Photobiomodulation of Pain in Carpal Tunnel Syndrome: Review of Seven Laser Therapy Studies

MARGARET A. NAESER, Ph.D., Lic.Ac.

ABSTRACT

In this review, seven studies using photoradiation to treat carpal tunnel syndrome (CTS) are discussed: two controlled studies that observed real laser to have a better effect than sham laser, to treat CTS; three open protocol studies that observed real laser to have a beneficial effect to treat CTS; and two studies that did not observe real laser to have a better effect than a control condition, to treat CTS. In the five studies that observed beneficial effect from real laser, higher laser dosages (9 Joules, 12–30 Joules, 32 J/cm2, 225 J/cm2) were used at the primary treatment sites (median nerve at the wrist, or cervical neck area), than dosages in the two studies where real laser was not observed to have a better effect than a control condition (1.8 Joules or 6 J/cm2). The average success rate across the first five studies was 84% (SD, 8.9; total hands = 171). The average pain duration prior to successful photoradiation was 2 years. Photoradiation is a promising new, conservative treatment for mild/moderate CTS cases (motor latency < 7 msec; needle EMG, normal). It is cost-effective compared to current treatments.

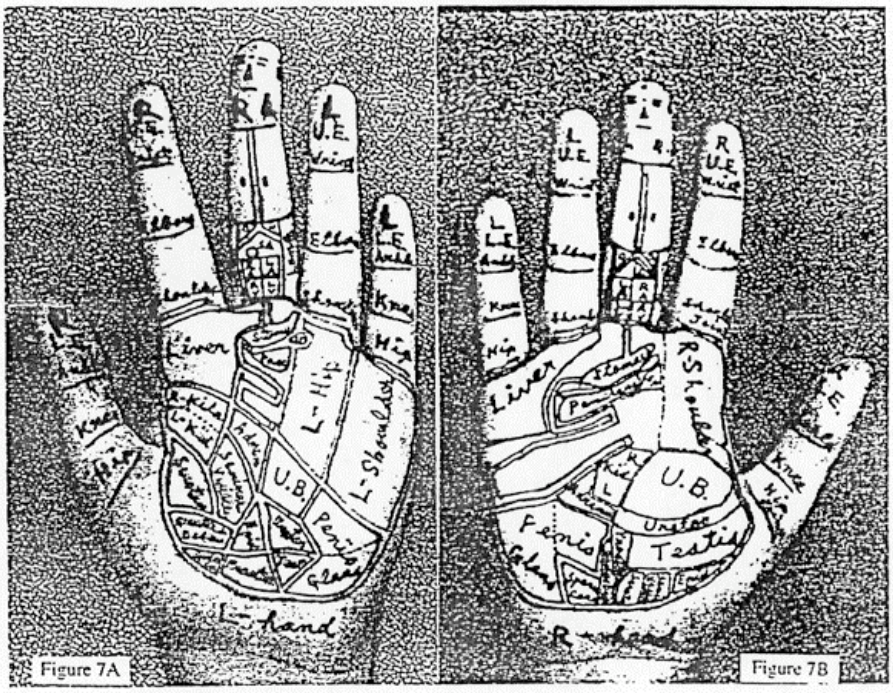

Figure 7A & 7B: Organ representation areas of the fingers and palms of the left and right hands (copyrighted by Yoshiaki Omura, M.D., Sc.D., 1994).

Source: Omura Y. Accurate localization of organ representation areas on the feet & hands usingthe bi-digital o-ring test resonance phenomenon: Its clinical implication in diagnosis & treatment -- Part I. Acupuncture & Electro-therapeutics Res., Int. J., 1994; 19: 153-190.

Home Treatment of Non-healing WOUNDS with MicroStim 100 TENS

Naeser MA, Wei XB, Laser Acupuncture - Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders, Boston, Boston Chinese Medicine, 1994, p. 59

Patients who sit or lie down in the same position for long periods of time can develop non-healing open wounds (bedsores or decubitus ulcers) or "pressure points" (these are sores, but they are not open wounds, they are more like bruises). I have used the MicroStim 100 TENS device to successfully treat some of these cases.

When treating a non-healing open wound with the MicroStim 100 TENS device, it is necessary to also use sterile occlusive dressing (similar to occlusive dressing used with burn patients). The occlusive dressing is a thin, clear "jello-like" material which can be placed directly on the open wound because it is sterile. Two sources where occlusive dressing may be purchased are:

1. 2nd Skin. P.O. Box 2501, Waco, TX 76702, 1-800-877-3626, http://www.spenco.com
2. "Elasto-gel" Sterile Occlusive Dressing, Southwest Technologies, Inc., 1510 Charlotte, Kansas City, MO 64108 1-800-247-9951.

This treatment protocol is designed to treat a wound that is less than, or equal to the size of the circular LED electrode with the four embedded, tiny red lights, part of the MicroStim 100 TENS device (e.g., a wound which is
1.5 inch diameter or less). Treat once or twice daily until the wound is completely closed. This protocol also includes the optional use of a red-beam, low-level laser. No medical claims are made.

MicroStim 100 TENS Device (A TENS device may not be used with a patient with a pacemaker.)

1. Be sure the wound is clean. You can used a hydrogen peroxide solution (3%) and gently pour it over the area, to help clear the wound. Do this only once a day, before the treatment, NOT after the treatment. If you do it immediately after or even a few hours later, you may wash away the granulation of tissue that is starting to form, to promote the healing of the wound. I have treated only wounds that are not infected. Seek medical support for infected wounds.
2. Set the switch at the end of the MicroStim 100 TENS device to the "square wave."
3. There are 2 circular electrodes, each has a copper-coated surface, with four embedded, tiny red LED lights which come with the MicroStim 100 TENS device.

Peel off the plastic cover of one side of one double-sided sticky CLEAR conducting patch. Place this patch onto the copper surface of one circular electrode. Now peel off the plastic cover of the sticky conducting patch which is on top of the circular electrode, and place the circular electrode onto the skin, two inches from an edge of the wound. The sticky patch will hold the circular electrode in place.

4. Cut a 2" x 2" square of the occlusive dressing. This size will be slightly larger than the size of the circular electrode. Peel off one side of the occlusive dressing, being careful not to touch the surface of the occlusive dressing; it is sterile. Place the peeled sterile surface directly onto the wound site.
5. Gently peel off the plastic from the "other" side of the occlusive dressing which is now facing up, on top of the wound site. Do not touch the sterile side which is against the wound.
6. Gently place the second circular electrode with the four embedded red lights onto the occlusive dressing which is facing up. Tape this electrode into place. (Do not use any conducting gel or any double-sided sticky clear patch on the occlusive dressing, itself or on this second circular electrode.)
7. Set the frequency switch on the top of the MicroStim 100 TENS to F4 (292 Hz) for the first frequency to use.
8. Turn the round power control knob to "On," and SLOWLY turn up the power until the patient reports feeling a "tingling sensation" from either circular electrode which is in place. Now, turn the power down, until the PATIENT DOES NOT FEEL ANY STIMULUS AT ALL. This will be the correct setting (it should be around only 2 or 4 on the round power control knob). If the patient does not report any tingling sensation at all, even at the highest setting of 9, this is OK and just set the power to maximum. Leave the power setting at this subthreshold level, for 2 minutes.
9. After the first 2 minutes at F4, switch the frequency knob over to the lowest frequency setting of F1 (0.3 Hz) for 18 minutes. The MicroStim 100 TENS device turns itself off after 20 minutes. The total time required for the MicroStim 100 TENS treatment for wound healing is 20 minutes.

10. Gently peel off the second circular electrode from the skin, where it was placed two inches from an edge of the wound. Discard the double-sided sticky patch; do not store the used patch on the circular LED surface, this would corrode the copper; do not re-use the sticky patch after one use.

11. Gently peel off the first circular electrode from the occlusive dressing which is over the wound, however, leave the occlusive dressing over the wound, and cover the occlusive dressing with a gauze pad, and tape this securely in place.

12. Do not remove the occlusive dressing until the next day. Removal of the occlusive dressing could disturb the healing process. Leave it in place for approximately 24 hours, then discard and start over at step 1.

If you treat a second time in one day, remove the gauze pad, and simply place the circular LED electrode over the original occlusive dressing that is still in place. Repeat steps 2 and 3; and steps 6 - 11.

In severe cases of a non-healing open wound, this treatment should be performed twice a day for at least the first week. I notice a definite improvement after about 8 days. After the healing has leveled off somewhat, it is possible to treat only once a day. It may take 2 or 3 months to completely heal the wound. The wound will heal from the perimeter, towards the center. If it is used to treat a non-healing ulcer on the lower leg, the leg should be elevated for several hours a day. It may not be effective if the leg is not elevated for several hours a day. When treating a non-healing ulcer on the back or hip area, the patient should lie down on his/her side for the treatment. The patient should not sit or lie directly on the circular LED electrodes with the red lights, when they are in place.

Faster results may be obtained if red-beam laser is used at 4 Joules/cm^2 on the wound, before the MicroStim 100 TENS device is applied. With a 5mW red-beam laser (5 mm diameter aperture), 4.59 Joules/cm^2 requires 3 minutes of exposure time. Hold laser tip 1 mm away from actual wound, and at a right angle to the skin surface. Treat each square centimeter of the wound, beginning on the periphery. The laser treatment may be performed through the CLEAR occlusive dressing while it is in place.
http://gancao.net/ht/laser.shtml

Some Vendors of Devices mentioned in this Home Treatment Program

(No medical claims are made for these devices.)

1. Microamps TENS Device

The microamps TENS device I am familiar with is the MicroStim 100 TENS. The price is $295.00.

It can be ordered from: MicroStim, Inc., 7881 NW 90th Avenue, Tamarac, FL 33321.

1-800-326-9119 or (954) 720-4383. FAX: 954-697-7984

It was invented by Dr. Joel Rossen, DVM. jrossen@MicroStim.Com info@microstim.com

2. Low-level Laser Lecture Pointers

Low-level lasers (5 mW, 670 nm wavelength, red beam, 5 mm diameter aperture) may be purchased as lecture pointers (Continuous Wave). One distributor I am aware of is:

Lhasa Medical, Inc., Weymouth, MA www.LhasaOMS.com 1-800-722-8775

Regular Price, $118.00, for an ITO low-energy laser lecture pointer (LASER PEN LP-5F1) which is approximately 5 mW, and 670 nm wavelength (5 mm diameter aperture). It has a fixed on-off switch. This laser pen is easy to use. It is small, and when folded in half, fits into a shirt pocket.

REPLACE BATTERIES AFTER 3 HOURS. DO NOT WAIT FOR THE RED LASER BEAM TO WEAKEN OR GO OUT BEFORE REPLACING BATTERIES. (This unit require two AAA batteries.)

3. Some Low-level Lasers which are Manufactured in the U.S.

a. Pantheon Research, 626A Venice Blvd., Venice, CA 90291

310-822-4965 John Hubacher This company manufactures red-beam and infrared-beam lasers, continuous wave or pulsed.

b. Medical Laser Systems, 20 Baldwin Dr., Branford, CT 06405 1-800-722-1228 203-481-2810

This company manufactures red-beam and 904 nm, infrared lasers (deeper penetration), pulsed and continuous wave lasers. FAX: 203-481-2456 www.mediallasersystems.com

POSTHERPETIC NEURALGIA TREATED WITH LASER THERAPY - A TREATMENT PROTOCOL

Teaching Module Abstract presented at the 3rd Annual Meeting of the North American Association for Laser Therapy (NAALT), Uniformed Services University for the Health Sciences, Bethesda, MD, April 4, 2003. www.naalt.org

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General

Postherpetic Neuralgia (PHN) is a debilitating condition which can prove resistant to conventional treatment. 75% of patients with established PHN will demonstrate a greater than 50% reduction in pain levels following a course of laser therapy (LT).

Pre-treatment Assessment

Should include detailed history, general physical assessment and list of current medication. Measurement of pain severity (VAS score: 0-10) and pain distribution (body surface perimetry) is recommended prior to each treatment session.

Treatment Regime

Plan a 12 session course. A small number (c5%) achieve effective pain resolution within 4 sessions of LT. The vast majority of patients require 8-12 treatments.

Initial treatment should be given twice per week for 2 weeks. Treat weekly thereafter. Allow 20-30 minutes for initial sessions gradually reducing to 10-20 minutes for later treatments. Spend time at each visit outlining the area of pain distribution. Identify and note any painful trigger points.
In first 2 sessions treat 2 spinal segments above and below the affected innervation. (Hence the additional treatment time).

Equipment

A portable (2.5 Kg) THOR DD Laser Therapy Unit is used. Mains or battery operated.
Timed delivery settings between a range of 20 seconds to 3 minutes.
Variable frequency outputs:- 2.5Hz: 20Hz: 150Hz: 5KHz: CW.
Classification:- Class 3B Laser Device.
Probes:-
Single probe:- 810 nm infra-red diode: 200mW: CW
Spot size: 0.28 cm2
Power Density (Irradiance): 714mW/cm2
Cluster Probe:- 810 nm infra-red diode x 5: each diode 200mW: CW
Diameter of probe head 4cm
Power Density (Irradiance): 2W/cm2

Treatment Protocol

Treatments 1 & 2 :- Use only cluster probe. Apply in contact mode.
Use light pressure only. Frequency setting 150 Hz.
Start treatment at spinal level and work peripherally along affected segmental innervation.
Apply at 4cm intervals for 5 seconds each point.
For example:- if T8 & 9 affected then start at T8, then T9; T7; T10; T6; T11.
Average treatment time per segment 90 seconds (18 points); Total time c10 minutes.

Breakdown of session :- 5-10 minutes - Greeting; discussion; measurement.
10 minutes - Treatment. 5-10 minutes – Advice; appointment; goodbye.

<u>Treatments 3-6</u> :- Use both cluster and single probes.
Cluster probe :- Contact mode. Firm(ish) pressure. Frequency 150 Hz.
Treat affected area only. 4 cm intervals. 8 seconds per point.
Treatment time c5minutes.
Single probe :- Identify trigger points. Usually 6+
Contact mode. Firm pressure. Frequency 150 Hz.
10 seconds per point. Treatment time 1-2 minutes.
Breakdown of session :-5-8 minutes – Greeting; discussion; measurement.
8 minutes – Treatment. 5 minutes – Advice; appointment; goodbye.

<u>Treatments 6-12</u> :- Use both probes.
Cluster probe :- Contact mode. Firm pressure. Frequency 2.5 Hz.
Smaller affected area. 4 cm intervals. 10 seconds per point.
Treatment time 3 minutes+
Single probe :- Identify trigger points. 6 or less.
Contact mode. Firm pressure. Frequency 2.5 Hz.
15 seconds per point. Treatment time 90 seconds.
Breakdown of session :- 5 minutes – Greeting; measurement; assess.
5 minutes+ - Treatment. 5 minutes – Appointment; goodbye.

Expected Progress

1-2 treatments – patient sleeping better
2-4 treatments – reduction in attacks of severe pain
4-8 treatments – reduction in severity and frequency of pain
6-12 treatments – sustained reduction in base line pain

Safety

Devices are generally Class 3B Lasers. Subject to national/state regulations.
Use in laser designated area. Exclude unnecessary personnel.
Basic laser science & safety course for health professionals.
Protect eyes. Goggles/glasses for appropriate wavelength.

Troubleshooting

<u>Possible problems:-</u>
1. Treatment reaction – approximately 10% of patients some increased pain following first 2 treatments. Usually lasts 12-24 hours. Advise and re-assure.
If continues – reduce treatment time by 50% for next 2 treatments then increase slowly.
2. No pain reduction after 3 sessions – increase cluster probe frequency to 5KHz and treatment time by 25%. If still no change after further 3 sessions - ? abandon.
3. Stubborn trigger points – increase single probe frequency to 5KHz and treatment time by 25-50%.

THE MANAGEMENT OF POSTOPERATIVE PAIN - A LASER THERAPY PROTOCOL.

Teaching Module Abstract presented at the 3rd Annual Meeting of the North American Association for Laser Therapy (NAALT), Uniformed Services University for the Health Sciences, Bethesda, MD, April 4, 2003. www.naalt.org

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General

A reduction in postoperative morbidity combined with early patient mobilisation can significantly reduce the duration of inhospital stay following surgery. Pain is a major postoperative symptom frequently requiring potent analgesic medication. A once only postoperative laser therapy (LT) treatment can reduce the need for analgesic medication by as much as 50% thus promoting early mobilisation and more rapid hospital discharge.

Treatment Regime

Laser therapy (LT) should be administered at the earliest postoperative opportunity. A single 5 minute treatment is all that is required. The OR recovery room is ideal as it offers the therapist a single site multiple patient treatment opportunity.

Equipment

A portable (2.5 Kg) THOR DD Laser Therapy Unit is used. Mains or battery operated.
Timed delivery settings between a range of 20 seconds to 3 minutes.
Variable frequency outputs:- 2.5Hz: 20Hz: 150Hz: 5KHz: CW
Classification:- Class 3B Laser Device.
Probe:- Cluster probe – 810nm infra-red diode x 5: each diode 200mW: CW
Diameter of probe head 4cm. Power Density (Irradiance): 2W/cm2

Treatment Protocol

Single treatment using cluster probe only.
Contact mode. Light pressure. Frequency – 20Hz.
Probe applied around wound in 2 concentric ellipses.
For example:- a 15cm (6 inches) wound.
Inner ellipse – 2cm from wound margin. Apply at 4cm intervals. 10 seconds each point.
Number of points – c12. Treatment time – 2 minutes.
Outer ellipse – 6cm from wound margin. Apply at 4cm intervals. 10 seconds each point.
Number of points – c18. Treatment time – 3 minutes.
Average treatment time – 5 minutes.

Post-treatment Monitoring

Record all postoperative analgesic medication – cf. non-LT treated patients.
Check VAS pain scores (0-10) 2-3 times per day for 48-72 hours.

Troubleshooting

Main problem is logistical – gaining access to patients prior to return to ward.
Wound access – OK with simple dressing. Impossible through thick padding.

...

THE EFFECT OF INFRA-RED DIODE 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 postoperative 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 mWCW: CM) to the wound area immediately following skin closure prior to emergence from GA. All patients were prescribed on demand postoperative 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.

KEY WORDS LLLT GaAlAs laser Postoperative pain Double blind

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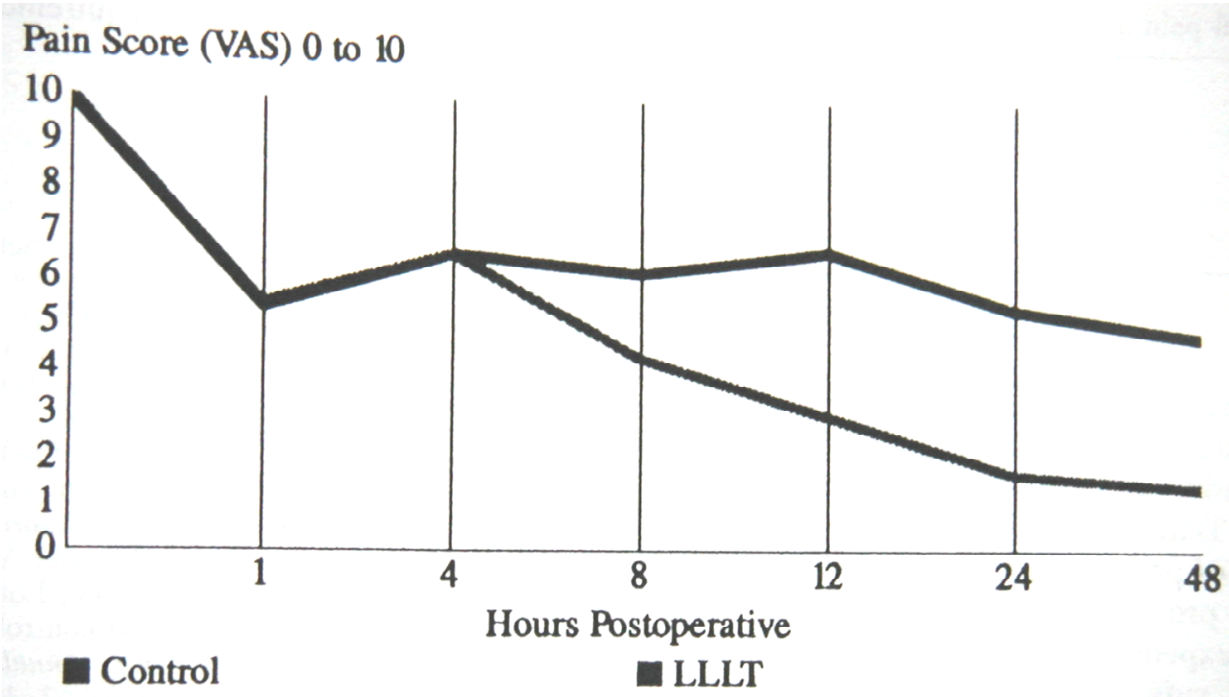

Figure 2. Pain score comparison

...

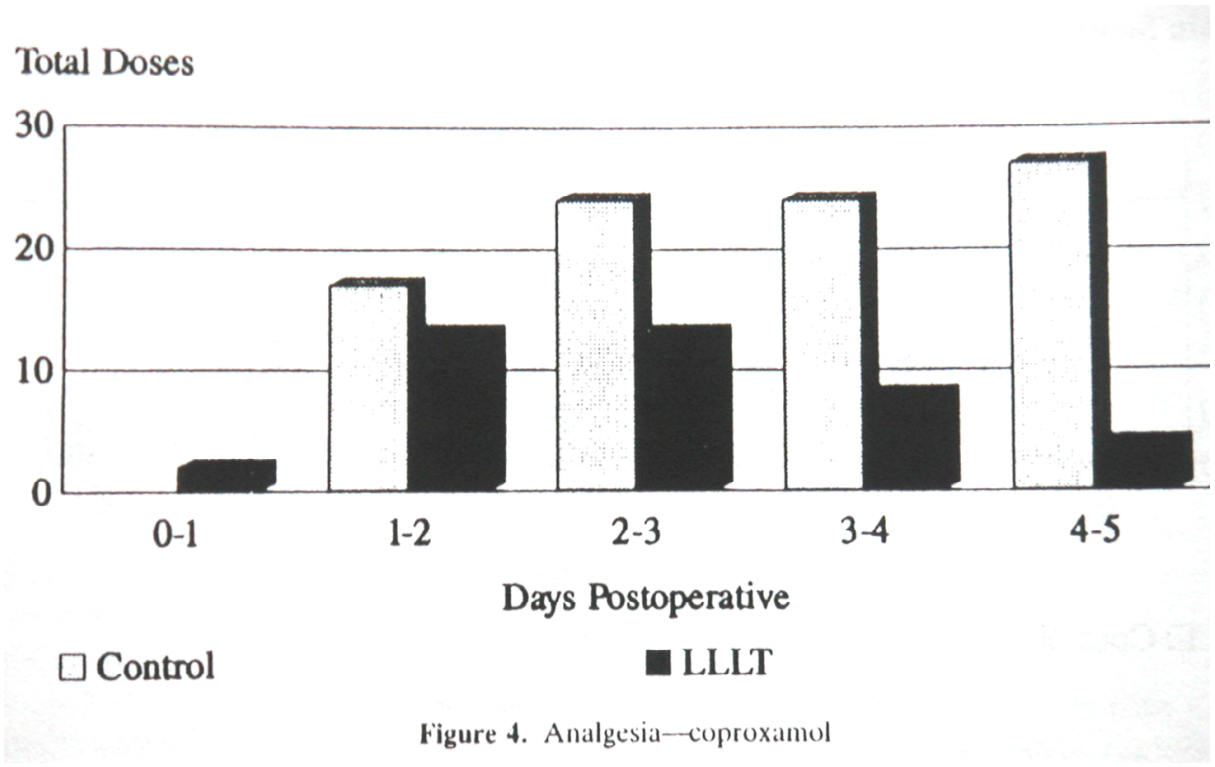

Figure 4. Analgesia—coproxamol

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Laser stimulation of acupuncture point P6 reduces postoperative vomiting in children undergoing strabismus surgery

A. SCHLAGER, T. OFFER AND I. BALDISSERA

Summary

We conducted a double-blind, randomized, placebo-controlled study to investigate the effectiveness of P6 acupuncture on postoperative vomiting in children undergoing strabismus surgery. Acupuncture was performed by laser stimulation with a low-level laser. Laser stimulation of P6 was administered 15 min before induction of anaesthesia and 15 min after arriving in the recovery room. In the laser stimulation group, the incidence of vomiting was significantly lower (25%) than that in the placebo group (85%). (*Br. J. Anaesth.* 1998; **81**: 529–532).

Keywords: anaesthesia, paediatric; acupuncture; vomiting, incidence; vomiting, nausea, surgical factors; surgery, ophthalmological

was allocated randomly to one of two groups. Acupuncture was performed on acupuncture point Pericard 6 (P6). P6 is located at the wrist between the tendons of the palmaris longus and flexor carpi radialis, 2 Cun proximal from the distal palmar crease. One Cun is equivalent to the width of the patient's thumb across the interphalangeal joint. Patients in group A underwent laser stimulation of P6. We used a low-level laser with the following characteristics: diode laser with continuous laser beam; power output 10 mW; wavelength 670 nm laser (Minilaser 2010F, Helbo-Medizintechnik, Gallspach, Austria). Laser stimulation was performed on each P6 bilaterally over 30 s, 15 min before induction of anaesthesia and 15 min after arriving in the recovery room. In group B, the same low-level laser was held on P6, but the laser beam was not activated. Neither the children nor their parents were able to tell if the laser was active. Both laser and placebo acupuncture

Journal of Clinical Laser Medicine & Surgery
Volume 20, Number 6, 2002

Pp. 319–324

NASA Light-Emitting Diodes for the Prevention of Oral Mucositis in Pediatric Bone Marrow Transplant Patients

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ABSTRACT

Objective: **The purpose of this study was to determine the effects of prophylactic near-infrared light therapy from light-emitting diodes (LEDs) in pediatric bone marrow transplant (BMT) recipients.** ***Background Data:*** **Oral mucositis (OM) is a frequent side effect of chemotherapy that leads to increased morbidity. Near-infrared light has been shown to produce biostimulatory effects in tissues, and previous results using near-infrared lasers have shown improvement in OM indices. However, LEDs may hold greater potential for clinical applications.** ***Materials and Methods:*** **We recruited 32 consecutive pediatric patients undergoing myeloablative therapy in preparation for BMT. Patients were examined by two of three pediatric dentists trained in assessing the Schubert oral mucositis index (OMI) for left and right buccal and lateral tongue mucosal surfaces, while the patients were asked to rate their current left and right mouth pain, left and right xerostomia, and throat pain. LED therapy consisted of daily treatment at a fluence of 4 J/cm^2 using a 670-nm LED array held to the left extraoral epithelium starting on the day of transplant, with a concurrent sham treatment on the right. Patients were assessed before BMT and every 2–3 days through posttransplant day 14. Outcomes included the percentage of patients with ulcerative oral mucositis (UOM) compared to historical epidemiological controls, the comparison of left and right buccal pain to throat pain, and the comparison between sides of the buccal and lateral tongue OMI and buccal pain.** ***Results:*** **The incidence of UOM was 53%, compared to an expected rate of 70–90%. There was also a 48% and 39% reduction of treated left and right buccal pain, respectively, compared to untreated throat pain at about posttransplant day 7 ($p < 0.05$). There were no significant differences between sides in OMI or pain.** ***Conclusion:*** **Although more studies are needed, LED therapy appears useful in the prevention of OM in pediatric BMT patients.**

INTRODUCTION

ORAL MUCOSITIS (OM) is a frequent side effect of chemotherapy in preparation for bone marrow transplant (BMT). Ulcerations in the vulnerable oral mucosa produce severe pain, oral superinfections that may lead to systemic infections, and compromise oral hydration and nutrition.[1–3]

Investigations into low-energy stimulation of tissues by lasers have shown increased cellular activity during wound healing, including increased collagen production[4,5] and angiogenesis.[6] The data suggest that monochromatic, near-infrared laser biostimulation produces its primary effect during the cell proliferation phase,[7,8] increasing mitochondria respiration through stimulation of cytochrome oxidase.[4,5,9] Production increases have been seen in fibroblasts, collagen and procollagen, growth factors, lymphocytes, and extracellular matrix—as well as macrophage stimulation—with laser treatment.[10–13] Optimal wavelengths for wound healing, as proven in previous laser studies, include 680, 730, and 880 nm.[4,5,11,14] Additionally, previous studies have shown that use of helium-neon lasers in BMT recipients significantly decreases the severity and duration of ulcerative mucositis.[15–17]

Recently, light-emitting diodes (LEDs) have been shown to be a safe, efficient, lightweight, and less-expensive alternative

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[3]Department of Hematology and Oncology, Medical College of Wisconsin, Milwaukee, Wisconsin.

Recommended anti-inflammatory dosage for Low Level Laser Therapy

Laser classes 3 or 3 B, 780 - 860nm GaAlAs Lasers. Continuous or pulse output less than 0.5 Watt

Energy dose delivered to the skin over the target tendon or synovia

Diagnoses

Tendinopathies	**Points or cm2**	**Joules 780 - 820nm**	**Notes**
Carpal-tunnel	2-3	12	Minimum 6 Joules per point
Lateral epicondylitis	1-2	4	Maximum 100mW/cm2
Biceps humeri c.l.	1-2	8	
Supraspinatus	2-3	10	Minimum 5 Joules per point
Infraspinatus	2-3	10	Minimum 5 Joules per point
Trochanter major	2-4	10	
Patellartendon	2-3	6	
Tract. Iliotibialis	2-3	3	Maximum 100mW/cm2
Achilles tendon	2-3	8	Maximum 100mW/cm2
Plantar fasciitis	2-3	12	Minimum 6 Joules per point
Arthritis	**Points or cm2**	**Joules**	
Finger PIP or MCP	1-2	6	
Wrist	2-4	10	
Humeroradial joint	1-2	4	
Elbow	2.4	10	
Glenohumeral joint	2-4	15	Minimum 6 Joules per point
Acromioclavicular	1-2	4	
Temporomandibular	1-2	6	
Cervical spine	2-4	15	Minimum 6 Joules per point
Lumbar spine	2-4	40	Minimum 8 Joules per point
Hip	2-4	40	Minimum 8 Joules per point
Knee medial	3-6	20	Minimum 5 Joules per point
Ankle	2-4	15	

Daily treatment for 2 weeks or treatment every other day for 3-4 weeks is recommended

Irradtiation should cover most of the pathological tissue in the tendon/synovia.

Tendons

Start with energy dose in table, then reduce by 30% when inflammation is under control
(Does not apply for carpal tunnel tenosynovitis)

Therapeutic windows range from typically +/- 50% of given values
Recommended doses are based on ultrasonographic measurements
of depths from skin surface and typical volume of pathological tissue
and estimated optical penetration for the different laser types in caucasians

Disclaimer

The list may be subject to change at any time when more research trials
are being published. World Association of Laser Therapy is not responsible
for the application of laser therapy in patients, which should be
performed at the therapist/doctor`s discretion and responsibility

Revised August 2005

Recommended anti-inflammatory dosage for Low Level Laser Therapy

Laser classes 3 or 3B, 904 nm GaAs Lasers (Peak pulse output more than 1 Watt)

Energy dose delivered to the skin over the target tendon or synovia

Diagnoses

Tendinopathies	**Points or cm2**	**Joules 904nm**	**Notes**
Carpal-tunnel	2-3	4	Minimum 2 Joules per point
Lateral epicondylitis	1-2	1	Maximum 100mW/cm2
Biceps humeri cap.long.	1-2	2	
Supraspinatus	2-3	3	Minimum 2 Joules per point
Infraspinatus	2-3	3	Minimum 2 Joules per point
Trochanter major	2-3	2	
Patellartendon	2-3	2	
Tract. Iliotibialis	2-3	2	Maximum 100mW/cm2
Achilles tendon	2-3	2	Maximum 100mW/cm2
Plantar fasciitis	2-3	3	Minimum 2 Joules per point
Arthritis	**Points or cm2**	**Joules 904nm**	
Finger PIP or MCP	1-2	2	
Wrist	2-3	3	
Humeroradial joint	1-2	2	
Elbow	2-3	3	
Glenohumeral joint	2-3	6	Minimum 2 Joules per point
Acromioclavicular	1-2	2	
Temporomandibular	1-2	2	
Cervical spine	2-3	6	Minimum 2 Joules per point
Lumbar spine	2-3	10	Minimum 4 Joules per point
Hip	2-3	10	Minimum 4 Joules per point
Knee anteromedial	2-4	6	Minmum 2 Joules per point
Ankle	2-4	6	

Daily treatment for 2 weeks or treatment every other day for 3-4 weeks is recommended

Irradtiation should cover most of the pathological tissue in the tendon/synovia.

Tendons

Start with energy dose in table, then reduce by 30% when inflammation is under control
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Revised August 2005

Books: Low-Level Laser Therapy and Laser Acupuncture

Low Level Laser Therapy Clinical Practice & Scientific Background
Jan Tuner & Lars Hode (2002)
Prima Books. ISBN 91-631-23037 www.prima-books.com

Therapeutic Lasers Theory & Practice
G. David Baxter (1999)
Harcourt Publishers, Ltd., London, UK
SBN-0-443-04393-0

Laser Acupuncture: An Introductory Textbook for Treatment of Pain, Paralysis, Spasticity and Other Disorders: Clinical and Research Uses or Laser Acupuncture from Around the World
M.A. Naeser and X.-B. Wei (1994**)**
Boston Chinese Medicine, Boston, MA Available from: www.LhasaOMS.com

Low Level laser Therapy, A Clinical Manual
J.A. Blahnik and D.W. Rindge (2003)
Available from: coopmed@bellsouth.net

Low Level Laser Therapy A Practical Introduction.
T. Ohshiro and R.G. Calderhead (1988)
John Wiley & Sons Ltd., Chichester, UK

Low Level Laser Therapy as a Medical Treatment Entity:
A Manual for Physicians, Dentists, Physiotherapists and Veterinary Surgeons
Pekka Pontinen (1992) Art Urpo Ltd, Tampere, Finland
ISBN 951-96632-0-7.

The Science of Low-Power Laser Therapy.
T. Karu (1998)
Gordon and Beach Science Publishers, (OPA) Overseas Publishers Association, Amsterdam, The Netherlands

Lasers in Medicine and Dentistry: Low Intensity Laser Therapy –
Editor: Z Simunovic (2000) Vitagraf: Locarno, Switzerland/Rijeka, Croatia
(email: info@lasermedico.ch)
ISBN 953-6059-30-4

Energy Medicine The Scientific Basis
James L. Oschman (2000) Churchhill Livingstone
ISBN 0-443-06261-7

Alternative Medicine and Spinal Cord Injury – Beyond the Banks of the Mainstream
Laurance Johnston, Ph.D. (2006)
Demos Medical Publishing, LLC, 386 Park Avenue South, NY, NY 10016
ISBN: 1-932603-50-6
www.medpub.com OR available on Amazon.com

Some Low-Level Laser Therapy, and Laser Acupuncture Websites

1. Website with **Low-Level Laser Therapy on Acupuncture Points, for Spinal Cord Injury.**
   Websites prepared by Laurance Johnston, Ph.D:
   http://www.healingtherapies.info/laserpuncture.htm

   Acupuncture and Spinal Cord Injury, summarizing M. Naeser's NIH report, 1997:
   http://www.healingtherapies.info/acupuncture%20&%20SCI.htm

2. Website with **Low-Level Laser Therapy on Acupuncture Points, for Spinal Cord Injury.**
   Prepared by Dr. Albert Bohbot, from France. Contains case histories, and videotapes of before and after treatments with his method: **www.laserponcture.net**

3. **HEALING THERAPIES NEWSLETTER**. This is an email newsletter associated with alternative therapies used with SCI: **www.healingtherapies.info**
   The purpose of this email newsletter is to expand the healing spectrum of people with physical disabilities, especially spinal cord injury and dysfunction.
   Reply to: **root@mail37.safesecureweb.com** to subscribe to the newsletter.
   This email newsletter is prepared by Laurance Johnston, Ph.D., (Biochemist) who formerly worked for the Paralyzed Veterans of America. He is now located in Portland, OR.
   Dr. Johnston is author of the book, Alternative Medicine and Spinal Cord Injury: Beyond the Banks of the Mainstream, published by Demos Medical Publishing. Available from Amazon.com (rated 5 stars, highly informative).

4. **Magnet Cap**. Used to help reduce leg spasticity (or organ/stomach spasticity) in SCI patients (anecdotal experience, M. Naeser with SCI patients). May be ordered from Jayne Ronsicki, Lic.Ac., Hudson, MA silverbog@aol.com 1-877-527-1550 or 978-562-6389. This cap was developed by Agatha Colbert, M.D., Eugene, Oregon. email: acolbert@ncnm.edu

5. **General Laser Acupuncture Information.**
   A short website page written by M. Naeser, Ph.D., Lic.Ac., to help answer questions from licensed acupuncturists interested in laser acupuncture: **http://gancao.net/ht/laser.shtml**

6. Contact for a **Lic.Ac. who uses laser acupuncture with SCI:** Patricia Worth, Lic.Ac., R.N.
   9632 Olde Park Court, Tipp City, OH 45371 937-667-8533 pworth@woh.rr.com
   OR, other contact information:
   Patricia Worth, Lic.Ac, DiplAc, RN, MS, Centerville OH 45459 937-439-9165
   Mason OH 937-231-9718

7. Website for laser acupuncture and Carpal Tunnel Syndrome with color **photos of how the therapy on the HAND is performed**. Prepared by M. Naeser, Ph.D., Lic.Ac., to help answer questions regarding laser acupuncture research to treat CTS: **http://gancao.net/ht/cts.shtml**

8. **www.bu.edu/naeser/acupuncture** This website has published papers and reports on acupuncture and laser acupuncture research by Margaret Naeser, Ph.D., Lic.Ac.

9. **General Low-Level Laser Therapy Information (from Sweden and European sources).**
   Extensive references and excellent information on low-level laser therapy research from around the world, written by the Swedish Laser Medical Society: **www.laser.nu**

10. Website with **collection of published abstracts on LLLT research and clinical studies**:
Healinglightseminars.com/library.html

Prepared by David Rindge, Lic.Ac., A.P. (FL), R.N., who teaches laser acupuncture seminars with the Luminex lasers (FDA Approved). coopmed@bellsouth.net 321-728-9700 Melbourne, FL

He also has published a Clinical Laser Acupuncture Textbook, by Jennifer Blahnik, Lic.Ac., and David Rindge, Lic.Ac., available through his acupuncture office: coopmed@bellsouth.net

11. Website for **video clip of a mouse fibroblast cell,** seeking out a pulsating near infrared laser light:
http://www.basic.northwestern.edu/g-buehler/video.htm#video1

Prepared by Guenter Albrecht-Buehler, Ph.D., Physicist, Professor of Cell Biology & Anatomy, Northwestern University Medical School, Chicago, IL.

Some Researchers conducting Low-Level Laser Therapy Research with Spinal Cord Injury

Shimon Rochkind, M.D. Neurosurgeon. Tel-Aviv Sourasky Medical Center, Tel Aviv University, Tel Aviv, Israel rochkind@zahav.net.il

Dr. Rochkind is a Senior Neurosurgeon and Specialist in Neurosurgery & Microsurgery. He is currently Director of the Peripheral Nerve Reconstruction division of the Department of Neurosurgery at Tel-Aviv University. Known around the world for his research on nerve regeneration and nerve transplantation, Dr. Rochkind is currently researching the influence of low power laser irradiation on severely injured peripheral nerves, brachial plexus, cauda equina and spinal cord. He is also studying spinal cord transplantation followed by low power laser treatment, microsurgical reconstruction of the peripheral nerve and brachial plexus.

Juanita J. Anders, Ph.D., and Kimberly R. Byrnes, Ph.D. Department of Anatomy, Physiology & Genetics, Uniformed Services University of the Health Sciences, Bethesda, MD.

Research with animal studies on light to promote regeneration and functional recovery and alteration of the immune response after spinal cord injury. See also: http://www.thorlaser.com/nerve/

Some National and International Laser Therapy Organizations

www.naalt.org North American Association for Laser Therapy (NAALT)
Their annual meetings are informative and educational. Next meeting, June 12-14, 2008 in Palm Beach, FL.

www.walt.org World Association for Laser Therapy

www.laser.nu Swedish Laser Medical Society

Journals: Photomedicine and Laser Surgery Subscription with membership in the North American Assoc. for Laser Therapy (NAALT). **www.naalt.org** Linked with World Association for Laser Therapy (**www.laser.nu**). Lasers in Surgery and Medicine (Linked with American Society for Laser Medicine & Surgery, Inc. (www.ASLMS.org).

Some Vendors for Low-Level Lasers

Lasers:

Ito Laser, 5mW, 670 nm, Lhasa Medical, Weymouth, MA 800-722-8775, www.LhasaOMS.com $118.00, replace two AAA batteries after three hours of use. If 2 lasers purchased, cost is $112 per laser.

Luminex Laser (FDA Approved). 500 mW, with four red-beam and infrared laser probes: 670 nm, 830 nm, 867 nm and 904 nm probes. Medical Laser Systems, Branford, CT Phone: 800-778-0836 www.MedicalLaserSystems.com Brian@medicallasersystems.com

Thor Lasers (FDA Approved). Made in U.K. Red or infrared, single laser & laser cluster probes. Mark.Granic@Thorlaser.com 1-877-355-3151 Director of N. Am. Sales. He is in Toronto, Canada.

Medx Lasers:

The contact for Medx lasers is Anita Saltmarche, R.N. She is in Toronto, Canada. saltmarche@medxhealth.com www.medxhealth.com

Laser Therapeutics, Inc.

Julie Foshay is the contact person for Laser Therapeutics, Inc. She is the VP and can be reached by phone: 978-335-5366 or by email: lasertherapeutics1@hotmail.com www.lasertherapy.us Laser Therapeutics, Inc. is a vendor for Omega Lasers (UK) and Medicom Lasers (Prague), as well as the "Doris" laser that has a single 820nm probe, a 200mw 670 nm laser, a 10 true laser diode cluster and a combo cluster with LEDs and IR laser. Omega also makes a cluster with 46 Red and IR LEDs plus a few 830 nm laser diodes in it.

Microamps TENS:

MicroStim 100 TENS unit with 2 circular LED electrodes. MicroStim, Inc., Palm City, FL. 800-326-9119 or (954) 720-4383. Developed by Joel Rossen, DVM. jrossen@MicroStim.com info@microstim.com Approximately $295.00 per unit.

Contraindications for Low-Level Laser Therapy Use

1. Do not stare directly into the laser beam, even for a few seconds.
The laser will damage the retina; it is similar to staring directly at the sun.

2. Do not shine the laser beam directly onto a cancerous tumor, or onto a wart on the skin, for example.

3. Do not use the low-level laser on forbidden acupuncture points with pregnant women. [Except during the last few weeks of pregnancy on Bl. 67 to help correct the breach position of a fetus (Chinese study, l984).]

4. Do not shine the laser beam onto the unclosed fontanelles of babies and children. It could promote bone growth and early closure of the suture lines.

5. Do not shine the laser over ...a colored topical substance on the skin, such as iodine. Iodine could increase absorption. Use on clean, dry skin, or through a dried, clear liquid.

6. Do not use the laser over a skin site where a corticosteroid has been applied or injected. The use of an injected corticosteroid (within 3 months) will tend to retard the laser effect.

7. Do not use the laser over a site where Box-Tox has been injected (within the preceding 3 months). Bo-Tox has an effect on the myo-neural junction, essentially reducing the ability of the muscle area to contract. Hence, using the laser there, to reduce spasticity (in a stroke patient, for example), will not be effective.

8. Many practitioners of LLLT do not recommend using the laser over the thyroid area.

9. Do not use the laser over the surgical site for repair of an inguinal hernia. The promotion of scar tissue here is desired, and the laser could potentially reduce the promotion of scar tissue, to strengthen the area.

10. Do not shine the laser over a tattoo on the skin. The dark pigmentation will absorb extra photons, and the patient will feel a painful, burning sensation.

11. Do not mark the area you want to laser, with a ...Black X. Draw a circle, larger than the point, if you want to mark an area to target with the laser.