A Guide to

Low Energy Photon Therapy

By Gerard Cartier

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Prepared in the hope that more animals can receive more appropriate and effective care…

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Documented results welcomed for review for inclusion in updates.

Foreword

The desire to receive accelerated and yet quality healing for the equine athlete has resulted in the advancement of effective therapies often suitable for human use. In recent history, these therapies have advanced from various poultices and heat wraps to a variety of modern electronic devices which produce light, sonic waves, electromagnetic and electric current to accelerate healing.

Two of the newest forms of therapy are pulsed magnetic field (PMF) and low level laser therapy (LLLT), both being introduced in the 1960s. In the 1980s, light emitting diode (LED) technology advanced to the point that power output, equal to or greater than the lasers in common therapeutic use, became available and at a much lower cost. This allowed the application of a device containing several LEDs to be used which would apply an equal or greater amount of energy to the desired injured area in much less time and with far greater efficiency. A device of this type was patented in 1987. While many of the proponents of LLLT maintained that only the coherent focused laser light was therapeutic, university and clinical studies continue to disprove this hypothesis. Pekka J. Pontinen, MD, Associate Professor of Anesthesiology, Tempere University, Tempere, Finland, a world renowned authority on laser therapy and author of several books and papers on this subject is titling a chapter in a new book "Low Energy Photon Therapy" (LEPT), as he is now recognizing that the therapeutic light doesn't have to have the critical characteristics of a laser.

Over the past 12 years, hundreds of veterinarians have testified to the effectiveness of pulsed LED photon therapy. However, because no official certifying USA institution has given official approval, LED or even laser therapy must be officially classified as experimental.

This booklet titled Low Energy Photon Therapy (LEPT) is presented as a guide for users of LEDs or lasers and is the result of university and clinical use. It is a compilation of data gleaned from veterinarians over several years. While there is much evidence to its efficacy, this book is not intended to warrant or imply that LEPT devices will produce positive results in the application you select.

A BRIEF REVIEW OF LIGHT BIOSTIMULATION

Although many have achieved quite favorable results with light biostimulation, little of practical value is presently available that describes what light biostimulation does and how it seems to work. Following is a summary of selected research that may be helpful in understanding a rather complex subject.

Two research papers in particular offer valuable insights into the effects of laser or light biostimulation. One was prepared by two veterinarians – Richard W. Fredericks and Donald J. Baker – for presentation at the 29th Annual Convention of the American Association of Equine Practitioners (See Clinical Applications of the Non-Surgical Laser in Conference Proceedings). The other was written by Chukuka S. Enwemeka, Ph.D., and appeared in Volume 9, Number 10 of The Journal of Orthopedic and Sports Physical Therapy (See: Laser Biostimulation of Healing Wounds: Specific Effects and Mechanisms of Action"). Both papers provide many references to other research that may be of interest to those using this booklet.

Cellular Activity – Information provided in these papers indicates that laser biostimulation has been shown to influence functions in the following ways:

- Acceleration of the inflammatory stages and the general healing of wounds and injured
- Stimulation of cellular replication (which is the key to healing and the production of healthy tissue)
- Increase of RNA and DNA synthesis
- Stimulation of collagen production (Collagen is a main supportive protein of skin, tendon, bone, cartilage and connective tissue.)
- Alteration of the immune system (helps immune cells combat infection)
- Stimulation of fibroblast activity (aids in the production of collagen)
- Enhancement of vascularization (aids in improving circulation)

In fact, the Enwemeka article goes on to say that "Because of the overwhelming positive effects of soft lasers, selective clinical trials (for human applications) have been initiated" (clarification added).

LIGHT

The present view is that light has a dual character in its propagation it consists of electromagnetic waves, but when it interacts with matter in emission, absorption and scattering processes we must consider it as composed of photons. The photo-acupuncture

process consists of the emission of light from a semiconductor chip, its scattering through the flesh and absorption into the nervous system so it can only be sensibly described as a stream of photons. Terms such as coherence and collimation describe waves, not particles, so are meaningless with photons.

When a photon decays, it becomes an electron with the same energy level. In photopuncture, most photons decay in the tissues, but those which encounter the acupuncture point stimulate it electrically, thus sending patterns of stimuli to the brain. Photons are fundamental particles and differ from each other only in their energy level, i.e. their perceived color. A red photon from a laser is identical with a red photon from a Gallium Aluminum Arsenide chip or from a burning match. Ascribing other properties to them would probably be contrary to modern physics. The objective is to achieve levels of stimulation which the brain cannot ignore.

With the previous technology, the only practical way of generating intense rd or infrared light strong enough for the brain to recognize was a gas (helium-neon) laser or a solid state laser. In order to get a useful power output, it was necessary to pass high current pulses through these devices. With the latest technology, this is no longer necessary for high light output.

The nervous system works by an interchange of sodium, Na+ and potassium K+ ions – a slow process which could never follow these high pulse rates. What has been demonstrated is that the end effect depends upon the total energy into the acupuncture point. This can be mechanical, heat, electrical, chemical, sound, magnetic, or here, light energy. It has to be above a certain threshold, or the brain ignores it, so the rate at which the energy is injected by the time of application is the key to success. To explain this better, a little physics review follows.

The Energy in Light

Early in the 20th Century, Albert Einstein and Niels Bohn pointed out that in some contexts it is legitimate to describe light as electromagnetic waves; but when light interacts with matter it behaves as if its energy is contained in packets of value *hf* where *h* is Pianck's universal constant of action, and *f* is the frequency of the light. The energy packed *hf* is referred to as a photon. This is the "Quantum Theory."

LEPT

Pekka J. Pontinen, M.D., Associate Professor of Anesthesiology, Tempere University, Tempere, Finland, a world renowned authority on Laser Therapy, has coined an all inclusive term to describe Laser and Non-Laser Light Therapy, both of which he now believes are effective therapeutic methods, properly applied. This term is "Low Energy Photon Therapy" (LEPT). This is the term we will use throughout this booklet when referring to any device of this type.

LEPT DEVICES

There are many different LEPT systems available today. They vary in size and configuration. Some are very small penlight packages, both LED and laser at various wavelength, usually red or infrared, and may or may not be set up for different frequencies. Others are available with both single point light and output devices capable of covering a larger area with multiple light sources. The single point units are very effective when used with acupuncture points and even small areas to receive local therapy. However, when large areas (one square inch and more) are to receive local therapy, the larger multiple output devices are essential. As you find out when you read further, to be able to supply the energy required to promote healing, with local application, could take hours with a single outlet device. Fortunately there are multiple outlet devices available that will cover areas from 2 square inches to 36 square inches that deliver from 2 to 40 milliwatts per square centimeter.

When you are trying to select a unit to purchase, you must weigh several factors; the size of the unit, the output power, the output power per treatment device area, the wavelength of the output light, the ease and time of application and the frequencies available. Some devices are made that attach totally to the animal making long time periods of therapy practical.

You must look at your particular needs and decide which unit will be the most efficient and economical for your situation. We will now give you the details that go into the parameters we mentioned above.

COMMON TERMS AND DEFINITIONS IN LEPT DEVICES

WAVELENGTH: Wavelength is the distance measured in nanometers (nm) of one full wave cycle. LEPT devices emit wavelengths of light in the visible and infrared range.

e.g. 630 nm to 670 nm (red)
830 nm to 904 nm (infrared)

NOTE 1: Lasers emit light at a single wavelength
e.g. 632 nm, 830 nm or 904 nm

NOTE 2: LEDs emit light that covers a small spectrum
e.g. Some infrared LEDs emit light at 830 nm to 930 nm peaking at 880 nm

FREQUENCY: Frequency is the rate the light is turned on and off measured in Hertz (H) or cycles per second. Most all LEPT devices have available one to seven of the following frequencies and are designated as follows:

FREQUENCY	
F or 1	73Hz
G or 2	146 Hz
A or 3	292Hz
B or 4	584Hz
C or 5	1168Hz
D or 6	2336Hz
E or 7	4672Hz

NOTE 1: Some devices sweep back and forth across a particular frequency or even sweep across all of them.

NOTE 2: Most laser devices do not offer the frequency 7 as operation at this high a frequency is beyond the power capability of the output laser device.

POWER OUTPUT: This term is used to describe the intensity of the light emitted and is measured in watts or milliwatts (thousandths of a watt). Most solid state laser device manufacturers state their power output as peak power, e.g. 10 watts. This means that for a very short time 200 x 10^9 (.0000002) seconds, or 2 ten millionths of a second, or less, the power output is 10 watts maximum. LED devices output power is stated in milliwatts (mw) as the output is continuous, e.g. 30 mw.

AVERAGE OUTPUT POWER: This is the true power output of a device. It is derived by multiplying the peak or maximum output power by the duty cycle, e.g. 10 watt x .0002 (.02%) = 2 mw average power.

DUTY CYCLE: This is a measure of how long the output is "on" compared to its "off" time, measured as a percent.

> EXAMPLE: The solid state laser device may only be operated at a maximum .02% duty cycle. That means that it can be "on" only for 1/5,000 of a second, for each second of operation. This fact usually limits the maximum frequency of laser devices to about 2,500 Hz (between frequencies 6 and 7).

ENERGY: This term is a measure of power per unit time (watts per second) and is usually expressed in "joules" of energy much the way heat output is measured in BTUs or electricity in kilowatt hours (kwh). Energy is one of the most important elements in LEPT as it defines the time LEPT should be applied to an area to invoke a proper response.

DEPTH OF PENETRATION: The commonly stated depth of penetration for devices that have an average output power in the range of about 10 mw is 1 to 2 centimeters. There are, however many unanswered questions in these numbers. They do not tell you how much power must remain at this depth and there has been no definitive studies that state at what power level no cellular effect is obtained. Until these parameters are established, the question of depth of penetration remains unanswered for both lasers and LEDs.

The following facts are known:

1. The longer wavelengths of infrared (invisible) light penetrate deeper before being absorbed than those in the red (visible) spectrum.
2. Red light is absorbed at the surface and as such may be even more energetic to cells at the surface level of the skin than infrared (I.R.).
3. All light, visible or infrared, collimated or non-collimated, coherent or non-coherent begins to scatter or be reflected at and just below the surface of the skin.

Research continues to show the most important factors in LEPT are the amount of delivered energy involved and the frequency at which the light is pulsed.

THE ENERGY NEEDED TO ACTIVATE CELLULAR FUNCTIONS

The degree to which these cellular functions are activated is said to be influenced by several factors. These include the frequencies and wavelengths used and the amount of light energy that is actually delivered to an injury site. As to desired energy output needed to evoke cellular activity, levels adhered to by most researchers are one to ten joules per square centimeter. This is well below thresholds suggested to be at our near tissue damage levels.

For the benefit of the practitioner, the power output of therapeutic lasers or other infrared emitting diode systems is calculated by multiplying four factors:

- Power delivered per pulse (measured in watts or milliwatts per centimeter squared)
- The duration of each pulse (measured in fractions of a second and sometimes referred to as the “duty cycle”)
- The number of pulses per second (or “frequency” which is measured in Hertz)
- The number of seconds a treatment lasts

By knowing the area covered by an infrared emitting diode (or multi-diode applicator), the value of the calculation can be converted to a specific “power density”, which is measured in joules per square centimeter (or square inch).

Below are examples of calculations for determining the LEPT application time required to achieve proper energy input.

1. Fora pulsed I.R. laser device: (with 4 diode laser probe)
   Laser Power = 10 watts peak/each diode
   Frequency @ 7/E: 4672Hz (cycles per second)
   Max Laser Pulse Width/Cycle = .0000002 seconds

NOTE: The 7 frequency yields the highest energy/duty cycle, lower frequencies yield less energy. (This applies to all pulsed "laser" diodes.)

Average Power = Pulse duty cycle x frequency x peak power

.0000002 x 4672 x 10 = .00934 watts per laser diode

For 4 laser diode probe:

.00934 x 4 = .03736 watts (37.36 mw)

Time required to deliver 1 joule of energy =

Area to be treated (square inches) x 6.452 (constant)

Total Average Power

For the above laser (with 2 square inch head) Time required to deliver 1 joule of energy = 2 sq. in. x 6.452 (constant) = 345.4 seconds .03736

2. **For 30 diode L.R. LED probe** (covers approximately 2 square inches)

   LEPT Power = 0.025 watts peak each diode

   Frequency @ 7 4672Hz (cycles per second)

   Max LED Pulse width Duty Cycle = .5 (the same regardless of frequency)

   Average Power = Duty cycle and peak power

   .5 x .025 = .0215 watts per diode

   For 30 diode probe .0125 x 30 = .375 (375 mw) average power

   NOTE: Frequency does not affect LED power output, because LED has a 50% duty cycle

For the above 30 diode I.R. LED probe (with 2 sq. in. head) Time required to deliver 1 joule of energy = 2 sq. in. x 6.452 (constant) = 34.4 seconds .375

FREQUENCY DESIGNATIONS AND THEIR FUNCTIONS

Nearly all commercially available light biostimulation systems used in the veterinary market include or exclusively utilize common wavelengths ranging from 632 to 904 nanometers and employ a range of frequencies. These frequencies, first designated by Paul F. M. Nogier, MD, of Lyon, France, include:

Setting	Freq	Anatomical Function
1 or F	73 Hz	For use when cellular activity is hypoactive, such as chronic recurring problems, nonunion fractures and chronic splints and for stimulation of osteoid. It is also helpful in activating humoral and endocrine functions. (Field work has shown setting 1 helpful in stimulating (tonifying) acupuncture and trigger points and increasing circulation in areas being treated, such as wounds when past the acute stage)
2 or G	146 Hz	For areas of yellow scar tissue that are generally formed internally on tendons, ligaments and sub-acute (lingering but not chronic) conditions. (Field use has shown setting 2 to be helpful in reducing inflammation associated with injuries and infections) This is often called the "universal frequency" because most problems involve inflammation.
3 or A	292 Hz	For tissue of ectodermal origin, such as body openings, skin and nerve. (Field applications include wounds, eye injuries and after surgery. Setting 3 tends to tone tissue while minimizing the chance of hemorrhaging fresh wounds of recent surgical sites) It is also good for the treatment of acupuncture and trigger points, corneal ulcers and ulcerated mucous membranes. This is called the "universal frequency" in acupuncture.
4 or B	584 Hz	For circulatory and lymphatic stimulation and treatment of tissue of endodermal origin. (In field applications, setting 4 has been used in conjunction with 5 and 2 for tendon, ligament, joint and other injuries where reaching secondary levels of tissue is needed.)
5 or C	1168 Hz	For tissue of mesodermal origin, such as bone, ligament, viscera and tendon. (Field experience has shown setting 5 to be especially good for tendon and ligament injuries when used with 4 and 2.) It also helps in relaxing large muscle groups.
6 or D	2336 Hz	For chronic conditions not responsive to setting 3 or 5. (Field experience show setting 6 to be a good supplement to 3 when healing processes appear to reach a plateau.)
7 or E	4672 Hz	For pain control, primary when nerve fibers are transmitting to dorsal root ganglia and when involvement of neurotransmitters is of physiological importance. (Field experience shows 7 to help suppress pain and to sedate acupuncture and trigger points and other nervous tissue.) Setting 7 also aids in diminishing excess calcification associated with chips, spurs and arthritic conditions.

General Rule:

When stimulation is required, use lower frequencies.
When sedation is required, use higher frequencies.

DO NOT USE SETTING 7 ON FRESH WOUNDS *as cellular proliferation is inhibited – use 6 in these cases coupled with 3 if insult is to ectodermal (superficial) tissue and 5 if mesodermal (deep). Do not use 4 when excessive bleeding is involved.*

APPLICATION HINTS:

1. Sanitation and Cleanliness of wounds and LEPT Probe.
   When applying LEPT device in most all situations, it is desirable to have the LEPT output device as close to the skin as possible so the maximum amount of light penetrates the area under therapy. However, there are times when this can be messy and unsanitary, such as when treating open wounds. It is suggested, in these cases that you wrap either the wound or the LEPT output device with clear, clean plastic wrap such as household "Saran" wrap, which will protect the wound and keep the LEPT device clean.

2. Duration of treatments and Rest Time
   LEPT may be applied daily if it is convenient and possible. *It is most effective the sooner it is used after the injury occurs.* On chronic conditions such as arthritis, ringbone, and chips, treatment may be needed for as long as 3 months.
   No condition should be continuously treated longer than 3 weeks without a rest period of one week. Thereafter, treat only every other week, with a one week rest between. As with almost any type of treatment, the body tends to get accustomed to what is happening and begins to ignore the treatment. For this same reason, LEPT often is effective in treating old chronic conditions because it awakens the body to recognize a condition it has come to ignore. With any condition, it should be treated until it has healed.

3. Use of "5" Frequency
   The 5 frequency is least understood as to its specific function. However, many veterinarians report they have had positive response to its use on chronic conditions that have not responded properly in conditions that normally require 3 or 5.

4. Preventive Therapy
   LEPT can be quite helpful when used in a preventive mode in dealing with cannon bone injuries. The use of 5 on each leg following a hard workout or race and a combination of 5 and 2 on a routine weekly basis during training may be very beneficial. Whenever possible, preventive procedures should be attempted.
5. Pain Control
   Frequency 7 is a valuable tool in dealing with pain. However, it should be used judiciously. Care must be taken not to mask pain in conditions where such a sensation is the body's protective mechanism. This could lead to the worsening of an injury. When an animal is inactive, use 7 freely to maximize comfort levels.

If veterinary diagnosis indicates that pain is from a chronic condition, or one that is normally irreversible such as arthritis, navicular or other conditions where the control of discomfort

would not be potentially dangerous, 7 can be used. **Such therapy can make the difference between a winner and a marginal performer.**

6. **Cautions and Suggestions involving Calcium Deposits**
   In any ailment where calcium deposits are a problem, do not use 1, which has shown to aid in calcium accumulation. This applies more generally to a local application, not necessarily for acupuncture point treatment. It has been suggested by many users that 7 aids in diminishing calcification associated with chips, spurs, osselets and arthritic conditions.

TREATMENT RECOMMENDATIONS FOR COMMON LARGE ANIMAL AILMENTS

BEFORE YOU BEGIN

The following suggestions are offered to help you achieve the most satisfactory results in the shortest time.

- **Veterinary Consultation is a Must** LEPT can work well only if an injury or condition is accurately located and properly diagnosed. No matter how good the therapist or his equipment, improvement will not be seen if the wrong condition or injury site is treated. **Always consult a qualified veterinarian to determine the nature and location of an injury.**
- **Review All Instructions** Best results will be achieved if you fully read the instructions provided with the therapy device of your choice. This will take only a few minutes and is well worth the time.
- **Preparing Area for Therapy** All medications, poultices, salves, ointments, etc. should be removed and the surface cleansed and dried prior to daily treatments.
- **Proven Methods Should Still be Used** LEPT is not intended to be a singular means of treatment. Poultices, braces, aqua-stimulation and a range of other traditional methods can and often should be used in conjunction with this form of therapy.
- **Initiating and Continuing Treatment** The sooner LEPT is applied to an injury the shorter the healing time. Therapy should begin as soon as possible after the onset or discovery of an injury and continued until the injury is healed.
- **Biostimulation and Implants** LEPT can be used in areas where metal pins and screws have been implanted. If a cast is applied, leave a hole directly over the injury so contact can be made with the skin.
- **Use Caution When Treating Pregnant Animal** There has never been contra-indications reported from use of light on pregnant animals, however, extreme stimulation of certain acupuncture points could possibly cause abortion according to acupuncturists. Due to the fact that mares commonly abort and resorb on their own, it is suggested that you do not treat pregnant mares since potentially unwarranted accusations may occur.
- **When dealing with the frog area**, use a farrier stand if possible or hold up the leg by hand. Do Not under any circumstances allow the horse step on Pads.

FREQUENCY SETTINGS

The following recommendations are based on data given by veterinarians with thousands of hours of accumulated experience in LEPT. The number and alphabetic letter given under the setting column, (4, 2) is the frequency or frequencies suggested for that problem. The first frequency given in the primary frequency and as such should receive more time of application (3-5 joules) than the secondary frequencies receive (1-2 joules).

SELECTING TREATMENT TIME

To determine the time each frequency should be applied, consult the specific Instruction Manual and calculate the proper time required for your particular LEPT device (determined by Average Output Power in cm^2) to deliver a minimum of 1 joule of energy for treatment with all secondary frequencies and 3 joules of energy for primary frequency. Administration of 5 joules of energy is generally a maximum per area since more is considered non-productive.

LEPT DEVICE	Treatment Times		
Average Output Power (per cm^2)	For 1 joule Secondary Frequency	For 3 joules Primary Frequency	For 5 joules
1 mw	1000 sec.	3000 sec.	5000 sec.
5 mw	200 sec.	600 sec.	1000 sec.
10 mw	100 sec.	300 sec.	500 sec.
30 mw	33 sec.	99 sec.	167 sec.
40 mw	25 sec.	75 sec.	125 sec.
45 mw	22 sec.	66 sec.	111 sec.

If you wish to calculate the time requirements yourself, consult the formulae given on pages 9 and 10.

TREATMENT RECOMMENDATIONS FOR EQUINE CONDITIONS

Condition	Settings			Comments
	PRIMARY	SECONDARY	SECONDARY	**NOTE: Be sure to read all comments before starting treatment. If one setting appears in setting section, use for 10 minutes. Otherwise use 5 minutes per setting.**
Abscesses	4	2		Place pad on abscess. For hoof, place over the coronet band. Use setting 3 instead of 4 after abscess breaks.
Acupuncture Points	7	1		Frequency 7 is used to sedate acupuncture points while 1 stimulates. Limit treatments to 10 minutes when stimulating a point, and 10 minutes for sedation. Many fine books are available on veterinary acupuncture for further research. An excellent reference is Dr. Marvin Cain's Acupuncture Diagnosis and Treatment of the Equine, 1966. (1-800-388-2712)
Adhesions	3	5		Place pads to cover affected area.
Ankle Injuries				See settings for Fractures, Edema, Ligaments, Osselets, Sesamoiditis and Windpuffs.
Arthritis	7	5	2	Use this regimen daily for up to six weeks with normal exercise. Stop after three weeks and rest one week. Resume treatment every other week and evaluate.
Back	7	5	4	Place pads along area to be treated. Keep in place for one time period on each frequency before moving on to next placement. If inflammation is found, change from frequency 7 to 2 for the duration of the inflammation.
Bone				See Bucked Shins or Fractures
Bowed Tendons	2	4	5	Place pads to cover affected area. A poultice may also be used after treatment. This condition often originates in the hindquarter. Unless this is found and treated, the problem may recur. Do not use 7. Refer to PAIN CONTROL under the "Before You Begin" section. After inflammation is gone 5 should replace 2 as the primary frequency.
Bruises, Contusion	2	4	5	Place pads to cover affected area, 4 should be used only **after** first day.

Bucked Shins	5	4	1	Apply over affected area. NOTE: Poultices and other traditional remedies (except iodine) should be used in conjunction with this therapy. Treat for 7-10 days, depending on severity, while walking horse daily. Shedrow under tack an additional week before beginning light training. Treat daily until horse is race-ready. Do not use 7: Refer to PAIN CONTROL under "Before You Begin" section.
Calcium Deposits	7	4		Apply pads to cover affected area.
Capped Elbow	5	4	2	Apply pads over rear of hock or on elbow.
Cartilage	2	4	5	Apply pads to cover affected area.
Chips	7	5	2	Apply pads to cover affected area.
Curbs	5	4	2	Apply pads to cover rear of hock.
Cysts	2	4		Apply pads on affected areas. If cyst is a hard or knuckle-like variety, use settings 5 and 2 after second day.
Dermatitis	3	2		Apply pads on the affected area. Some conditions may appear to worsen after a day or two of treatment. This is a "reactive" phase which should clear by the fourth day. Please refer to **Applications Hints, #1 to prevent spreading potentially contagious material.**
Edema	2	4		Apply pads to cover affected area. 4 should be used only after the first day.
Exostoses	7	2	5	Apply pads to cover affected area. IMPORTANT: Treat for double the designated time until pain subsides (approximately one to two days), thereafter treat for usual times.
Eyes	3			For eye infection, ulcerated cornea and lacerated cornea: Apply pads over eye for 5 minutes. Treat daily until condition clears. Ointment need not be used. IMPORTANT: USE ONLY "LED" DEVICES. LASER PRODUCTS MAY CAUSE RETINAL DAMAGE. Progress should be measured by applying a fluorescein strip to eye which will cause lesion to stain green.
Foot Bruises	2	4	5	Place pads horizontally over the coronet band and on the sole. If you have two separate output heads you can treat both areas at the same time. If noticeable heat is present in hoofwall, DO NOT TREAT WITH 4.
Founder				See Laminitis
Fractures FIRST DAY Thereafter	1 5	2 4	4 2	Place pads to encompass fracture site. All fractures should be diagnosed via X-ray prior to beginning therapy. Follow-up X-rays should be arranged every two weeks. For the treatment of coffin bone fractures, hold the diodes horizontally over the coronet band. A second pad can be held to the sole.
Frog Injuries	4	3	2	Place pads horizontally over coronet band. Hold a second pad on the sole.

Hyperactivity	7	5		For hyperactive or nervous horses, place pads on the navel. Allow 5 or more minutes for treatment to take effect. For pre-race jitters, cut treatment time in half. Alternative points include inside of upper lip, muzzle, poll and hollows above eyes.
Infections	2	3		Place pads secure to cover affected area. Treat twice daily until symptoms are no longer evident. If tissue is moist or oozing, place clear plastic (Saran) wrap between diodes and would to keep diodes from building up residue. (See Application Hints)
Joints	5	4	2	Place pads on both sides of ankle, knee, hock, stifle, or on outside of elbow. Moderate use of setting 7 may be used to alleviate pain.
Joint Subluxation	7	4	5	This is a partial dislocation of the joint. Place pads on both sides of joint.
Knees, Open	7	4	5	Place pads on the front of each knee. An X-ray should be used to assess closure.
Laminitis	4	5	2	Place pad horizontally over coronet band. Then hold or secure second pad on the sole.
Ligaments, All	5	4	2	Place pads directly on affected area. If pain symptoms are present use setting 7 when performance is required.
Mouth and Gums	3	2		For cuts or infections to mouth or gums, use single diodes or cluster, whichever is convenient.
Mud Fever	3	2		See Dermatitis
Muscle, Bruises	4	5	2	Place pads on an affected area. Then move to adjacent areas until coverage is complete.
Muscle, Torn	4	5	2	Place pads on affected area.
Muscle, Strained	7	5	2	Place diodes on affected area. When pain subsides, use 4 instead of 7.
Navicular	5	4	2	Place pad horizontally between bulbs of heels, then place pad on the sole. On the first two days, use 1 instead of 4 in the regimen.
Ovaries, Hypoactive	1			Place pads on area over each ovary of fillies and mares that won't come into season or for simple ovary problems that need stimulation. **If no response in 24 hours, treat for Hyperactive Ovaries.**
Ovaries, Hyperactive	7			Place pads over each ovary of fillies and mares for simple ovary problems that need sedation. **If no response in 24 hours, treat for Hypoactive Ovaries.**
Osselets	4	7	2	Place pads on each side of ankle.
Pharyngitis	2	4	3	Place pads under each side of halter so throat area is covered. Place single diode 4-6 inches inside each nostril using setting 3. The use of a twitch for this procedure may be necessary. Refer to **Application Hints, #1 to prevent spread of contagious material.**

Post- surgery	3			Place pads on the affected area. Conclude treatment for the day if clear serum appears. (See Application Hints)
Proud Flesh	3	2		Place pads over affected area. When Proud Flesh subsides, use only 3 and 2.
Punctures				See Soft Tissue Injuries.
Reproductive System, Female	1			Place pads directly over ovaries. When intra-uterine infections are a problem or if scar tissue is present in an older mare, best results are achieved with an Intra-Uterine probe. (Separate instructions are provided with the probe.) Refer to Marvin Cain's book on acupuncture for reproductive/endocrine problems.
Reproductive System, Male	1			Place pads on each side of the scrotum. Refer to Marvin Cain's book on acupuncture for reproductive/endocrine problems.
Ringbone	7	5	2	Place pads on affected area. See Arthritis.
Rundowns	3	5		Place pads on injury. Check for other problems.
Sand Cracks	5	4	2	Place pads horizontally over coronet band. Then hold second pad on the sole.
Sarcoids	7	3		Place pads directly over affected area
Scar Tissue	3	5		Place pads over affected area.
Seedy Toe	4	5		Lift foot and place pads to cover affected area.
Scratches	3	2		See Dermatitis
Sesamoiditis	5	4	2	Place pads over affected area.
Shoe Boil	4	2		Place pads over affected area.
Soft Tissue Injuries (wounds)	3	4	2	On fresh wounds place pads on injury site using 3. If clear serum appears, conclude treatment for the day. As injury begins to heal, the diodes may be secured to affected area and the settings adjusted to include 4 and 2.
Sore Feet	7			Place pads to sole. While this treatment is in progress, treat around the coronet band on setting 1 for about 10 minutes to stimulate related acupuncture points.
Spavin, Blind Day 1 Day 2 Day 3	 4 4 5	 2 5 6	 2 6	Place pads to affected area. Regard all frequencies as primary. Continue Day 3 settings until condition is resolved.
Spavin, Bog				

Day 1 and 2 Day 3	6 6	2 4	 2	Place pads to affected area. Regard all frequencies as primary. Continue Day 3 settings until condition is resolved.
Spavin, Bone Day 1 Day 2 Day 3	 3 7 5	 7 5 7	 6	Place pads to affected area. Regard all frequencies as primary. Continue Day 3 settings until condition is resolved.
Splints, Acute	5	1	2	Hold diodes to cover affected area. Many splint injuries are the secondary effect of a hindquarter problem. This should be checked and treated as appropriate. A radiographic confirmation shown unsolved, setting 1 would be indicated. However, if exostosis (excess calcification) is a problem, use of setting 1 is not advised as it promotes calcification. Once a diagnosis is made, see treatment pertaining to Joints, Fractures, Ligaments, etc.
Stifle problems, General				Stifle injuries can be complex and difficult to pinpoint. It is strongly urged that a proper veterinary diagnosis be obtained before establishing a treatment program. For example, if a fracture is involved, setting 1 would be indicated. However, if exostosis (excess calcification) is a problem, use of setting 1 is not advised as it promotes calcification. Once a diagnosis is made, see treatment pertaining to Joints, Fractures, Ligaments, Etc.
Stifle, Patella	7	2		Place pads to cover affected area. Veterinary consultation is recommended prior to initiating therapy.
Stifle, Dislocation	5	2		Place pads on inside of stifle side by side for full treatment, then on outside. Setting 7 may be added to the regimen if pain is present. Veterinary consultation is recommended prior to initiating therapy.
Stifle, Inflammation	5	7	2	Place pads to cover affected area. Veterinary consultation is recommended prior to initiating therapy.
Stifle, Osteochondrosis	5	2	1	This is a disease of the growth center in a bone. Place pads to cover affected area. Veterinary consultation is recommended prior to initiating therapy.
Stifle Problems “Stifled”	5	2		Place pads to cover affected area. Veterinary consultation is recommended prior to initiating therapy.
Strangles	3	4	2	Place pads under each side of halter so throat area is covered.
Suspensories	4	5	2	Place pads to affected area. If pain is present, setting 7 may be added to regimen.
Throat	3	4	2	Place pads under both sides of halter so throat area is covered.

Tied Up	7	5		Place pads on affected area. Usually hind quarters
Windpuffs	4	2		Place pads to affected area.
Wounds	3	4	2	See Soft Tissue Injuries

TREATMENT RECOMMENDATIONS FOR ADDITIONAL CANINE CONDITIONS

Condition	Setting			Comments
	PRIMARY	SECONDARY	SECONDARY	**NOTE: Be sure to read all comments before starting treatment.**
Collie Nose	3			Place pad on the nose.
Dry Eye Syndrome	3			Place pad over the eye.
Dysplasia	5	7	2	Place pads on affected areas. Trim hair from affected area when treating long haired animals.
Lick Granuloma	3	7	2	Place pads on affected area. Between treatments, cover site to reduce potential for licking.
Mange	3	2		Place pads on area using setting 3 until tissue shows a color change (e.g. from gray to pinkish). If infection is present, use setting 2 for an additional minute on each area being treated.
Torn Pads	3			Place pads on injury until either a color change is noted or a clear serum appears. If infection is suspected, use setting 2 on alternate sessions.

NOTE 1: When treating small animals, the symptoms and associated frequencies noted for equine therapy may be used. If desired, reduce the treatment time for each frequency by half. Although using the same treatment times for large and small animals will cause no negative side effects, the benefits of such extended therapy on small animals may not be dramatically more beneficial.

NOTE 2: Cats also respond well to light therapy. Treatment can begin at base of skull and continue slowly to tip of tail, over hips, etc. It is useful for geriatric cases, especially for specific conditions. Follow the basic frequency designations. Times may be lessened as with canines.

REMEMBER THIS BOOKLET IS TO SERVE AS A GUIDE ONLY.
CONSULT YOUR VETERINARIAN.