Low-Level Laser Acupuncture and the Use of the Respond Luminex Vet Class 3b Laser

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ABSTRACT
Low-level laser therapy (LLLT) may be useful for general tissue healing, as well as stimulation of acupoints. Acupoint stimulation with low-level laser light can be used instead of needles and the same types of cases treated with traditional acupuncture can be treated with laser acupuncture. Current clinical research has confirmed the therapeutic benefits of LLLT for equine laminitis and humans with myofascial pain, epicondylitis, knee osteoarthritis and other musculoskeletal disorders. The author finds the Respond Luminex Vet Class 3b laser with the Advantage probe very user friendly, as it has been pre-programmed for general tissue healing for a number of common conditions, based on species, animal’s size and area being treated. Using the Respond Luminex Vet Class 3b laser with the Profile probe with a fine point cap attached, the author is able to effective stimulate an acupoint in 2 seconds, delivering a dose of 0.6 J/cm². Common conditions successfully treated include pain and paresis from lumbosacral disease, intervertebral disk disease, hip osteoarthritis and infertility. More information about laser acupuncture and videos of case treatments can be found at: http://www.respondsystems.com/practitioners/.

Key words: laser acupuncture, Respond Systems Luminex Vet laser

ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tr>
<td>Hz</td>
<td>Hertz, cycles per second</td>
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<td>J</td>
<td>Joule</td>
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<td>LLLT</td>
<td>Low level laser therapy</td>
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<td>Nm</td>
<td>Nanometers</td>
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<td>PD</td>
<td>Power Density expressed as W/cm²</td>
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<td>W</td>
<td>Watts</td>
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A continuous mode of laser output occurs when the laser beam is not interrupted so does not turn on and off. This is usually used when treating acupuncture points. Super pulsed laser is a method of generating laser light that results in very high peak power and intense light pulses, but due to the short duration of the pulses causes no tissue heating. This method of laser light delivery will permit deep penetration into tissues and is used for stimulating tissue healing. The laser is delivered through probes of various sizes and the size of the laser beam, when it leaves the probe, is called the spot size. The laser power is measured in watts (W) and is factored with time to produce joules (J), the work required to produce 1 watt of power for 1 second. Higher laser powers will reduce treatment times. The laser dosage is a unit of measure of the intensity of laser energy given to the treatment area, expressed in J/cm². The laser irradiance, also called intensity or power density, accounts for spot size, expressed in W/cm².

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Clinical research on the efficacy of laser acupuncture is increasing.¹,³ In a clinical study of LLLT of acupoints and topically, pain scores after treatment of 21 horses with laminitis, significantly improved.¹ Some horses that had severe necrosis of the hoof wall and rotation of the pedal bone and a poor prognosis from a conventional medicine perspective also recovered with LLLT. Other reported case examples of the use of LLLT in horses have included a tarsal joint infection and recurrent airway obstruction.²
In a prospective, randomized, blinded human clinical study of 60 patients, trigger points in the upper trapezius muscles were treated either with a He-Ne Laser at 632.8 nm wavelength 3 times weekly for 4 weeks, dry needles once weekly for 4 weeks or placebo laser (probe only with laser in off position) 3 times weekly for 4 weeks. All patients were required to perform muscle stretching exercises regularly for 4 weeks. Pain during rest and activity, pain threshold and range of motion were significantly improved in the laser group compared to the other groups after 4 weeks of treatment. Evaluation at a 6-month follow-up showed no difference in the groups, but all had improved compared to pre-treatment evaluations.

A systematic review and meta-analysis were performed on studies using LLLT on acupuncture points and myofascial trigger points for lateral epicondylitis of the elbow of humans. They assessed changes in pain, grip strength, range of motion and weight testing. Ten articles met the inclusion criteria for the systematic review; in 7 of the articles only myofascial trigger points were treated, in 2 articles only acupoints were treated and in 1 article both myofascial trigger points and acupoints were treated. Three studies had 4 measurements in common that after meta-analysis showed that LLLT of myofascial trigger points improved pain scale values immediately after treatment and after 3-8 weeks of follow-up. Analysis of grasp force showed a significant increase after treatment and after follow-up. Two of 3 articles also studied weight tests, which showed a medium effect post treatment and a significant effect after follow-up of 4-8 weeks. These two studies additionally analyzed the effect of LLLT on increasing range of motion of the wrist, which was not statistically significant post treatment; however, post follow-up there was a trend to significantly increased range of motion. Because the authors found so few articles on LLLT of acupoints, they concluded that LLLT on myofascial trigger points and other tender points was more appropriate, until additional randomized clinical trials have been performed with LLLT of acupoints.

In another study of LLLT of trigger points, 243 human patients were treated in a placebo controlled study that monitored visual analog pain scales, verbal rating pain scales, a pressure threshold meter, functional disability (dynamometer) and patients’ pain diaries over the 6-24 treatment sessions. Researchers delivered a maximum dose of 10-12 J/cm², 3-5 times per week, to the trigger points associated with various conditions, including atypical facial and temporomandibular pain, cervical pain, frozen shoulder (periarthritis humeroscapularis), epicondylitis, low back pain, osteoarthrosis of the knee, Achilles tendonitis and rheumatoid arthritis of the wrist, hands or feet. The results showed that 64% of the patients with acute onset achieved 100% pain relief, 14% achieved 60-90% pain relief and only 3% failed with 0-10% pain relief. Further, 24% of the chronic cases achieved 100% relief, 35% achieved 60-90% relief and 3% failure rate at 0-10% pain relief. After 6 months, both groups that showed a response reported less than 50% of the initial pain level. The authors concluded that LLLT of trigger points achieved myofascial pain relief and improved functional ability.

In a double blind study to investigate the effectiveness of LLLT versus placebo in the treatment of knee osteoarthritis, 52 patients were randomly divided into 2 group receiving LLLT or placebo LLLT at SP-9 for 10 times in 2 weeks. The LLLT group received a 0.48 J/cm² dose at SP-9 per session and in the placebo group the laser probe only contacted SP-9 for 2 minutes, but was not activated. A number of outcome measures were assessed, including pain on movement via visual analog, 50 foot walking time, knee circumference, medial tenderness score, Western Ontario and McMaster Universities osteoarthritis index (WOMAC), and the Nottingham Health Profile. Statistically significant improvement was found in both groups for pain on movement and 50 foot walking time in the laser group. The placebo group showed a significant improvement in the WOMAC. The LLLT treated group showed superior reduction in knee circumference compared to placebo group.

**Clinical Application of the Respond Luminex Vet Class 3b laser**

In my practice I have found the Respond Luminex Vet Class 3b laser to be extremely user friendly for LLLT of acupoints and general tissue repair. This model of laser machine has a Profile probe and an Advantage probe useful to treat acupoints and tissue regions, respectively. The Profile probe has an output beam of 808 nm, continuous wave, with maximum power of 1 W and a spot size of 1cm², providing a dosage of 1 J/cm² each second. I usually operate this laser probe with a continuous wave and 0 frequency setting. The use of a fine point cap on the Profile probe allows for the treatment of acupoints, as the cap reduces the spot size to 3 mm². Although the fine point cap reduces power by 70%, it increases the power density from 1 W/cm² to 4.2 W/cm². The Profile probe with the fine point cap can be placed lightly on the skin over the acupoint and held for two seconds to deliver a dose of 0.6 J/cm² per acupoint. A longer treatment time is not necessary to achieve effective acupoint stimulation, but longer treatment will not cause damage. I do not worry about sedation or tonification of the acupoint, as it has been my experience that the appropriate response will occur following treatment.

The 2nd probe, the Advantage probe, is used for treating larger areas and has 8 super pulsed diodes with an output beam of 904 nm. This allows extremely high power to be delivered, without generating the superficial heat caused by some Class IV systems. The super pulse diodes fire at a maximum average power of approximately 500 mW and a peak power of 60 W. The
“on” time of the laser pulse is 220 nanoseconds. The treatment area is 46 cm², so is best suited for the treatment of large areas. The Respond Luminex Vet Class 3b laser® is pre-programmed to set itself to the ideal treatment times for various tissue conditions. Simply go to the menu, select the species being treated, the size of animal and the area to be treated. The Advantage probe is placed over the area to be treat. Once the start button is pressed, the machine will treat for optimal time period and “beep” when the treatment is complete. For example, if I want to treat an anterior cruciate injury in a large dog, I select that from the menu, place the probe over the stifle, start it and it will treat for 3 minutes and 20 seconds, then beep to tell me the treatment is finished. I might note here that treatment time is not all that critical with this unit. In my opinion, there is no benefit to additional time, but no damage can be done by over-treating an area. This is not true with Class IV lasers, which will damage tissue with over-treatment.

Some practitioners may clip the hair over the area to receive LLLT, but I have found that this is not necessary for a therapeutic effect. Light pressure should be applied with the laser probe head on the skin over the treatment site. If a fresh wound is being treated, cover the head with clear plastic wrap. Keeping the laser probe heads clean is essential. Iodine, nitrofurazone (Furacin) on the skin causes a yellow pigmentation that might interfere with the transmission of the laser light, so these and other ointments causing pigments must be removed. Applying ice to the treatment area might increase laser light penetration by reducing capillary size, but I have not found this necessary to do to achieve effective results.

Laser acupuncture and laser tissue treatment can be very effective no matter the diagnostic approach. In an article about pulse controlled laser acupuncture concept (PCLAC), Dr. Uwe Petermann used a laser pen to indicate sensitive points at auricular sites and pulse diagnosis to determine acupoints and other sensitive points to treat.2 I simply base my point selection on the Five Elements Theory and/or Eight Principles of traditional Chinese veterinary medicine along with my personal treatment experience based on previous results. The following are typical examples of conditions that I have treated with LLLT on a routine basis.

Case Examples
A case that particularly stands out to me is my own beloved dog, Kaiser. Kaiser was a 10-year-old Weimaraner dog who started showing signs of occasional fecal incontinence and periodic mild incoordination of the pelvic limbs. Radiographs of thoracic, lumbar and sacral vertebrae, hips and stifles were unremarkable. The complete blood count and serum biochemical profile were all within normal limits. A diagnosis of cauda equina syndrome was suspected. Treatment was started using the Luminex Advantage probe (preset 904 nm) applied to the lumbosacral area for the recommended 3 minutes 20 seconds. Acupuncture with the Profile probe with the fine point cap attached was then performed for 2 seconds (0.6 J/cm², with a power density of 4.2 W/cm²) at the preset 808 nm over acupuncture points TH-3, GB-40, BL-40 and GV-1. Treatments were done once weekly for 6 weeks, then once monthly for 2 years. After 2 months of treatments, he was clinically normal and remained so with excellent quality of life during the 2 years. After 2 years, the clinical signs gradually started to occur again despite more frequent treatment and he was euthanized a few months later.

Another condition I have successfully treated with LLLT acupoint stimulation is hip osteoarthritis, most commonly associated with hip dysplasia.3 A typical case is evaluated with radiographs of back, hips and stifles to confirm the diagnosis before LLLT is started. The Profile probe with the fine point cap attached is used to stimulate acupuncture points for 2 seconds on each point. Typical acupoints treated are TH-3, GB-40, GB-29, GB-30, BL-60, BL-40, BL-23, BL-54 and ST-36. Treatments are typically scheduled on a weekly basis, until pain and lameness improve, then gradually reduced 2 weeks at a time until a maintenance schedule is achieved, to keep the animal active and feeling well. Most patients have been able to go 2 months between treatments. A glucosamine joint supplement along with the Chinese Herbal medicine Du Huo and Loranthus are also typically used at recommended doses. Patients generally show improvement within 2 weeks and can be maintained for 1-2 years with a good quality of life.

Injured or ruptured anterior cruciate ligaments can be successfully treated with LLLT. I typically just use the Advantage probe preset at 904 nm.4 The treatment time varies with the size of the dog and is determined by selecting the appropriate setting on the pre-programmed menu of the Respond Luminex Vet Class 3b laser®. The average size German Shepherd receives 1-2 J/cm² per site, using the lower dosage for acute presentation, increasing to or continuing with 2 J after 1-2 weeks. Treatments are usually done twice weekly for 2 weeks, then once weekly until resolution, which is usually about six weeks. Supportive treatment is only restricted activity until the pain and lameness resolve and then the animal can gradually return to normal activity.

Intervertebral disk disease is a common condition treated with LLLT. Treatment consists of using the Advantage probe over the affected disks. Again, the duration of treatment depends on the size of the dog and is selected using the menu on the Respond Luminex Vet Class 3b laser®. Laser acupuncture is then performed, using the Profile probe with the fine point cap attached for 2 seconds (0.6 J/cm²) per acupoint. Typical acupoints treated include TH-3, GB-40, GB-34, ST-36, BL-60, BL-40, BL-23 and just cranial and caudal to the lesion. The LLLT is performed daily for 3 days for severe cases with severe paraparesis or paraplegia and twice weekly, if
only pain and mild paresis are present. Treatments are then performed weekly until resolution. In my experience, the prognosis has been very good in approximately 85% of cases. Supportive therapy consists of rest. I recommend that the animal be kept in a restricted, but familiar environment, as many of my patients become apprehensive and hyperactive if confined to a cage.

There is further information and a demonstration of LLLT on a German shepherd with hip osteoarthritis, an Australian kelpie with a cruciate injury and a Bernese Mountain dog with fertility problems on the Respond website.7 A digital video disc (DVD), available upon request from Respond Systems, may be useful to help understand the operation and uses of the Respond Luminex Vet Class 3b laser to be user friendly, efficient and effective to stimulate acupoints and treat tissue areas. I have discontinued the use of needles for acupuncture and have used only LLLT acupoint stimulation on my patients for the past 4 years. It is painless and most acupoints can be easily reached and treated with minimal stress for the animal, client and practitioner.

CONCLUSION

I have found the Respond Luminex Vet Class 3b laser to be user friendly, efficient and effective to stimulate acupoints and treat tissue areas. I have discontinued the use of needles for acupuncture and have used only LLLT acupoint stimulation on my patients for the past 4 years. It is painless and most acupoints can be easily reached and treated with minimal stress for the animal, client and practitioner.

FOOTNOTE

a Respond Systems, Inc, 20 Baldwin Drive, Branford, CT 06405; Ph. 203-481-2810; www.respondsystems.com

REFERENCES