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## **Laser acupuncture in acute and chronic lameness in horses with special consideration of laminitis, tendonitis and joint infections**

Dr. Med. Vet. Uwe Petermann, Veterinary acupuncture clinic,  
Melle, Germany

### **Summary**

Laser acupuncture is shown as a proper method to treat different kind of lameness. The area of application reaches from acute inflammatory joint disease, acute and chronic laminitis, and tendonitis up to chronic degenerative joint disease. The stimulation of blood perfusion, demarcation and anti inflammatory effects in inflamed tissue by local laser therapy connected with the vegetative regulation of the whole body by acupuncture is pointed out. The most common acupuncture points in these different areas of lameness and the way how to carry out LLLT is described.

### **Key words**

Lameness, Tendonitis, Laminitis, Horse, Low Level Laser Therapy (LLLT), Acupuncture

### **Introduction**

*Acupuncture* is a therapy, which sets disorders in vegetative regulation in balance again (2). This happens by targeted stimulation of nerves, which pass the body fascia as a vessel-nerve bundle to the outer skin (4). These areas where the nerve is particularly easy to reach for therapeutically stimulation are called acupuncture points. What acupuncture points in the body are required to set regulation in motion again, we know from the centuries-old experience of Traditional Chinese Medicine (6). The stimulation of the points can occur by needling (acupuncture) or with lasers specially developed for acupuncture (laser acupuncture).

*Low Level Laser therapy (LLLT)* is a versatile applicable local treatment against any kind of inflammation (5, 9), muscle tension, poor blood perfusion, encourage of wound healing(7, 12), demarcation in traumatized, phlegmonic, abscess- forming or degenerating tissue (10) and many other indications (14). Special importance laser acupuncture has in the treatment of chronic allergic and chronic degenerative disease (11).

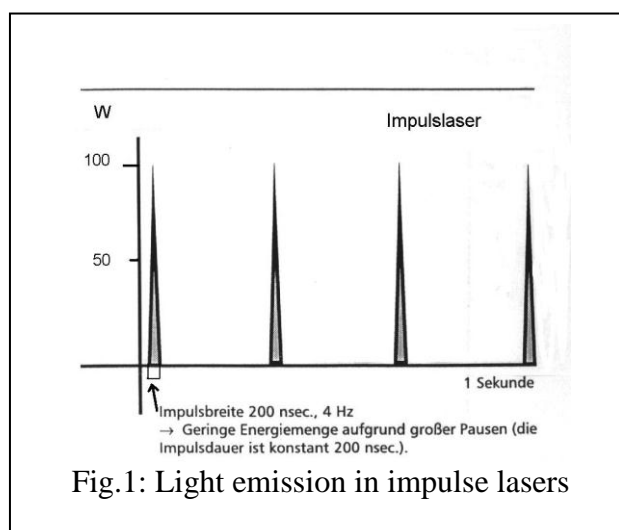
*Laser acupuncture* at least is the symbiosis of LLLT and acupuncture, whereby it includes the possibility of stimulation of acupuncture points by laser instead of needles. This has in addition to the possibility of local treatment, the advantage that the points can be treated absolutely painless and even without touching the area (13).

### **Therapy- and acupuncture- lasers**

For stimulation of acupuncture points and implementing "Low Level Laser Therapy" (LLLT) impulse lasers are used, in which light pulses of very high intensity with a pulse peak power of 90 Watt, but only a very short duration, 200 nsec, are emitted (fig.1) Although with these devices tissue penetration of the laser light is very high, there occurs not any thermal or even coagulating effect in the tissue due to the short duration of the laser light flashes even at high impulse frequencies up to 40000 Hz (13).

Beside the amount of energy applied to the tissue the frequency of light pulses is of vital importance. In treatment we mainly use to 2 rows of frequencies which showed especially good treatment results because of their good resonance to specific kind of acupuncture points and specific tissues or different states of tissue. These are the frequencies "A"- "G" according to Nogier (8) and the frequencies "1"- "7" according to Bahr (1).

The therapeutic effect of laser results from absorption of the laser light in the irradiated cells and thus generates energetic effects in tissues. The absorption occurs by a so-called "antenna pigment", the Flavoprotein-Metal- Redox- System (17) which is an important link in the respiratory chain within the mitochondria. Here the laser photons are absorbed directly and get converted into cellular energy in form of ATP (17).



### Acute lameness, distortion and contusion

Local laser treatment proved effective in the following trauma-related inflammatory conditions: acute distortion, capsule tearing, pulled muscles and haematoma. It is also very effective in the treatment of acute and chronic inflammation of the ligaments and of acute and chronic tendonitis. A markedly more rapid and complete reduction of accompanying tissue swelling and other symptoms of inflammation such as pain and heat also occurs. These symptoms like swelling and local sensitivity are typical for acute lameness as caused by distortion and contusion and is optimally treated with LLLT. Acute lameness, not caused by trauma, is often the result of chronic problems of the vertebral column followed by muscle spasms.

This kind of lameness I call secondary lameness (because they follow a primary problem in the vertebra column). Only minimal dispositions of the vertebral joints lead to irritations of the nerve root which that is followed by back pain and malfunction of the reflex bow. So the tonus of muscles and tendon becomes incorrect. Back pain leads to incorrect positioning of the feet, because the patient tries to avoid the pain as much as possible and tries to find a way to place the foot in the most painless way. Both, this incorrect tonus and the incorrect positioning of the feet by avoiding pain, together lead to severe problems in the tendons, ligaments and joint capsules. On one hand the tendons, ligaments and capsules can be overstretched in the case that the tonus is to weak. On the other hand, when the tonus is to

strong and a joint is bearing permanent pressure with poor perfusion of the cartilage and strong traction in the bone insertions of the tendons and capsules we will get arthrosis. Therefore, in horses suffering from tendonitis, capsule tearing, sprain and every other kind of lameness, the vertebral column needs to be included into the diagnostic procedure and into the treatment plan. This shows the importance of Shu point treatment as well as the treatment of involved neck vertebrae.

We can apply a very simple and effective laser acupuncture treatment by the Shu point of the blocked and painful vertebrae and the locus dolendi points at the painful joint (capsule, tendon, cartilage etc.). Acupuncture points are LI 4 for acute pain in general, GB 41 (prostaglandin point) for chronic degenerative (rheumatic) pain and SP 2 (the Tonification point of the Spleen Meridian and influential point for reparation of the connective tissue). In acute cases we can complete the therapy by treatment of the Tendo Muscular Meridian (TMM, what are also called sinew channels) of the affected area. For each involved TMM we use its Tonification point, its Ting point (end point at the hoof), and a special Reunion point for the TMM. Here we have 4 special Reunion points. GB 13 is the Reunion point for the *Yang* TMM of the forehand. GB 22 is the Reunion point for the *Yin* TMM of the forehand. SI 18 is the Reunion point for the *Yang* TMM of the hind leg. CV 3 is the Reunion point for the *Yin* TMM of the hind leg (15). All are to be treated with frequency “C” according to Nogier. In chronic cases we have another option to support the therapy treatment of the ancestral sinews. The most important acupuncture points to open these channels are GB41, GB 27, ST 25, BL 17 and BL 10 (3).

#### **Acute and chronic tendonitis (bowed tendon)**

Local LLLT plays an important role in the treatment of tendonitis, because of its positive effect on regeneration and regrowth of collagen fibres. In acute cases (suspensor ligament, fetlock sesamoideal ligaments) we again can treat the TMM (Tendo Muscular Meridian, sinew channel). TMM is a special superficial pathway of each meridian. As the name already tells, it is a course of the meridian through tendons and muscles in the pathway of the meridian. By activating this special course through tendons and muscles I treat different kind of lameness especially tendonitis and myositis. How to activate the TMM is mentioned above. In the case of tendonitis in suspensor ligament, deep and superficial bow tendon we can take the *Ting* points LU 11, PC 9 and HT 9 (Tonifying and Ting point in one), the Tonifying point LU9 and the Reunion point of forehand *Yin* TMM GB 22. Most important for me is LLLT as local laser irradiation, because it makes rebuilding of the tendon, proliferation of collagen fibres, everything that is important for the tendon becoming strong and elastic. The centre of the tendonitis is treated from 3 to 10 minutes with 90 watt impulse laser and frequency “B” according to Nogier, and the “Anabolic Master point”, the Tonification point of the Spleen, SP 2, that is responsible for the so called building energy of muscles and tendons,. Other important points are LIV 8, GB 34, PC 6 (the ear point of the stellate ganglion). The next point is, to look for connected vertebrae, which can be found by RAC or as painful points in palpation as mentioned above.

All acupuncture points can be needled or lasered for 20 sec with the mentioned frequencies. On average 4 treatments with an interval of one week is necessary to cure the tendon. It is accompanied by a soft training (20 min daily walk on hard plain ground after the acute swelling has gone). This happens in nearly every (acute) case after one or two days. After the third treatment, when normally there is no more swelling of the tendon to palpate the owner is allowed to trot the horse for 50m later on for 100m and more day by day, exactly

looking, if any swelling in the tendon appears after work. After the last treatment (4, 5, 6 treatments on average 4 treatments) I can give the ok for starting increasing training up to regular training after 2-3 weeks. While that time the horse has to stay in the stable or a small paddock, where it is unable to run. After 6 to 7 weeks I allow to give the horse to pasture again.

In chronic tendonitis up to very evil problems with big strong chronic swellings up to egg size and more the treatment is the same, but one needs more treatments. Sometimes it is necessary to give a laser to the owner for daily treatment for 2 or 3 weeks with a weekly control at my praxis! In this cases soft training start after the acute swelling (if actual existing) has disappeared and in the chronic cases swelling is reduced half. Also these chronic swellings disappear in most cases within 7 weeks. Recidivism is absolutely rare and happens only in those cases when the owner lets the horse run out to pasture too early, when the tendon is not absolutely rebuilt.

### **Case report**

An 18 years old Trakehnia mare had a ruptured superficial flexor tendon by an unknown trauma. Because the wound was already deeply infected since some days, a surgical intervention was negated (fig. 2). Because laser acupuncture is known as a wound- and tendon healing as well as an anti inflammatory treatment we started laser acupuncture in the way described above: SP 2 for wound healing and tissue repair, SP 4 and TH5 against infection TMM of the PC meridian and topic LLLT on the hurt tendon against infection and for healing.

The treatment was carried out daily. Beside a Tetanus vaccination not any other conventional therapy was applied. In spite of intensive laser acupuncture development of hypergranulation tissue and inflammatory swelling couldn't be avoided perfectly (fig. 3). The same therapy was applied for the next 8 weeks all 2 to 3 days in the clinic. Thereafter the wound had closed and the tendon healed step by step. The tendon was treated for another 6 weeks with a 90watt impulse laser by the owner at home.

Thereafter the tendon had rebuilt to its physiological structure and the mare was step by step put to regular training (fig.4). Not any medication like antibiotics or anti inflammatory drugs had been applied beside laser acupuncture over the entire treatment.



Fig.2, Left: infected wound with starting of hypergranulation tissue before laser acupuncture.

Fig. 3, Right: wound closed by hypergranulation tissue with distinct wound swelling treated by a 5x 30 Watt impulse laser shower



Fig. 4: nearly restored tendon after 14 weeks

### **Infectious arthritis**

Infectious arthritis and tendonitis is positively affected by laser acupuncture that offers a good chance of healing. In these cases it is essential to find the triggering focus where the infective germs have settled down and treat these areas carefully by LLLT with fr.

A'’. Especially in those cases that happen after minimal invasive surgery we find the invasive channels as the foci where the germs settled. Additionally one has to apply a topical treatment of the whole infected joint or tendon sheath with LLLT (frequency A'’) with the cluster probe 5x30Watt for 2-5 minutes each area. Again we treat the TMM and TH 5, SP 4 against inflammation. As a following problem, caused by protection of the affected limb, we find secondary back pain that has to be treated in the way described above.

### **Therapy laminitis**

Laminitis occurs mostly due to metabolic and micro circulatory disorders and inflammation of the hoof leather skin, with inflammatory edema in the hoof lamina. Therapy should therefore have the aim to eliminate the causal disturbances in Liver- and Kidney metabolism, to reduce the local Histamine release, inflammation, edema and pain and to improve blood perfusion.

All these facts can be positive influenced by laser acupuncture. Especially disturbed micro circulation in the hoof leather skin can be greatly improved by laser irradiation. With impulse lasers one can sufficiently penetrate the horn of the hoof wall and treat the laminitis locally with the anti inflammatory frequency A'’ (37376 Hz). The fr. A'' has the great advantage compared with the former used fr. A' (292 Hz), that A'’ sends out much more laser energy per time (approx. factor 150). That decreases treatment time from about 20 minutes to approx. 30 sec. and still brings in enough energy into the tissue.

Local acupuncture points are TH 1 and PC 9. Of further importance is LU 9 as the Masterpoint of blood (microcirculation), BL 40 that we know in “controlled acupuncture” as anti histaminic point, LIV 8 as Tonifying point of the Liver, KID 7 as Tonifying point of the Kidneys, GB 41 that we know in “controlled acupuncture” as Prostaglandine E1-point for control of inflammation, BL 18 and 23 as segmental Shu points of Liver and Kidneys and LIV 13 that we know in “controlled acupuncture” as ACTH-point.

The treatment per acupuncture point was approx. 20 sec; the LLLT of hoof leather skin depended essentially on the surface that is to irradiate and on the used laser device. With a 90watt impulse peak power laser one needs between two and five minutes of treatment. Between the acupuncture sessions wet hoof bandages with aluminum acetate and Arnika tincture were applied.

In normal acute cases treatment interims were about 2 -3 days until the acute symptoms subsided. Then the interims were extended to one week. On average 3-4 treatments had been carried out. In dramatic cases in which there was danger that the entire hoof wall could be lost (shoeing out) we carried out daily treatments.

It is important to mention that when starting laser acupuncture treatment any other medication had been discontinued. Beside acupuncture either antihistamines, antibiotics, anti-inflammatory drugs nor corticosteroids or any other conventional therapy was applied. By some cases I will explain the process of treatment and demonstrate the excellent effect of laser acupuncture.

Used acupuncture points in laminitis and their resonance frequencies according to Nogier and Bahr

Acupuncture point	Frequency acc. to
TH 1	Nogier C 1168hz
PC 9	Nogier C 1168hz
LU 9	Nogier C 1168hz
BL 40	Nogier C 1168hz
LIV 8	Nogier B 584hz
KID 7	Nogier B 584hz
GB 41	Bahr 5 9592hz
TH 5	Bahr 5 9592hz
BL 18	Nogier C 1168hz
BL 23	Nogier C 1168hz
LIV 13	Nogier B 584hz

Used acupuncture points in laminitis and their intent in western and traditional Chinese medicine

Acupuncture point	TCM	Western Medicine
TH 1	Metal point TH	<i>Ting</i> point
PC 9	Wood point PC	<i>Ting</i> point
LU 9	Tonifying point LU	Blood perfusion
BL 40	Earth point BL	Histamine point
LIV 8	Tonifying point LIV	Liver point
KID 7	Tonifying point KID	Kidneys point
GB 41	Opening point <i>Daimai</i>	Prostaglandien E1
TH 5	Opening point <i>Yangweimai</i>	Thymus point
BL 18	<i>Shu</i> point LIV	Sympathic Liver
BL 23	<i>Shu</i> point KID	Sympathic Kidneys
LIV 13	<i>Muo</i> point SP	ACTH point

**Case study laminitis 1: 1-year old stallion with deep necrosis of the hoof leather skin and partial necrosis of the hoof bone**

When a 1 year old stallion made an attempt to escape from trailer while driving he got stuck with the hind legs on the trailer board and scratched with the two front hoofs for approx. 500m on the tarmac. After four days of treatment the colleagues decided for euthanasia.

Instead of this the owner decided to try laser acupuncture. When examining the hoofs I saw that in addition to the massive scratched hoofs there was mainly on right foot the necrosis caused by the heat the limiting factor. In the entire medial area of the hoof the hoof leather skin was necrotic so that the hoof bone laid open (Fig. 4).

We started therapy with daily LLLT of both hooves under sedation and nerve block anesthesia with fr. A" for anti infective therapy and demarcation of the necrotic tissue. The acupuncture was as usual TH5, Gb41, Sp4 and LI4 (Masterpoint against pain). The stallion had also developed severe muscle tensions in the back and the shoulder due to the extreme pain in the hoofs, which could not significantly be alleviated even by high doses of pain reducers. Even the slightest touch on the back provoked a strong moaning and led almost to plunge. This was especially noticeable with the segments of the Liver and Kidneys. So BL 18 (*Shu* point of the Liver) and BL23 (*Shu* point of the Kidney) were treated with fr. C according to Nogier for 30 sec each on both sides. The same was carried out for a fist-big very strong swelling in the right bladebone angle.

Here also appear the synergistic effects of laser and acupuncture in muscles by neurophysiologic effect of acupuncture and direct ATP enrichment in the muscle cell that leads to relaxation of muscles. Both effects start immediately while the treatment. The muscles become relaxed and painless within a few seconds.

After 10 days once-daily hospital treatment in the same way and 1 week further treatment by the owner, the stallion had been absolutely painless in walk. Up to a small area the hoof was closed again. In the remaining open center of the sole we found a piece of hoof bone sequester, that we removed (fig6). After an additional week both hoof soles again were completely closed with sound hoof horn and also in trot no lameness was present any more (Fig. 7).



Fig. 5: hoof before laser acupuncture treatment





Fig. 6, Left: piece of hoof bone sequester.  
Fig 7, Right: hoof completely closed after end of laser acupuncture treatment

### **Case study laminitis 2: Severe acute laminitis with a clear subsidence of the hoof bone in an 11-year-old Trakehnen breed mare**

At the beginning of the pasture season an 11- year-old Trakehnen breed mare developed a severe acute laminitis. Despite intensive therapy in a veterinary hospital after a week of treatment a clear subsidence of the hoof bone could be obviously seen and diagnosed by radiographs (Fig. 8 and 10). The mare was walking very sensitive on both front legs with a significant lameness on the left front leg.

4 stationary treatments at an interval of 3- 4 days with laser acupuncture were carried out in my practice: local treatment with a laser shower, fr. 5 according to Bahr, for 5 min on each front hoof. As acupuncture points I gave TH 1, PC 9, LU 9, BL 40, LIV 8, GB 41, BL 18 and 23 and LIV 13 with the corresponding laser frequencies for 20 sec.. After 14 days the movement in the trot was significantly quicker and the lameness was significantly reduced. Subsequently, the mare was treated daily at home by the owner every day with a 90 watt impulse laser in the same manner. The hooves were expertly cut; the tip of the toe was reduced and remained without fitting. 4 weeks after we started laser acupuncture the mare was without lameness and was carefully ridden and returned to full Training within six weeks.

After totally 4 months control radiographs were made, which showed that the subsidence of the hoof bone almost completely resolved and the hoof wall reorientates itself already parallel to the hoof bone (Fig. 9 and 11). Since 1 year, the mare is running again extremely successful in dressage tournaments without any further treatment.



Fig. 8 and 9: hoof before and after laser acupuncture treatment

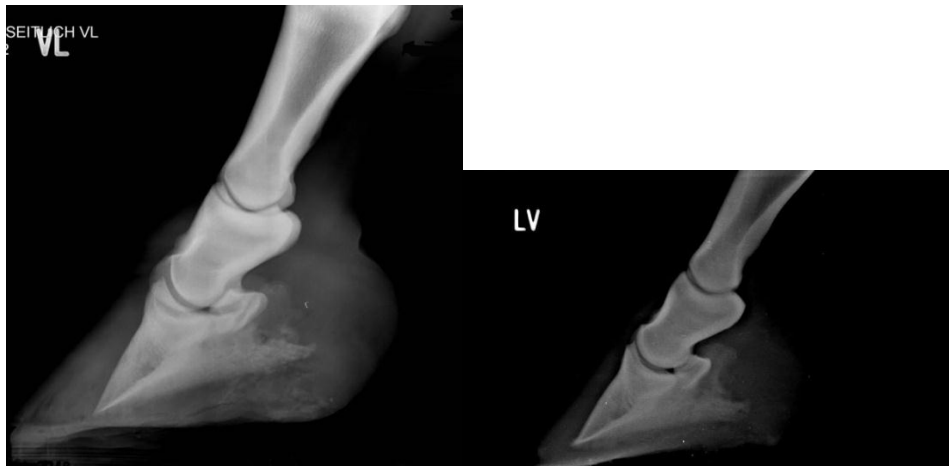


Abb. 10 and 11: X-rays left front hoof before laser acupuncture treatment

### **Outcome of a study about 21 horses with acute and chronic laminitis**

Here I will show to you the outcome of a study about 21 horses with acute and chronic laminitis I carried out in 2008 -2010 and that was published in January 2011 AJTCVM. On average 6,2 treatments had been carried out.

### **Assessment and results**

In assessing pain and symptoms before and after completion of the treatment a score was established.

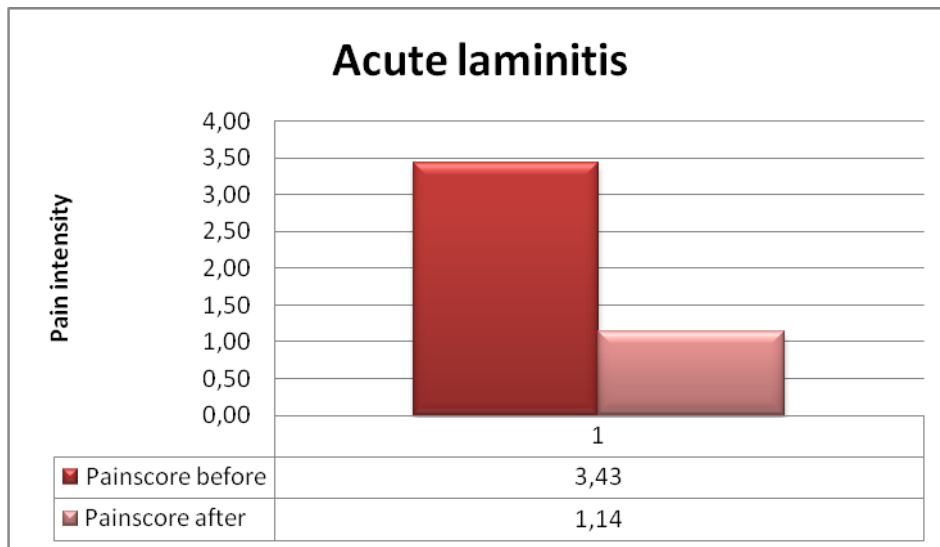


Fig. 11 Comparison of pain scores before and after low level impulse laser in fourteen horses with acute laminitis (mean and standard deviation of pre-treatment pain scores =  $3.43 \pm 1.02$  and post-treatment pain scores  $1.14 \pm 0.36$ , t- test=  $p < 0.001$ )

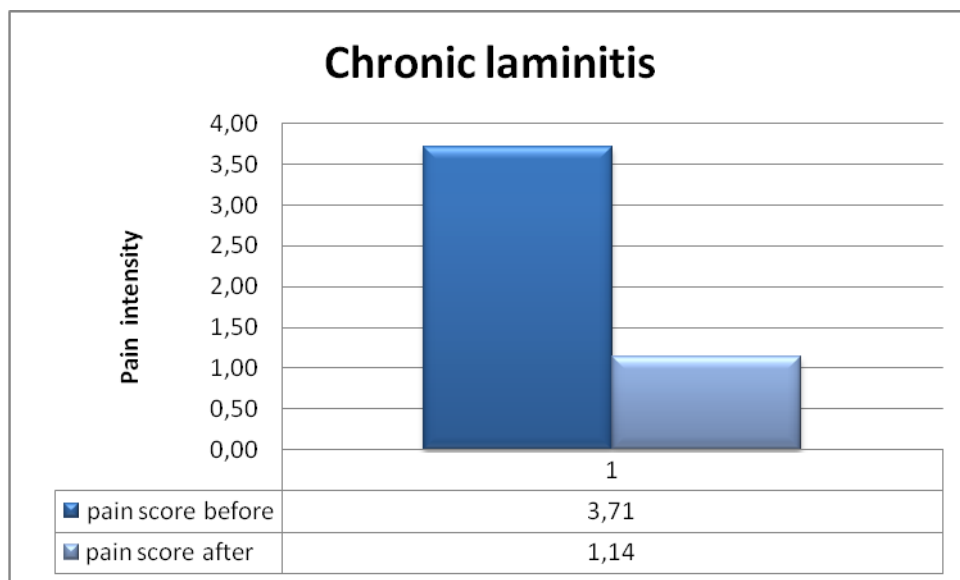


Fig.12: Comparison of pain scores before and after low level impulse laser acupuncture in seven horses with chronic laminitis (mean and standard deviation of pre-treatment pain scores were  $3.71 \pm 0.76$  and post-treatment pain scores  $1.14 \pm 0.38$ , t test=,  $p < 0.001$ )

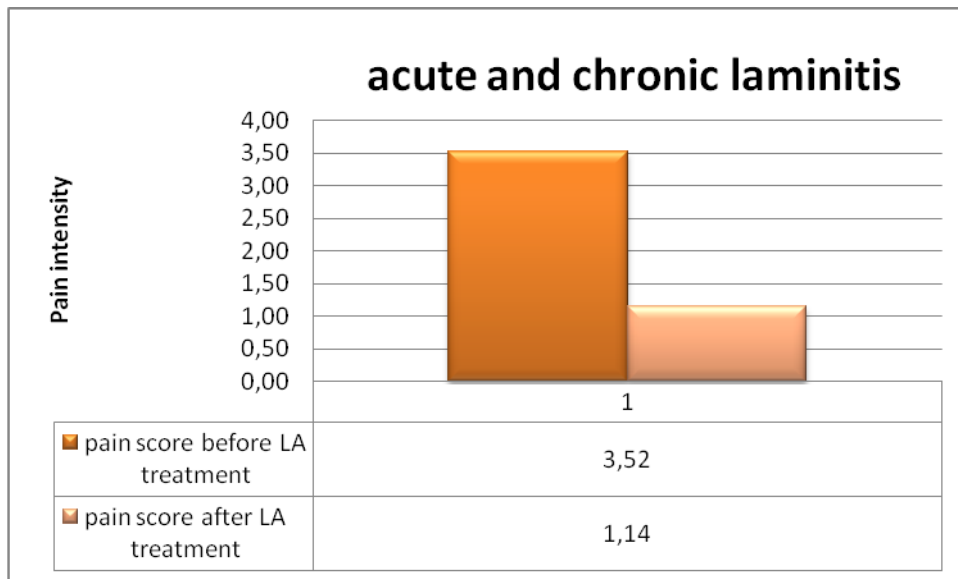


Fig. 13: Comparison of pain and symptoms scores before and after LLLT acupuncture (LA treatment) for twenty one horses with either chronic or acute laminitis (mean and standard deviation pre- treatment score  $3.52 \pm 0.93$  and post-treatment pain scores  $1.14 \pm 0.36$ , paired t-test=  $p < 0.001$ )

#### **Pain assessments determined for figures 11-13:**

- 1 No lameness in all gaits, no Pulsation,
- 2 Tenderness in the front legs when trotting and light pain in turning around, light pulsation of the foot arteries, light pain on pressure with the hoof gripper
- 3 Significant lameness in trot, clear pulsation, clear pain on pressure with the hoof gripper
- 4 Severe lameness in trot and step, strong pulsation,
- 5 Patient is mostly lying due to pain and is hardly able to move forward in step, very strong pulsation.

**Discussion**

It should be underlined that laser acupuncture was not used as an adjuvant therapy to conventional treatment, but as exclusive therapy. In particular many cases that were classified as infaust after a long prior conventional therapy and euthanasia was recommended, show that laser acupuncture is a very effective alternative to conventional therapy and much more recognition has to be granted to. Laser also extends the indications in many fields of acupuncture.

In my longstanding personal experience for now more than 20-years laser acupuncture has proven for me with absolutely no doubt as exceptionally effective in very many indications in veterinary medicine.

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