COMPANION ANIMAL HEALTH

Laser Therapy for Acute Conditions

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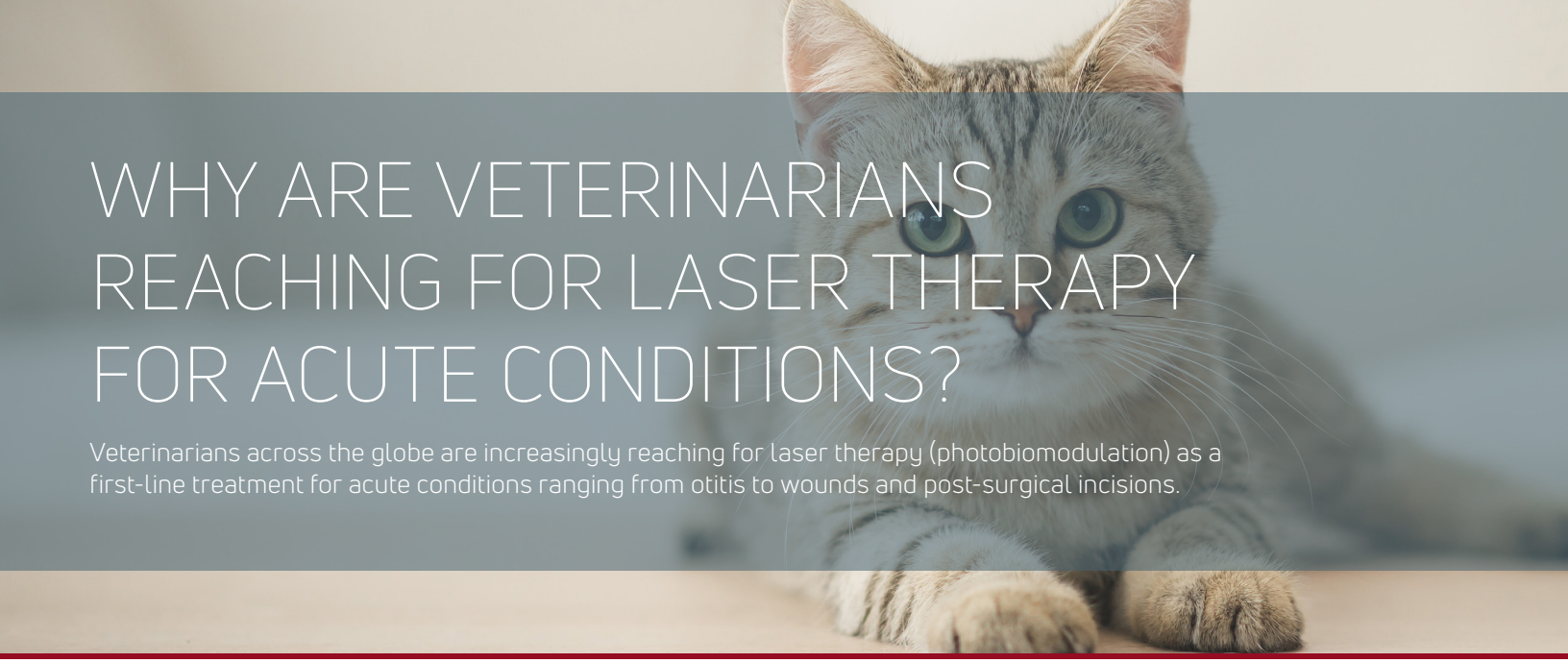


WHY ARE VETERINARIANS REACHING FOR LASER THERAPY FOR ACUTE CONDITIONS?

Veterinarians across the globe are increasingly reaching for laser therapy (photobiomodulation) as a first-line treatment for acute conditions ranging from otitis to wounds and post-surgical incisions.

Laser therapy treatments are fast, noninvasive, and effective. Acute conditions are treated one time or multiple times until they resolve, and laser therapy can often have a significant impact in just a few treatments.

Some mild presentations of pyotraumatic dermatitis or otitis externa may only require a single treatment to help reduce inflammation and pain and facilitate the road to recovery for the patient. Other, more severe presentations of these problems (and others) may require a few sessions daily to every other day if a deeper infection is suspected or confirmed.

Insufficient dosing can result in treatment failure or inconsistent results.

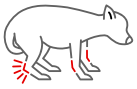
Target doses are expressed in joules/cm^2. Modern therapy lasers have built-in treatment protocols to calculate optimal doses for you.

TARGET DOSAGES

Superficial Conditions

4-6 joules/cm^2

Conditions in tissues such as wounds or other dermatologic conditions



Deep Conditions

8-20 joules/cm^2

Conditions under the skin

In this guide, we'll review acute conditions that may benefit from laser therapy, tips for achieving consistent clinical outcomes, and real-world case studies.

A TARGETED APPROACH TO PAIN MANAGEMENT

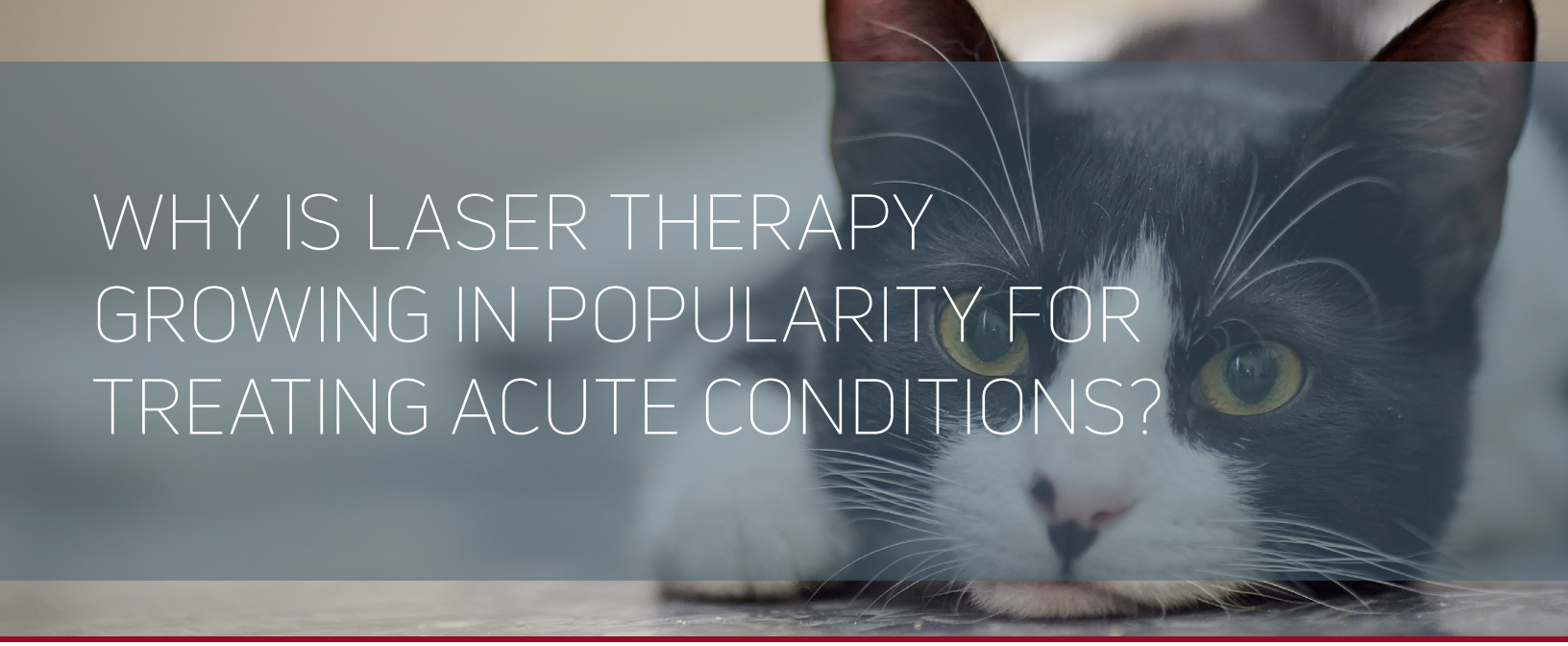
According to a recent survey, 100% of veterinarians prefer to start with a side-effect-free treatment for pain if efficacy is the same.[1] Recent publications have shown that photobiomodulation is more effective with longer duration than the most commonly prescribed NSAID.[2] Adding photobiomodulation to existing pain management protocols can accelerate recovery and, in some cases, reduce the amount of NSAIDs patients need for pain relief.

Photobiomodulation targets and decreases pain at the source instead of providing a systemic treatment that only masks symptoms. The top pain management tools identified in the survey by clinics that employ targeted therapies for pain are:

#1	#2	#3	#4	#5
Laser Therapy	Acupuncture	Physiotherapy	Platelet-Rich Plasma (PRP) Therapy	Stem Cell Therapy
90%	38%	24%	20%	12%

Surveyed clinics shared their most profitable services. Service revenue related to problem visits was the #1 most profitable service reported.

#1	#2	#3	#4	#5
Problem Visits & Related Services (Laser Therapy, Exam Fees, Diagnostics, etc.)	Wellness Exams & Related Services (Vaccines, Exam Fees, etc.)	Surgical Procedures	Diagnostic Tests & Services (Routine Labs, X-Ray, etc.)	In-Clinic Pharmacy



WHY IS LASER THERAPY GROWING IN POPULARITY FOR TREATING ACUTE CONDITIONS?

Photobiomodulation reduces pain and inflammation very quickly and is safe to combine with other treatments, including pharmaceuticals, topical treatments (for dermatologic conditions), and dietary changes or supplements.[3] Acute treatments typically take less than five minutes and can be performed by nurses. The short duration of treatment makes laser therapy easy to add to existing pain management.

RESEARCH SUPPORTING PHOTOBIOMODULATION FOR ACUTE CONDITIONS

The Effect of Photobiomodulation Therapy on Inflammation Following Dental Prophylaxis

This research found that photobiomodulation therapy significantly reduced the grade of gingivitis following dental prophylaxis and supported the hypothesis that laser therapy may be a useful adjunct following dental prophylaxis.[4]

Read more at https://pubmed.ncbi.nlm.nih.gov/36632039/

The Effect of Photobiomodulation Therapy on the Management of Chronic Idiopathic Large-Bowel Diarrhea in Dogs

The study revealed that photobiomodulation therapy significantly improved clinical signs and frequency of diarrhoea episodes compared to current standard of care treatments.

Read more at https://pubmed.ncbi.nlm.nih.gov/34817707/

[Webinar]

Photobiomodulation in Large Bowel Diarrhoea and Gingivitis

Take a deep dive into these two studies with author Joao Alves, DVM, MSc, PhD, watch the on-demand webinar review at

companionanimalhealth.com/webinars/photobiomodulation-in-large-bowel-diarrhea-and-gingivitis

COMMON ACUTE CONDITIONS

Laser therapy quickly reduces inflammation and can produce impressive results for acute conditions. For those new to laser therapy, the easiest way to get started implementing the technology is with acute conditions (especially wounds and post-surgical incisions) because of how fast and easy treatments are to administer and how significantly they impact recovery.

Photobiomodulation is one of the most versatile tools in the pain management toolbox. Here is a long list of common acute conditions that laser therapy can help with:

- Abscesses
- Amputation (post-op)
- Aural hematoma (post-op)
- Burns
- Cranial cruciate ligament repair (post-op)
- Cystotomy (post or intra-op)
- Declaw (post-op)
- Degloving injury
- Enterotomy (post or intra-op)
- Hematoma (post-op)
- Incisional healing
- Orthopedic/Fracture repair (post-op)
- Post-operative pain relief
- Ischemia/reperfusion injury
- Skin graft (post-op)
- Spay/Neuter (post-op)
- Wounds
- Post-dental cleaning (pain management)
- Tooth extractions (pain management)
- Cystotomy (post or intra-op)
- Lower urinary tract infection
- Urinary tract obstruction (pain management)
- Fracture healing (delayed or nonunion)
- Anal sacculitis
- Demodicosis (pain management)
- Eosinophilic granuloma complex
- Feline acne
- Hygroma
- Infections (bacterial and fungal)
- Interdigital cyst
- Juvenile cellulitis
- Lick granuloma
- Mastitis
- Non-inflammatory alopecia
- Otitis
- Perianal fistula
- Pododermatitis
- Pyoderma
- Pyotraumatic dermatitis
- Skin graft (post-op)
- Vasculitis
- Diarrhea
- Anal gland sacculitis
- Upper respiratory infection

LASER THERAPY FOR EXOTIC PETS

See how Dyrlægehuset Farum in Denmark is utilizing laser therapy to help common ear problems in rabbits.

Watch now at *youtube.com/watch?v=GD3tiHKngUc*

LASER THERAPY AND VETERINARY FIRST AID

BY LISA A. MILLER, DVM, CCRT

Light as a restorative and protective therapy for the treatment of injury and disease in veterinary medicine has generated increasing interest over the last decade. This is due to numerous factors, especially the ability to apply this modality in a non-invasive way that has no detrimental side effects to the patient or negative environmental impacts. Laser therapy, or photobiomodulation (PBM), has a beneficial effect on cells and tissues, contributing to a directed modulation of cell behaviors enhancing the processes of tissue repair and cell proliferation while also reducing inflammation and pain.

All these effects make PBM a versatile modality for many first-aid situations, such as treating traumatic wounds or burns, acute muscle injuries, and snake bite envenomation cases.

TRAUMATIC WOUNDS, BURNS, AND DECUBITAL ULCERS

The benefits of laser therapy in wound healing are well described in the literature. In vivo and in vitro studies have shown that PBM accelerates the activity of fibroblasts, collagen synthesis, neovascularization, decreases inflammatory cells, and increases the amount of elastic fibers in the wound healing process.[1,2,3] PBM also offers a demonstrated benefit for use in thermal burns to encourage re-epithelialization and reduce scar tissue.[4] It may also have potential benefits for infected wounds, where it may enhance macrophage function and modulate the immune response[5] as well as potentially having some direct effects on microorganisms.[6]

Straightforward acute wounds that have been cleaned may require only one to three treatment sessions (depending on wound size) before significant contraction and/or complete healing is noted. Treatment should be administered in an off-contact manner so as not to contaminate the wound further, or contaminate the optical probe itself. The entire wound...

"bed" should be treated as well as a few inches of healthy-looking tissue margin around the wound.

A starting dose of 2-5 J/cm^2 is recommended, treating daily if possible and then reducing the frequency of treatment sessions as the lesion improves.[7] Chronic or infected wounds and thermal burns may require a more aggressive treatment schedule. Alongside other standard of care therapies and supportive care measures, especially for wounds such as decubital ulcers, higher fluences (energy densities) may be necessary in order to appreciate beneficial results. If no improvements are seen after three or four treatment sessions with the previously mentioned starting doses, an increase in the amount of total energy (in total joules) delivered at 25% to 50% per session is recommended until a significant response is seen.[8] It is worth noting that PBM should be applied after the wound or burn has been cleaned (or debrided) and prior to the application of any dressings, ointments, or bandages.

MUSCLE INJURIES

PBM may be used preventatively to benefit athletic training by reducing delayed-onset muscle soreness and signs of muscle damage after intense exercise. This modality may also be used to treat muscle damage caused by strains or trauma. Numerous studies have demonstrated the usefulness of PBM in muscle recovery after injury.[8,9,10] Studies that have examined markers for oxidative stress and inflammation in muscle tissue from euthanized animals, or in serum from other patients, have demonstrated that PBM accelerated or resolved the acute inflammatory response and reduced oxidative stress elicited by muscle trauma.[11,12] Other research that looked at PBM effects on histopathological features after muscle injury showed that PBM attenuated the extent of edema, myofibrillar degeneration, and area of necrosis.[13]

Taking all of the above into account, PBM is crucial during several phases of rehabilitation from muscle injury. During the acute phase following injury, where the goal is to limit the effects of immobilization, reduce pain and inflammation, and promote healing of the injured tissue, PBM may be used daily if possible.[14] Additionally, it may be used throughout later stages of rehabilitation where the goals shift to enhancing mobility, improving endurance and/or strength, re-establishing more normal neuromuscular control patterns, and ultimately to strengthening and conditioning injured areas even further. Time between treatment sessions is gradually increased as the patient improves, a common approach to resolving injuries and returning to full function. In the case of performance animals, long term maintenance therapy as a preventative measure prior to athletic events may also be considered.

When treating in vivo, the depth of the target tissue is of utmost importance.[15] Thus, for transcutaneously delivered light to be effective in injured muscle tissue, the light's parameters and PBM application protocols must be such that — after accounting for the light's energy losses in the haircoat and the intervening tissues of the skin, fat, etc. — a sufficient amount of light must reach and be absorbed by muscle cells in the injured area(s). A starting point for fluences that may be effective, depending on the size of the patient and the depth of tissue being treated, would be 6-10 J/cm^2 up to 20 J/cm^2 or higher in some cases.[15,18,19] One way to maximize the amount of light penetrating to deep tissue for

CASE REPORT

Figures 1 to 5 depict the case of a dog that was trapped in a kennel during a house fire. The dog was treated with PBM starting six days after initial presentation to the ER for thermal burns, in addition to standard of care wound therapies; however, no skin grafts were performed.

Figure 1.
Thermal burn 6 days after initial presentation to DVM, prior to debridement.

Figure 2.
Thermal burn 12 days after initial presentation, after debridement.

Figure 3.
Thermal burn 26 days after initial presentation.

Figure 4.
Thermal burn 51 days after initial presentation.

Figure 5.
Thermal burn 90 days after initial presentation.

Photos courtesy of Dr. Jeanette Pettit.

musculoskeletal injuries is to treat with the optical probe in firm contact with the skin, minimizing the amount of light that may be lost due to reflection off the skin's surface.[17]

SNAKE BITES

Numerous small animal models have been researched with regards to PBM and inflammatory pain. One particular application of PBM and its benefits in treating inflammatory pain is related directly to snake bite envenomation. Bites from certain snakes can cause severe local tissue damage, systemic coagulopathy, and localized edema, intense pain, hemorrhage, and myonecrosis. Studies in mice have shown that PBM improved pain, reduced inflammatory infiltration, stimulated phagocytosis, and increased regeneration of muscle fibers and myoblast proliferation after injection of *Bothrops moojeni* venom.[20,21] PBM has also been shown to promote vascular endothelial growth factor receptor 1 (VEGFR-1) expression and increase angiogenesis,[22] as well as improve skeletal muscle regeneration by accelerating recovery of the myofiber mass[23] post-injection of venom into mouse skeletal muscle.

A veterinary surgeon working from a large multi-specialty 24-hour emergency and critical care hospital in Tucson, Arizona, that treats an average of 395 rattlesnake envenomation cases each year, recently authored a chapter in the veterinary textbook *Laser Therapy in Veterinary Medicine: Photobiomodulation*.[24] In this chapter, Dr. Barbara Gores describes initiating laser therapy for snake bite envenomation patients after they have been stabilized with IV fluid therapy, analgesics, and in most cases, antivenin. Treatment with PBM usually begins six to eight hours after hospital admission and is administered once daily while the patient is hospitalized (usually two to four treatments in-clinic) followed by an additional two to four sessions after discharge at a fluence of approximately 8 J/cm^2; though as with other deep tissue doses, this varies depending on the size of the patient and the area/depth of the wound being treated. Dr. Gores goes on to describe that anecdotally, over the past decade since initiating PBM for these cases, there has been a significant decrease in clinical morbidity as well as the necessity to perform major surgical reconstruction of snake bite wounds at their facility. This is also consistent with the anecdotal success reported to this author by other colleagues utilizing PBM in similar cases throughout the country.

In conclusion, since Mester's original discovery in the 1960s (see sidebar below), a large amount of research has been done to elucidate the mechanisms behind PBM. Though further work focusing on a deeper understanding of molecular mechanisms, biological context, and optimal dosing parameters for various conditions is still underway, great progress has been made in PBM research. This modality has the potential to make a significant impact on the overall prognosis and outcome of many veterinary

PBM – ITS DISCOVERY AND HOW IT WORKS

The positive effects of photobiomodulation therapy (formerly low level laser therapy, or LLLT) were originally observed in a rodent model more than 60 years ago by Dr. Endre Mester, when he noted the effects this application of light had on hair growth and wound healing.

PBM is a photochemical interaction that occurs between target cells and applied laser light. Mitochondria within cells contain chromophores that absorb photons from PBM. The primary chromophore of interest is the enzyme, cytochrome coxidase, located in the mitochondrial membrane and which impacts the activity of various molecules such as nitric oxide (NO), calcium ions, ATP, beneficial reactive oxygen species (ROS), and numerous other signaling molecules. These molecules work together by various pathways to normalize metabolism and regulate proteins that are affected by redox reactions and involved in cellular proliferation and differentiation. Together with cytokines and growth factors, they aid in tissue recovery and the reduction of oxidative stress and inflammation.

In addition to the effects mediated primarily via the biologically active chromophore mentioned above, light-sensitive ion channels are also found within the cell membrane. These ion channels are gated by light and include "transient receptor potential" (TRP) channels[2] that are activated by specific factors, such as heat or cold, noxious chemicals, mechanical forces, voltage, and others. When activated, TRP channels open, allowing ions such as sodium to flow into the cell. This results in an action potential, which is realized as a nerve impulse. Mounting evidence suggests that light-mediated activation of TRP is responsible for some of the mechanisms of action of PBM as well, particularly regarding histamine-dependent wound healing effects and antinociceptive effects.[2]

patients being treated for acute traumatic conditions; however, this therapy may be commonly overlooked when evaluating these cases. Laser therapy is well tolerated in veterinary patients, and easy to perform by technical staff. Its use should be considered, especially in these types of cases, in order to maximize success, reduce pain, and hasten the return to full health.

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8 REASONS TO USE LASER THERAPY FOR ACUTE CONDITIONS

1
Quickly Reduces Inflammation

Photobiomodulation (laser therapy) is becoming a first-line treatment because it can quickly relieve pain and inflammation. These quick outcomes enable more effective administration of other therapies.

2
A Safe Addition to Your Multimodal Pain Management Protocols

Laser therapy can be safely combined with other treatment modalities and pharmaceuticals to provide multimodal pain relief.

3
Multiple Treatment Attachments Optimize Treatments

Companion's software recommends the ideal handpiece attachment for the condition you are treating. For acute deep tissue conditions such as IVDD, you will want to leverage the on-contact Deep Tissue Applicator. In contrast, for conditions with broken skin such as wounds or post-surgical incisions, you'll use an off-contact treatment applicator.

4
Fast Treatments Fit into Workflow

Acute treatments typically take under five minutes and fit easily into existing workflow.

5
A Nurse-Driven Treatment

Laser therapy treatments are designed to be administered by nurses, freeing up the veterinarian's time.

6
Targeted Treatment Accelerates Tissue Repair

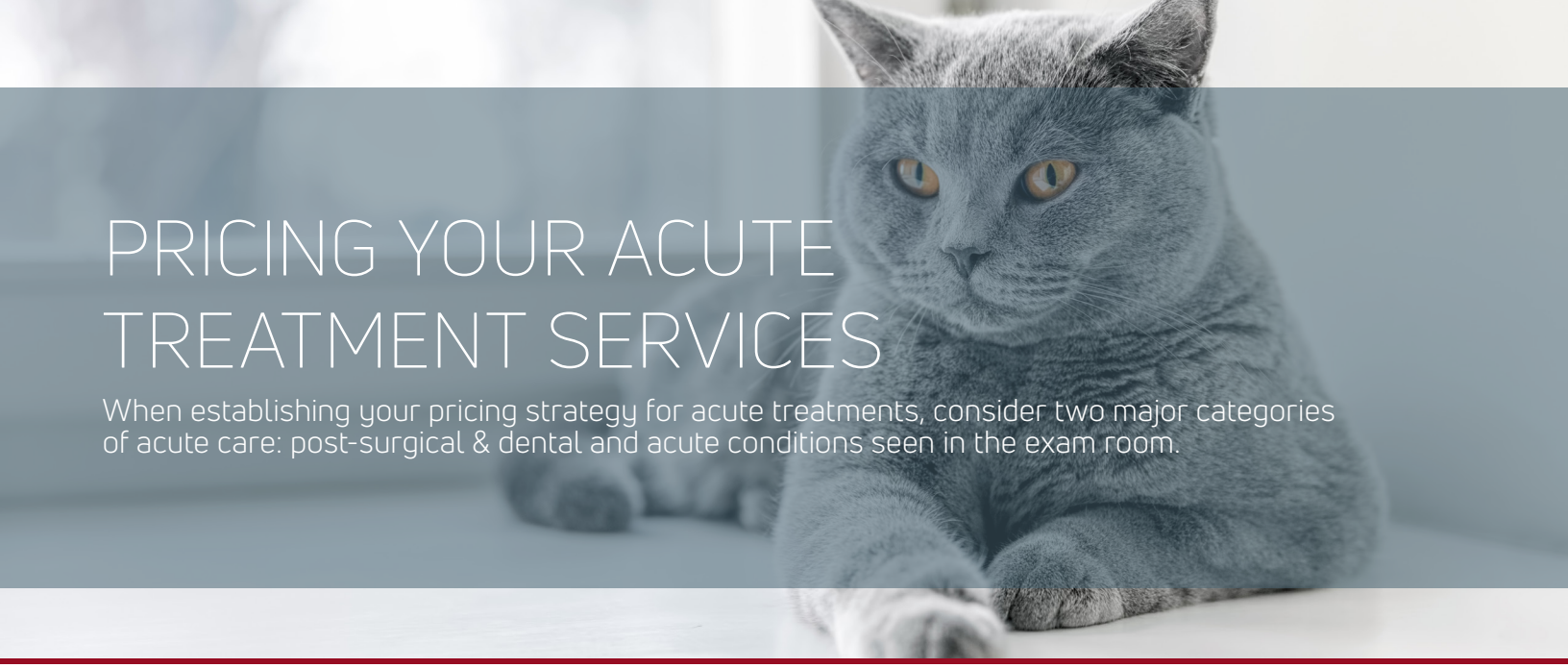
Instead of masking symptoms like systemic treatments, laser therapy treats and improves tissue health at the source of the injury.[1]

7
A Comfortable Treatment for Painful Patients

Laser therapy treatment is well tolerated by patients in acute pain and requires no fur clipping to achieve effective outcomes.

8
A Strong Revenue-Driver

Adding laser therapy to acute treatment protocols can significantly increase revenue and improve outcomes. Most clinics pay their laser off in less than 12 months, making laser therapy a major long-term profit driver.



PRICING YOUR ACUTE TREATMENT SERVICES

When establishing your pricing strategy for acute treatments, consider two major categories of acute care: post-surgical & dental and acute conditions seen in the exam room.

Post-Surgical & Dental

These treatments are typically performed in the surgical suite directly after a surgical procedure as a standard part of pain management protocols. The fees for these conditions are typically less since treatments are fast and easy. Some clinics elect to roll these fees into a standard "pain management" line item on the invoice to reduce the probability of clients trying to remove the treatment from their pet's care.

Acute Conditions

This category includes common conditions like abscesses, hot spots, otitis, wounds, etc. Unlike the post-surgical treatments, these are addressed in the exam room with the pet owner present. Often laser therapy treatment is combined with other modalities or pharmaceuticals. Laser therapy treatment for acute conditions can produced "wow" results because of it's ability to quickly reduce inflammation.

USE THE CHART BELOW TO ESTABLISH PRICING FOR YOUR ACUTE SERVICES:

POST-SURGICAL & DENTAL

Suggested fee per laser treatment **$10-$20**

- Abscesses
- Aural hematomas
- Cystotomy
- Declaws
- Dental cleanings (post-procedure)
- Enterotomy
- Fractures post-fixation
- Neuters
- Oral surgery
- Orthopedic surgery
- Pain
- Skin grafts
- Spays
- Wound repairs

ACUTE CONDITIONS

Suggested fee per laser treatment **$20-$35**

- Abscesses
- Anal sacculitis
- Aural hematomas
- Bruising
- Burns
- Cystitis
- Demodicosis
- Edema/swelling
- Enteritis
- Feline acne
- Fractures
- Hot spots
- IVDD
- Infections
- Mastitis
- Otitis
- Pain/trauma
- Pancreatitis
- Pyoderma
- Respiratory disorders
- Rhinitis/sinusitis
- Snake bites
- Sprains & strains
- Stomatitis
- Tendon/ligament injuries
- Urinary tract disorders
- Wounds

Appropriately pricing your service can result in an impressive return on investment. Because of the versatility of laser therapy treatments, most clinics have their equipment paid off in less than 12 months, making the therapy laser a strong profit center.

Get Your Custom ROI

Schedule a consultation with our team to create your own customised laser therapy ROI at *info.companionanimalhealth.com/acute-roi*

CASE STUDY

Necrotizing Wound, Domestic Short Hair

Author(s): "Ms. Polly Keene, RVN, VPAC, CET, Bridwater, United Kingdom"

Signalment: Feline, 5yo, M/N, Domestic Short Hair

History: The patient presented with necrosis and tissue loss involving the lower back and tail base after disapppearing for seven days

Exam Findings & Initial Treatment: Physical examination revealed a cat bite abscess at the base of the tail. The patient was sedated to clean the wounds, given Convenia (cefovecin sodium) and sent home with intraoral buprenorphine and NSAID for 24 hours.

Laser Treatment: The preset "superficial wound" protocol was used, delivering a fluence of - 6J/cm^2 with a non-contact technique.

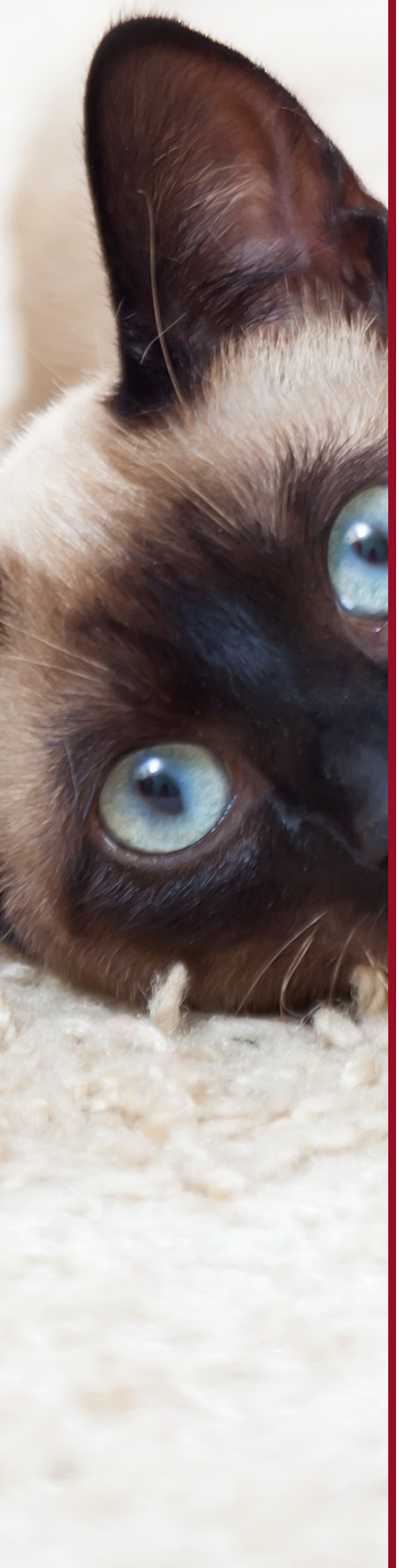
Frequency of Treatment: Once weekly for the first six weeks, then tapered to every other week as wounds improved

Other Treatments: Systemic antibiotics, wound lavage, and hydrogel was used in the deeper wounds near the tail base.

CASE STUDY

Laser Therapy Siamese Cat Recovers From Lip Ulceration

Case courtesy of: Dr. Huseman, Bluffton Animal Clinic, Bluffton, IN



Signalment: Feline, 1yo, FS, Siamese

History: Patient visited a spay/neuter clinic and came home after procedure sneezing, rapidly progressed to lethargy, inappetence, and ulceration of the nose and lips. Patient was uncomfortable and only able to lay sternly at rest.

Diagnostics and Exam Findings: Due to owner financial constraints, initial diagnostics were limited. Upper respiratory infection (likely viral) was main rule-out as cause of symptoms.

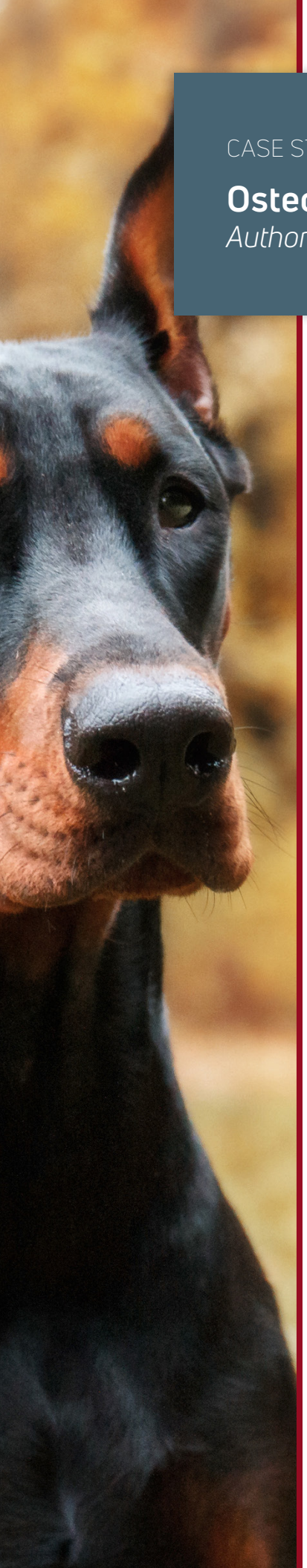
Laser Treatment Details: 360 total joules administered at 3-4W to entire area of nose, sinuses, mouth, and gums in off-contact manner.

Laser Treatment: Daily for three consecutive days

Frequency of Treatment: A total of 34 treatments have been done so far, ranging from daily to every 2 to 3 days.

Other Treatments: Subcutaneous fluid therapy; antibiotics (Excenel®); supportive care (cleaning/wiping face and nose); tube feeding until patient started eating on her own.

Comments: Two hours after the first laser treatment, nasal discharge stopped and dried up, the patient was breathing noticeably easier, and was even taking a nap in lateral recumbency. By day two, the patient was active, vocalizing, and eating.



CASE STUDY

Osteomyelitis, Doberman Pinscher

Author(s): "Mile High Veterinary Hospital, Aurora, CO"

Signalment: 2yo, M/N, Doberman Pinscher, "Dax"

Presentation: History of neglect (foot injury originally from strangulation with chain); third and fourth toes had previously been amputated, but the surgery site never healed and painful granulation tissue was now present. Dog was significantly lame on right hind leg. Radiographs suggested osteomyelitis. Surgeon recommended amputation, but owners wished to try laser therapy as a last resort to save the limb.

Treatment Details: Bacterial C&S was submitted and pending results, patient was started on Clavamox and laser therapy was instituted. 196 total joules were delivered to affected area at 2W; EOD for five treatments, then every five days for six additional treatments.

Ultimately, C&S grew multiple severe antibiotic resistant bacteria including Methicillin Resistant Staph, Pseudomonas aeruginosa, and Morganella morganii. All were resistant to Clavamox. Patient was started on appropriate antibiotic therapy 7 days later, after clinical improvement already noted

Treatment Results: "*Dax's exceptional recovery was most likely due to a combination of therapies, but since he did not start appropriate antibitic therapy until seven days after the beginning of our treatment course and we saw significant improvement only two days after the first use of the Class IV Therapy Laser, we suspect that the Companion Laser was primarily responsible for his dramatic response to treatment.*" -Dr. Waskow






CASE STUDY

Otitis, Mixed Breed Canine

Author(s): "Woodland Springs Veterinary Hospital, Ft. Worth, TX"

Signalment: 10yo, M/N, Mixed Breed Canine, 30 lbs

Presentation: Left ear canal swollen with yellow discharge.

Diagnostics: Cytology revealed bacterial and yeast otitis.

Treatment Details: 307.5 total Joules administered to superficial component and 690 total Joules delivered to deep component at 3.5W; Frequency of two treatments, two consecutive days. Appropriate topical therapy was used as well.

Treatment Results: Otitis resolved with ear much less swollen and pruitic after treatment.

Day 1

Day 2

Day 14

CASE STUDY

Severe Demodicosis, American Staffordshire Terrier

Author(s): "Baring Boulevard Veteinary Hospital, Reno, NV"

Signalment: 2yo, M/N, American Staffordshire Terrier, "Bosley"

Presentation: Presented after being taken in by Animal Control, received single dose of Ivermectin SC injection and had received Prednisone 20mg PO SID for unknown duration. DVM diagnosed severe Demodicosis and discontinued steroids, started Cephalexin and benzoyl peroxide bathing/shampoo, daily Ivermectin PO and laser therapy.

Treatment Details: Started laser therapy on 1/29. Approximately 85% of total skin surface treated for total dose of 16,200 J at 6W over ~3,200 cm2 (5 J/cm^2).

Every other day treatment for 5 treatments, then weekly through 3/1 when all lesions resolved.

Treatment Results: "*Patient's skin lesions/disease showed rapid reduction in erythema, crusting, and pruritis leading to marked improvement in patient's comfort level while managing/treating generalized demodicosis/pyoderma. Overall healing process was dramatically accelerated by laser therapies and most importantly comfort was markedly improved throughout laser therapy period.*" – Dr. Sara Hogel

References

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