

Laser therapy and its role in pain management and rehabilitation



By Jennifer F. Johnson, VMD, CVPP

Lasers have been used for a variety of medical, industrial, and computer applications for decades. Most consumers are familiar with the medical applications of various lasers – to remove hair, to correct vision, to remove tattoos or scars – and in surgery, to cut tissue.

However, the use of therapy lasers, while approved by the FDA in the early 1990s, has only recently been utilized with much success in the human and veterinary arena.

Laser therapy works by utilizing near infrared light to stimulate cellular change, in a process called “photobiomodulation”. This specific wavelength of coherent and collimated light penetrates cells deeply. It exerts effects on all chemical processes within all types of cells. It increases the tissue release of endorphins, decreases prostaglandin and inflammatory mediators, increases macrophage activity, dilates lymphatics, increases blood flow, promotes angiogenesis, increases cytokine release, stimulates fibroblast activity, and increases collagen production. Chromatophores within the cells absorb the infrared light energy, causing an increase in ATP. Because of this increase in ATP, enzymes begin the signaling and protein synthesis cycles. The unique quality of laser light stimulation promotes and enhances healing by reducing inflammation and promoting proliferation, remodeling, and maturation of tissues. This is truly regenerative medicine, not just something that treats the symptoms!

Dosing and application

The dose of energy needed to achieve photobiomodulation at the target injured cell varies depending on the area of the body that one wishes to treat. Superficial conditions, such as skin wounds, or mouth pain, will require a lower dosage, while the dose for deep musculoskeletal or visceral pain is much higher. When we try to calculate the dose in a clinical setting, the absorption of photons by body mass, skin and coat colour, and thickness of the hair coat factors into our calculation. Most therapy lasers have established protocols and computer programs to help standardize these factors, taking the “guess-work” out of calculating a proper dose.

Dosing and treatment times are directly related to the wattage – or the amount of power that can be delivered to the cells. For example, if we determine that we need a total dose of 3000 joules, we can deliver it in a short time with a higher wattage machine versus over a long time using a lower wattage. The difference between the older therapy lasers and the current therapy lasers have to do with the amount of watts the laser provides. Class III therapy lasers, or “Low Level Laser Therapy” (LLLT) are lasers with a maximum power output of 0.5 watts. Class IV therapy lasers, or High Powered lasers, provide from 0.5 watts up to 15 watts of power. With proper technique, it is now possible to deliver a therapeutic dose into the cells in a shorter amount of time, obtaining better treatment success using the high powered lasers. If a LLLT laser is used, you may still get a cellular response, it will just take much longer to achieve an appropriate dose.

Penetration of the laser light to deep cells also depends on the wavelength of the infrared light. Too high a wavelength and the photons are absorbed by water; for example, the high wavelength light that is utilized in surgical lasers. Too low a wavelength and the photons are absorbed by hemoglobin and melanin and there is less total energy to stimulate cellular function. Current research suggests that the optimal wavelength for appropriate photobiomodulation is 810-980nm.

Recommendations for therapeutic laser treatment depend on the type of injury. For acute pain conditions, one treatment daily or every other day for 1-3 treatments will commonly resolve an acute and/or superficial condition. For chronic conditions and deep pain conditions, once a day or every other day treatment for the first week or two is recommended, followed by a transitional phase where the patient has treatment 2-3 times a week until the therapeutic goal has been achieved. Once we see treatment success, chronic patients continue with laser therapy as often as needed to control pain and maintain satisfactory progress. For example, in cases of chronic osteoarthritis of the hips, a common treatment plan begins with treatments 2-3 times a week for 2-4 weeks, then once a week for 2-4 weeks, then every other week, and finally, once every 4-6 weeks. As photobiomodulation

continues to create normal cellular respiration within the cells, less therapy is required to maintain tissue homeostasis and overall body wellbeing.

We apply the laser therapy over the area of injury using skin contact heads for deep organ and musculoskeletal conditions and non-contact heads for superficial or wound conditions. During the application of the appropriate dose, the therapy technician will apply the laser perpendicular to the body, moving the laser continuously to bathe all the tissue as well as tissue adjacent to the obvious injury. Better treatment success is achieved with application of the dose from all possible angles toward the target tissue; for example, when treating a stifle, we apply the dose from medial, lateral, and cranial angles, keeping the handpiece perpendicular to the skin.

Laser therapy and pain management

The therapy laser is an essential tool in veterinary medicine’s pain-management arsenal. Pain turns on the body’s stress response, increasing cortisol, delaying healing, causing GI dysfunction, clotting dysfunction, and overall poor health. One can extrapolate that continued pain will also contribute to patient morbidity and mortality. Our first objective as clinicians is to acknowledge the adverse consequences of pain in our patients and use every modality possible to reduce pain so that we can keep our patients their healthiest.

We incorporate laser therapy into established perioperative pain management for routine and non routine surgeries as well as acute and chronic pain conditions. Multi-modal analgesia can be combined with laser therapy for continued cumulative effect. Essentially anything that is considered a painful or inflammatory condition can benefit from laser therapy. Some examples of common conditions that have responded to laser therapy are asthma in cats, pancreatitis, urinary tract disease, acute and chronic skin conditions, and acute and chronic musculoskeletal disorders. Contraindications are direct exposure to the retina of the eye and neoplasia conditions. Research has not been able to determine neoplastic cellular response to laser light therapy, as the response varies between cells.

Therapy laser is easily incorporated into a veterinary pain management and rehabilitation program. In human practice, sports-medicine and physical therapy professionals continue to be at the forefront of laser therapy research and application. Post surgical rehabilitation that includes the use of laser therapy results in faster return to normal function and it can be utilized concurrently with passive range of motion exercises, myofascial trigger point work, treadmill and proprioceptive work, acupuncture, and therapeutic massage. Interesting research continues to study the positive effect of photobiomodulation on exercise performance, showing an increase in muscle healing and improved performance after the use of laser therapy prior to athletic activity.

Summary

Veterinarians need to use any and every treatment available to reduce pain in our patients to improve their health, welfare, and quality of life. Photobiomodulation is a great addition to our arsenal, and incorporating the use of laser therapy in practice adds an indispensable tool, creating positive outcomes and improved healing.

After receiving her B.S. in Chemistry/Biology from West Chester University of PA and graduating from the University of Pennsylvania, School of Veterinary Medicine in 1993, Dr. Johnson worked as an associate veterinarian for 14 years before becoming the sole owner of Stoney Creek Veterinary Hospital in 2007. The AAHA-accredited hospital employs six veterinarians and 35 team members.

Pain management has always been a priority in her practice and Dr. Johnson is always looking for new treatment modalities to help her patients. Her special interest is in the use of therapeutic laser for the treatment of pain. Since 2006, Dr. Johnson has worked with Zoetis to teach acute and chronic pain management and analgesia. In 2013, she achieved Certified Veterinary Pain Practitioner (CVPP) qualification through the International Veterinary Academy of Pain Management. Dr. Johnson speaks nationally on pain management, laser therapy and general orthopedic surgery and is the author of numerous articles on laser therapy and pain management.

Dr. Johnson lives in Morton, PA, with her husband, two daughters, and a rescue pit bull. In her spare time, you will likely find her cheering on her daughter’s soccer team or boating on the Chesapeake Bay.



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Pro-active veterinary dentistry: making the most of a bad design

WINNIPEG, MB – The primary goal in veterinary dentistry is to provide and maintain patients with a mouth free of pain and infection. Fraser A. Hale, DVM, FAVD, Dipl. AVDC, speaking at the CenCan Conference, refers to this as the “Prime Directive”. He added that maximizing the number of teeth is not the goal, especially in brachycephalic breeds, which suffer the most from serious dental disease and deformity. “Brachycephalism is never normal”, he said, “and is in fact grossly abnormal in accordance with current breed standards.” Educating the public about the problems associated with these breeds is important, so that they are not considered normal.

Dentistry continues on page 5



Photo credit: Andrew Woodley

Dr. Kelly Barratt with “Craigcrest Rejoices Sidney”
Heartland Veterinary Services, Listowel, ON

Table of Contents

Focus on:
CenCan Veterinary
Conference, Winnipeg, MB

- 3 Canadian Vet Advisory Board
- 4 VetLaw
- 4 CenCan Conference: rave reviews, zoo tour, and more!
- 10 Clinical assessment and management of bleeding patients
- 12 Laser therapy and its role in pain management and rehabilitation
- 14 *Echinococcus multilocularis*: an emerging threat to canine and human health in Canada?
- 16 Nutritional myths and misperceptions – part 2: Human-grade, organic, and natural ingredients, cats & carbohydrates
- 18 Use of combination carbamide peroxide and calcium peroxide toothpaste to prevent dental plaque in dogs
- 21 Industry News
- 22 Continuing Veterinary Education Calendar
- 22 CVMA News

Nutrition for the equine engine: muscle function, fuel, and repair



By Russell Mueller, MS, PAS
and Kelly Ann Graber, BSc, PAS

The horse’s body contains a significant amount of amino acids. Traditionally, we have associated amino acids with muscle development, knowing that muscle contains approximately 73% amino acids. Additionally, hoof and hair are largely dependent on dietary amino acids as they contain 95% of this nutrient. Skin and tendon also carry a significant level, in the 90% range, and even bone contains a 30% amino acid content. While amino acids have always been present in equine diets as naturally occurring nutrients within forage and feedstuffs, there is renewed interest in a superior amino acid model, and the addition of

Nutrition continues on page 6

“What do I say?” Managing challenging conversations



By Jayne Takahashi, DVM, MBA

Challenging and often emotion-laden conversations with clients are a matter of course in veterinary practice. By skillfully applying basic communication skills with a sense of curiosity

and sincere empathy, you can turn adversarial conversations into collaborative discussions.

These four core communication skills are the foundation for effective conversations, including your most difficult ones.

1. **Open-ended questions or inquiry.** Initiate your conversations by using statements or questions that allow others to tell their story. This enables you to discover their perspective, understanding, and concerns in an open, respectful manner. “Tell me about ...”, “What have you noticed ...?”, “How do you feel about ...?” rather than questions that are answered with a “yes” or “no” response. Use closed-ended questions when you need confirmation of facts or absolute consent for a treatment or procedure.

Conversations continues on page 8