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The New Frontier in Drug-Free Pain Management for Veterinary Patients

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MODERNIZING PAIN MANAGEMENT

Pain management is a critical component of veterinary practice, impacting patient comfort, mobility, and quality of life. Whether it stems from surgery, injury, or chronic disease, pain negatively affects nearly every aspect of an animal's well-being—mobility, appetite, sleep, and emotional health. As our understanding of pain mechanisms evolves, so does the need for more comprehensive, individualized care.

Modern pain management is shifting away from a single-drug, symptom-control model toward a multimodal approach that addresses pain at the source instead of symptom-masking. This modern evidence-based strategy combines pharmacologic, modality-based treatments, with regenerative and physical therapies to target pain across multiple pathways simultaneously. This approach not only improves comfort and function but also minimizes reliance on systemic drugs and their potential side effects.

Among the most promising tools in this new era of multimodal care are laser therapy (photobiomodulation therapy, PBMT) and platelet-rich plasma (PRP). Both modalities offer drug-free, minimally invasive ways to modulate inflammation, promote tissue repair, and reduce pain. Their mechanisms complement each other. PBMT reduces inflammation and stimulates cellular metabolism and microcirculation to accelerate healing, while PRP provides concentrated growth factors that drive tissue regeneration from within.

Recognizing this, **the American Animal Hospital Association (AAHA) and the World Small Animal Veterinary Association (WSAVA) now advocate for the inclusion of non-pharmacologic and regenerative modalities in comprehensive pain management plans.** Together, PBMT and PRP represent a new frontier, integrating science, safety, and innovation to help veterinary professionals deliver faster recoveries, greater comfort, and improved long-term outcomes for their patients.

LASER THERAPY (PHOTOBIOMODULATION THERAPY, PBMT) DRUG-FREE, NON-INVASIVE PAIN MANAGEMENT

PBMT uses specific wavelengths of light to stimulate mitochondrial activity, resulting in increased ATP production, modulation of inflammatory mediators, and enhanced tissue repair. Because of its ability to deliver effective pain relief and enhanced tissue recovery without drugs or side effects, **PBMT has become a mainstream first-line treatment for a wide variety of acute and chronic conditions seen in veterinary medicine.**

The fundamental principles that underpin PBMT, as currently understood in the scientific literature, are relatively straightforward. There is consensus that the application of a therapeutic dose of light to impaired or dysfunctional tissue leads to a cellular response mediated by mitochondrial mechanisms that reduce pain and inflammation and speed healing.

The primary target (chromophore) for the process is the cytochrome c complex, which is found in the inner membrane of the cell's mitochondria. Cytochrome c is a vital component of the electron transport chain that drives cellular metabolism. As light is absorbed, cytochrome c is stimulated, leading to increased production of adenosine triphosphate (ATP), the molecule that facilitates energy transfer within the cell. In addition to ATP, laser stimulation also produces free nitric oxide and reactive oxygen species. Nitric oxide is a powerful vasodilator and an important cellular signaling molecule involved in many physiological processes. Reactive oxygen species have been shown to affect many important physiological signaling pathways, including the inflammatory response. In concert, the production of these signaling molecules has been shown to induce growth factor production, increase cell proliferation and motility, and promote extracellular matrix deposition and pro-survival pathways. Outside the cell, nitric oxide signaling drives vasodilation, which improves microcirculation in the damaged tissue to deliver oxygen, vital sugars, proteins, and salts while removing wastes.

For PBM to occur, light needs to reach the mitochondria of the damaged target tissue. Laser therapy is applied to the surface of the skin, but clinical results are only achieved when a sufficient amount of light (number of photons) reaches the target tissue, thus adequate dosing is essential. There are a number of factors that can help maximize the light that reaches the target.

These factors include

- Proper wavelength selection to reduce light scatter
- Sufficient laser power
- Reducing reflection off the skin's surface by treating in contact
- Minimizing incidental absorption by non-targeted molecules, such as melanin

PBMT HAS GROWN IN POPULARITY TO PIVOT AWAY FROM RELIANCE ON NSAIDS/OPIOIDS AND TO TREAT PAIN AT THE SOURCE.

CLINICAL INDICATIONS

- Post-surgical pain relief and recovery
- Wounds
- Post dental cleaning and extractions
- Chronic musculoskeletal disorders
- Abdominal disorders, including diarrhea
- Thoracic disorders
- Dermatologic disorders
- Neurological disorders
- Urinary tract disorders
- Acute pain and inflammation

The following studies illustrate the growing body of peer-reviewed evidence supporting PBMT's clinical efficacy in small animal veterinary practice.

Research Summary

A RANDOMIZED BLIND PLACEBO-CONTROLLED TRIAL INVESTIGATING THE EFFECTS OF PHOTOBIOMODULATION THERAPY (PBMT) ON CANINE ELBOW OSTEOARTHRITIS

Published: Canadian Veterinary Journal, 2018 Sep;59(9):959-966

Author(s): Looney A, Huntingford J, Blaeser L, Mann S

This is a randomized, double-blinded, placebo-controlled, multi-center clinical study examining the effect of photobiomodulation (PBM) or sham light therapy on pain, nonsteroidal anti-inflammatory drug (NSAID) requirement, and lameness in 20 client-owned dogs with naturally occurring elbow osteoarthritis

Materials/Methods

Dogs (n = 20) were randomly assigned to receive either PBMT (group PBMT; n = 11) 10 to 20 J/cm^2 or a placebo treatment (sham light group S; n = 9) treatment 0 J/cm^2, to both elbows for 6 weeks. Clinician Lameness score, Helsinki Chronic Pain Index scoring by blinded owner, and NSAID dose were recorded before and 7 to 10 days after last treatment by blinded study personnel.

Results

Reduction in NSAID dose occurred in 9/11 dogs in the PBMT group, and in 0/9 of group S dogs (P = 0.0003). There was greater improvement in lameness score in the PBMT group compared to S group (P = 0.001). A greater reduction in pain score was detected in 9/11 parameters/ daily life functions in group PBMT compared to group S (P < 0.05), with the exception of mood (P=0.2) and vocal score (P=0.35) which did not differ between groups before and after treatment.

Acknowledgment

Neither supporter contributed to study design, data collection, data analysis, manuscript preparation, submission, or publication decisions.

Conclusion

Regularly scheduled PBMT at 10 to 20 J/cm^2 per joint for 6 weeks was successful in improving lameness and pain scores, and in lowering NSAID requirement in canine elbow osteoarthritis patients.

Research Summary

A RANDOMIZED DOUBLE-BLINDED CONTROLLED TRIAL ON THE EFFECTS OF PHOTOBIOMODULATION THERAPY IN DOGS WITH OSTEOARTHRITIS

*Published: American Journal of Veterinary Research, Volume 83: Issue 8**

Authors: João C. Alves[1,2,] DVM, MSc, PhD; Ana Santos[1], DVM, MSc; Patrícia Jorge[1], DVM; L. Miguel Carreira[3,4,5,] DVM, PhD .

Objective

To evaluate photobiomodulation (PBM) therapy in dogs with bilateral moderate to severe hip osteoarthritis

Methods

Forty joints were assigned to a control group (CG, n=20) or treatment group (PBMT, n=20). CG received a 21-day course of meloxicam, and PBMT received treatment 14-20 J/cm^2 with a Class IV therapeutic laser over three weeks. Joint range of motion, thigh girth, the Canine Brief Pain Inventory (CBPI, divided into pain interference score - PIS and Pain Severity Score - PSS), Hudson Visual Analogue Scale (HVAS), Liverpool Osteoarthritis in Dogs (LOAD), Canine Orthopedic Index (COI, divided into function, gait, stiffness, and quality of life), and digital thermography evaluation of the hip joint were evaluated before treatment, +8, +15, +30, +60 and +90 days after initial treatment. Results were analyzed with repeated measures ANOVA or Wilcoxon signed ranks test, $p<0.05$. Kaplan-Meier estimators were compared with the Breslow test.

Results

Patients had a mean age of 8.3±1.9 years and bodyweight of 65.7±12.1lb. Osteoarthritis was classified as moderate (n=26) and severe (n=14). No differences were found at T0. Better results were observed in PBMT at +8d (p=0.01 for PSS, p=0.04 for function and COI), +15d (p=0.01 for PSS and function, p=0.02 for PIS and function, p=0.03 for COI and p=0.04 for LOAD) and +30d (p=0.01 for function and gait, p=0.02 for COI, and p=0.04 for PIS, PSS and LOAD). Joint range of motion improved in PBMT from +15d- to 90d. Lower values were recorded in both thermographic views of joints in the PBMT during the treatment period. Kaplan-Meier estimators showed that PBMT produced longer periods with better results.

Conclusion

PBMT reduced pain levels and improved clinical findings (including functional scores) in dogs with moderate to severe hip osteoarthritis. The mean number of days that joints in the PBMT group took to return to baseline values was significantly higher than in CG (meloxicam) and also showed improvements in joint ROM sometimes out to +90 days after discontinuing treatment.

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PLATELET-RICH PLASMA (PRP) THERAPY

ACTIVATING THE BODY'S OWN HEALING POWER

Regenerative medicine has recently become a hot topic in veterinary medicine because of its ability to act as an alternative to pharmaceuticals. PRP is derived from autologous blood, concentrated to increase platelet and growth factor content. Upon activation, platelets release bioactive proteins that promote angiogenesis, modulate inflammation, and stimulate tissue repair.

Platelet-rich plasma contains numerous growth factors that facilitate tissue healing and repair. Growth factors are small proteins contained within a platelet compartment called the alpha granule. When a platelet is exposed to an area of damage or alpha granules to release their growth factors. These growth factors play an important role in tissue repair by promoting new vessel formation, enhancing cellular proliferation, and promoting extracellular matrix formation.

Regenerative medicine can be a viable treatment option for patients for young patients with developmental orthopedic disorders that may lead to arthritis later on in life, who are poor surgical candidates or who have had less than ideal response to surgery, who have challenges coming in for maintenance treatments on chronic conditions such as arthritis, or who are trying to use conservative treatments to avoid surgery.

CLINICAL INDICATIONS:

- Osteoarthritis
- Ligament tears
- Tendon tears
- Muscle tears
- Pain and inflammation
- Wounds

The following studies demonstrate how PRP is used for common conditions in everyday veterinary practice.

Research Summary

A DOUBLE-BLINDED STUDY INVESTIGATING PLATELET-RICH PLASMA (PRP) IN DOGS WITH BILATERAL HIP OSTEOARTHRITIS (OA)

Authors: J. C. Alves, A. Santos & P. Jorge

A longitudinal, double blinded, negative controlled study, investigating the effect of Platelet-Rich Plasma (PRP) in police working dogs with bilateral hip osteoarthritis (OA).

In this double blinded clinical study, twenty dogs were randomly assigned to either a control group (CG, n = 10) or treatment group (PG, n = 10).

- The treated group received 2ml of PRP per hip joint, produced with the commercially available CRT PurePRP®Kit (Companion Regenerative Therapies, Newark, DE, USA) and the control group received 2 ml of 0.9% NaCl per hip joint.
- Four different CMIs (Canine Brief Pain Inventory: Pain Severity Score & Pain Interference Score; Liverpool Osteoarthritis in Dogs ; Hudson Visual Analog and Canine Orthopedic Index) were used to assess joint function at 8, 15, 30, 60, 90, 120, 150 and 180 days post initial treatment.
- The results of the study showed that the intra-articular inoculation of PRP could reduce pain and improve several functional scores of police working dogs with bilateral hip OA.
- The improvement in functional scores were observed in some cases lasting until the end of the study which lasted 6 months.
- PRP continues to gain increased interest to treat musculoskeletal conditions in companion animals because of the growth factors contained in platelets which contribute to tissue regeneration, reduce inflammation and promote cartilage synthesis or inhibition of its breakdown.
- OA is the most commonly diagnosed joint disease in companion animals and hip OA is commonly diagnosed in dogs, leading to reduced joint function and pain.
- For moderate to severe OA cases PRP is a valuable option and particularly to manage those cases where medication/treatment compliance or side effects are a concern.
- The study was conducted in extremely active police working dogs and pet dogs may experience longer-lasting PRP joint functional improvements compared to working dogs.

Conclusion

This study shows PRP reduced pain and improved joint function in police working dogs with bilateral hip osteoarthritis. Benefits appeared across multiple validated outcome measures and persisted for up to six months in several cases. Results support PRP as a practical option for moderate to severe OA, especially when long-term medication use raises concerns. Less active pet dogs may experience equal or longer-lasting functional improvements.

Research Summary

PLATELET-RICH PLASMA (PRP) FOR THE TREATMENT OF DEGENERATIVE LUMBOSACRAL STENOSIS: A STUDY WITH RETIRED WORKING DOGS

Published: Animals, 2021.

Author(s): A. M. Hernández-Guerra, J. M. Carillo, J. J. Sopena, J. M. Vilar, P. Peláez, B. Cuervo, and A. Santana, M. Rubio

Overview

The effectiveness of a series of epidural infiltrations of a PRP derivate for the treatment of degenerative lumbosacral stenosis in retired working dogs was evaluated in this study. 14 dogs were treated with 3 epidural injections of PRP on days 0, 15, and 45 and had a 90 day follow up period where clinical and force platform data were recorded. The results showed significantly improved clinical signs and gait improvement. PRP may provide a good alternative to other nonsurgical treatments such as prednisolone epidural injection.

Methods

14 working dogs diagnosed with Degenerative Lumbosacral Stenosis (DLS) were treated with 3 epidural injections of PRP on days 0, 15, and 45 and had a 90 day follow up period. The PRP solution had approximately 1.5 times the concentration of platelets in whole blood and an absence of leukocytes. Clinical assessment evaluating paresis of the pelvic limbs, lumbosacral pain, urinary incontinence, hindleg withdrawal reflex, and a proprioceptive deficit was performed on days 0, 15, 45, and 90. Force platform analysis evaluating peak vertical force was also performed on days 0 and 90 to objectively assess gait. Once peak vertical force data was obtained, the mean value was used to set a symmetry index between contralateral hindlimbs to standardize results.

The sample consisted of 4 Labrador retrievers, 2 Rottweilers, 3 German shepherds, and 5 mixed breeds. Males represented 71% of dogs (10/14), the mean age was 10 years (range 7-12), and the mean weight was 29.12kg (range 25-36). All were retired working dogs.

Results

All dogs showed clinical improvement 3 months after the initial treatment. Force plate analysis showed the gait to be more symmetric after treatment.

Conclusion

Epidural injection of PRP in working dogs with DLS with no or mild neurological deficits has proven to be subjectively and objectively effective, thus could be considered an additional therapeutic strategy in dogs suffering from this condition.

Research Summary

THE USE OF PLATELET RICH PLASMA IN THE TREATMENT OF DEGENERATIVE JOINT DISEASE IN CATS: AN EXPLORATORY CASE SERIES

Authors: Janice Huntingford[1] Andrea Looney[2] James Johnson[3] Lisa Miller[3]

Objective

To evaluate the effectiveness of intra-articular autologous Platelet Rich Plasma (PRP) in managing Degenerative Joint Disease (DJD) in cats

Design

Prospective pilot clinical trial

Methods

Six domestic cats with clinically and radiographically diagnosed DJD received intra-articular injections of autologous PRP. Clinical assessments pre and post intra-articular injections were conducted using the Feline Musculoskeletal Pain Index (FMPI, owner assessed) and Visual Analog Scale (VAS, clinician assessed) at baseline, Day 14, Day 28, and Day 42–45

Results

Significant improvements were noted in both FMPI and VAS scores at the end of the study period, indicating enhanced joint function and reduced pain.

Conclusion

The study indicates the potential of PRP therapy as a safe and effective treatment for feline DJD, warranting further research with larger cohorts and longer follow-up to establish comprehensive treatment guidelines.

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Research Summary

THE POWER OF COMBINATION THERAPY: WHEN 1+1 EQUALS MORE THAN 2

New research suggests that outcomes are amplified when PBMT and PRP are used as a combination treatment. Read the research summary below to see how osteoarthritis outcomes were improved when PBMT and PRP were used together.

A Preliminary Report on the Combined Effect of Intra-Articular Platelet-Rich Plasma Injections and Photobiomodulation in Canine Osteoarthritis

- The purpose of this pilot study was to evaluate the combined treatment of intra-articular platelet-rich plasma (PRP) and photobiomodulation (PBM) in dogs with bilateral hip osteoarthritis (OA).
- 30 dogs were assigned to a PRP group (PRPG, n = 10), a photobiomodulation group (PBMTG, n =10), or a combined therapies group (PRP+PBMTG, n = 10)
- Both dog handlers and researchers performing outcome evaluations were blinded as to which treatment group(s) the dogs were assigned to
- The PRPG received two intra-articular administrations of platelet-rich plasma 14 days apart. The PBMTG received photobiomodulation with a therapeutic laser, with three sessions every other day in week one; two sessions in week two; a single session in week three; and one session/ month on follow-up evaluation days. The PRP+PBMTG received the two combined therapies.
- When PBM was used (alone or in combination), it was used at the recommended dosage/ protocol (10-20J/cm^2) without changes in treatment power (W)
- The response to treatment was evaluated with weight-bearing distribution (Stance analysis) and three different validated clinical metrology instruments (CBPO, LOAD, and COI). Evaluations were conducted before treatment and throughout the first 90 days after initial treatment.
- All treatments produced clinically significant improvements in all outcome measures. However, the combination of PRP and photobiomodulation produced greater, longer-lasting improvements.
- Previous PBM-only studies have demonstrated beneficial effects during treatment but these effects tended to wean out after treatment was discontinued. This study shows that a continued PBMT protocol (reflecting “real world conditions”) can improve clinical signs and objective outcome parameters in dogs with hip OA, with long-lasting effects. In fact, pain severity scores showed a continuous improvement over time.

Conclusion

PRP and photobiomodulation can improve objective outcomes and client-reported outcome measures in dogs with OA. Their combined use leads to greater, longer-lasting, clinically significant improvements at least during the first 90 days. Further long-term studies are ongoing.

MULTIMODAL PAIN MANAGEMENT

Pain is multifactorial—neuropathic, inflammatory, and mechanical components often overlap. No single drug or therapy can address all of these pathways. A multimodal approach combines pharmacologic treatments with physical, regenerative, and environmental interventions to improve comfort, mobility, and recovery.

Laser therapy (photobiomodulation, PBMT) and platelet-rich plasma (PRP) complement traditional analgesics by targeting different mechanisms of pain and healing. **Both modalities can be safely integrated with pharmaceuticals to deliver more complete, long-term pain relief.**

According to the 2022 AAHA Pain Management Guidelines, non-pharmacologic modalities such as PBMT should be incorporated into multimodal pain protocols for both acute and chronic pain. PBMT offers local anti-inflammatory and neuromodulatory benefits that can reduce reliance on systemic medications.

AAHA also identifies intra-articular biologics such as PRP as appropriate options when first-line therapies are insufficient for chronic or localized joint and soft-tissue pain. PRP can be especially valuable when systemic drugs are contraindicated or poorly tolerated.

Similarly, **the WSAVA Global Pain Council recognizes regenerative medicine, including PRP, as an emerging component of multimodal pain management, emphasizing that combining biologic and pharmacologic therapies enhances outcomes and patient quality of life.**

In short, multimodal pain management allows practitioners to address multiple pain pathways simultaneously—reducing side effects, improving efficacy, and giving each patient the best chance at lasting comfort and function.

TAKE THE NEXT STEP FORWARD IN EXPLORING THE NEW FRONTIER IN DRUG-FREE VETERINARY PAIN MANAGEMENT

Laser therapy (photobiomodulation therapy, PBMT) and platelet-rich plasma (PRP) represent the next generation of veterinary pain management. Supported by AAHA and WSAVA guidelines, both modalities can be safely combined with pharmaceuticals and rehabilitation strategies to form a multimodal care plan that targets pain, inflammation, and tissue repair from multiple angles.

Unlike purely symptomatic treatments, PBMT and PRP address pain at its source, modulating inflammation, repairing damaged tissue, and restoring normal function rather than simply masking discomfort. PBMT enhances cellular energy and circulation to accelerate healing, while PRP delivers autologous growth factors that promote regeneration and reduce chronic inflammation.

This targeted, drug-free approach is especially valuable for senior patients, those with systemic disease, or animals that are not good surgical candidates, offering a means to relieve pain and support recovery without the side effects or risks associated with long-term pharmaceutical use. Together, PBMT and PRP provide veterinarians with a safer, more sustainable path to true functional recovery—helping patients regain mobility, comfort, and quality of life.

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