FLOWER POWER Curcumin, 1 of the 3 most frequently used herbal compounds in veterinary settings, is derived from the turmeric plant (right).

INTEGRATIVE MEDICINE

Herbal Therapies for Osteoarthritis

***Gary Richter**, MS, DVM*
Holistic Veterinary Care, Oakland, Calif.

One of the most common reasons that clients bring their middle-aged and older pets to the veterinarian is osteoarthritis. Common complaints voiced by clients on behalf of their dog or cat are pain, lameness, and exercise intolerance. Clients frequently assume that their older pet is "just slowing down" and interpret this as a normal function of aging; however, for many pets, the change in activity is avoidance of pain resulting from osteoarthritis.

For most veterinarians, the first line of treatment for osteoarthritis consists of nonsteroidal anti-inflammatory drugs (NSAIDs). For years, NSAIDs such as meloxicam, carprofen, and others have been used to help control osteoarthritis pain in dogs. However, although these drugs are often effective, they have the potential to cause hepatic, renal, and/or gastrointestinal complications in dogs, and long-term NSAID use in cats is not an option in the United States. Gabapentin and tramadol are commonly used as adjuncts or alternatives to NSAIDs. The question that we, as veterinary professionals, should consider is: when we consider safety and efficacy, are these medications the best, or only, options for the treatment of osteoarthritis? This article describes another option, herbal therapies.

HERBAL THERAPIES

For centuries, herbal therapies have been used to treat osteoarthritis and other types of pain.[1] Herbs and herbal extracts can be highly effective for relieving pain and inflammation; their mechanisms are frequently similar to those of pharmaceuticals but without many of the potential negative side effects. Although integrative medical practitioners and herbalists have commonly used dozens, if not hundreds, of natural compounds to treat osteoarthritis, a smaller number of compounds are supported by medical research detailing efficacy, mechanisms of action, and safety profiles in animals. Most veterinary research has been conducted with dogs. Data for cats are largely lacking; however, the clinical experience of veterinary herbalists indicates that herbal therapy is generally safe and effective for cats. Of the more well-studied herbal compounds, the 3 most frequently used in veterinary settings are curcumin, boswellia, and cannabis.

Curcumin

Curcuma longa, more commonly referred to as turmeric, is a flowering plant in the ginger family and is native to Southeast Asia and the Indian subcontinent. A common ingredient in Indian cooking, turmeric has been used for thousands of years as a remedy in Ayurvedic (traditional Indian) medicine. The

orange-yellow color of turmeric originates from its main active component, curcumin.

Turmeric root contains more than 235 active ingredients, including curcuminoids and essential oils. These compounds have the potential to benefit animals with osteoarthritis in a variety of ways, including reduction of inflammation, cartilage damage, and bone destruction. Clinical trials have shown that extracts of turmeric reduce pain and increase range of motion in arthritic dogs as well as in other animals.[2-4] As with many natural compounds, research findings regarding the benefits of turmeric/curcumin are not consistent; some reports maintain that these compounds lack efficacy for treatment of osteoarthritis.[5] Despite conflicting research data, the clinical impression of many veterinarians and clients is that products containing various extracts of turmeric do provide benefits for arthritic animals.

Some of the reported inconsistencies regarding the benefits of curcumin may have to do with absorption. Curcumin is a lipophilic molecule that is poorly absorbed when ingested in its natural form. In traditional Indian cooking and Ayurvedic medicine, turmeric is frequently combined with a fat, which increases bioavailability. The modern solution to this challenge has been to improve absorption through processes such as liposomal encapsulation. A variety of products in the veterinary market offer bioavailable curcumin formulations, and dosing is highly variable and dependent on the form in which it is being administered. Whole ground turmeric root, which contains approximately 60 mg curcumin per gram, can be dosed at the wide range of 50 to 600 mg/kg PO q8h.[6,7] More bioavailable forms enable dosing at 3 to 5 mg/kg PO q12h. To ensure the best chance of efficacy, veterinarians without experience using turmeric are advised to start with veterinary-specific products and follow the labeled dosing instructions. Curcumin is considered safe; side effects or toxicities are rare but may include gastrointestinal upset or allergic dermatitis.

Boswellia

Another herb commonly used for treatment of osteoarthritis is *Boswellia serrata*, or, as it is traditionally referred to, Indian frankincense. The resin collected from this tree, which is native to India, has also been used in Ayurvedic medicine for centuries. The primary constituents are boswellic acids, although other bioactive compounds such as volatile oils and β-sitosterol are contained within the resin. Boswellic acids exert their anti-inflammatory effect by inhibiting leukotriene synthesis. Six forms of boswellic acids are found in *B. serrata*, although one, acetyl-keto-beta-boswellic acid (AKBA), is the most active with regard to effects on osteoarthritis pain. AKBA has been shown to inhibit 5-lipoxygenase, nuclear factor kappa-light-chain enhancer of activated B cells (NF-κB), and matrix metalloproteinase-3 (MMP-3), which leads to improved joint mobility and comfort.[8,9]

Clinical research with boswellia in dogs supports the preclinical data. In a 2004 study, *Boswellia* resin extract was given to dogs with osteoarthritis at 40 mg/kg q24h for 6 weeks. Dogs were monitored for several parameters including intermittent lameness, local pain, stiff gait, lameness when moving, and lameness after a long rest. All parameters showed statistically significant improvement at the end of the trial.[10] Boswellia is readily available as an over-the-counter supplement and in numerous veterinary-specific formulations. Side effects, although uncommon, may include gastrointestinal upset.

Cannabis

No natural compound has received more attention in recent years than *Cannabis sativa*. With recent and ongoing changes to both state and federal laws pertaining to industrial hemp and, more broadly speaking, cannabis, medical professionals and pet owners alike are exploring the potential uses of medicinal cannabis for animals.

ANCIENT MEDICINE
Resin collected from a *Boswellia serrata* (Indian frankincense) tree.

HOT BUTTON TOPIC
A cannabis plant is legally described as hemp or marijuana based on its THC content.

In discussion of the use of cannabis as medicine, the terminology must be consistent and accurate. The terms "CBD," "hemp," and "cannabis" are not synonymous. CBD, or cannabidiol, is one of many bioactive components produced by the cannabis plant. The term "CBD" cannot be used interchangeably with "hemp" or "cannabis" because full-spectrum extracts contain hundreds of bioactive compounds including other cannabinoids, terpenes, and flavonoids. Legally, the term "hemp" is used to describe a cannabis plant that naturally produces less than 0.3% Δ-9-tetrahydrocannabinol (THC). By comparison, the term "cannabis" more accurately describes all *Cannabis* species, regardless of THC content, and plants producing greater than 0.3% THC are legally described as "marijuana."

A handful of cannabis medications have been approved by the U.S. Food and Drug Administration (FDA) for use in humans. Cannabidiol (Epidiolex; Greenwich Biosciences, epidiolex.com), a hemp-based CBD product, is approved to treat specific forms of refractory epilepsy in children. Dronabinol (Syndros; Benuvia Therapeutics, syndros.com) and nabilone (Cesamet; Mylan Pharmaceuticals, mylan.com) are FDA-approved synthetic forms of THC prescribed for nausea and vomiting associated with chemotherapy. Although these products do not currently have application in veterinary medicine, they potentially represent a first step toward broader availability of cannabinoid medicines for animals.

Although the debate continues regarding the technical legality of hemp-based cannabis products for animals, these products are widely available over the counter. In addition, many states now have cannabis laws that make products with higher levels of THC available, and some of these products are marketed specifically for animals. THC can be used safely and effectively in dogs and cats; however, its use necessitates veterinary supervision to ensure precise dosing and monitoring to prevent intoxication.

Whether legally described as hemp or marijuana, the constituents in cannabis can have positive effects on both inflammatory and neurogenic pain through a variety of mechanisms. Cannabinoids such as CBD and THC affect pain directly via endocannabinoid receptors; they are also allosteric modulators of μ-opioid receptors, interact with TRPV1 (capsaicin receptor and vanilloid receptor 1), and show cyclooxygenase (COX) inhibition activity. Thus, cannabis has the potential to effectively treat pain arising from various sources, including osteoarthritis.[11,12]

Recent changes in federal law have allowed clinical trials to use hemp-based CBD formulas, and studies evaluating CBD pharmacokinetics and efficacy for treatment of osteoarthritis and seizures have been published. CBD-rich extracts at doses of 2 mg/kg PO q12h were shown to be effective, with minimal side effects, for treatment of osteoarthritis in dogs.[13] Lower effective doses have been described by clinicians whose clients use hemp extracts to treat osteoarthritis in their dogs.

Due to federal prohibitions, very little research has been conducted with regard to clinical applications of THC in veterinary medicine. However, preclinical and human studies do support the use of products containing THC for treatment of arthritis.[14] In addition, a broad base of anecdotal reports from pet owners as well as clinical experience from veterinarians suggest that THC has positive effects for painful animals. Definitive clinical veterinary research, however, will be some time in coming.

The legal landscape pertaining to veterinarians recommending or selling hemp-based cannabis products varies from state to state. Some states allow veterinarians to stock and sell hemp-based products, while other states forbid the practice. Similarly, in states with medical marijuana laws, veterinarians' ability to discuss and/or recommend cannabis is frequently governed by their veterinary medical board. Clinicians

should consult with their state board to ensure that they are practicing in accordance with regulations.

INTEGRATIVE APPROACHES

The most successful approaches to osteoarthritis treatment, and many other medical challenges faced in veterinary medicine, involve integrative therapy. Conventional treatment for osteoarthritis frequently uses multiple pharmaceuticals such as NSAIDs, gabapentin, and/or tramadol. Similarly, the use of herbal therapy for osteoarthritis in animals is rarely accomplished with a single herb. Herbal compounds such as curcumin, boswellia, and many others are frequently produced as combination products. Cannabis, although generally not sold in combination with other herbs, is often used successfully in concert with herbs and pharmaceuticals. The benefits of using a variety of herbal compounds stem from varied mechanisms of action leading to a synergistic effect. Because the appropriate use of herbs for animals is very safe, combining multiple herbs and, if needed, pharmaceuticals, often improves outcomes. Although herbs and herb–drug combinations are generally safe, pet owners considering herbal therapy for their pet should do so under veterinary supervision to monitor for unanticipated negative effects.

Proactive therapy beginning before—or at the earliest sign of—soreness, lameness, or muscle loss is vital to success; multiple modalities can be incorporated into an osteoarthritis treatment protocol. Beyond herbal therapy and pharmaceuticals, patients frequently benefit from modalities such as acupuncture, chiropractic therapy, physical rehabilitation, injectable polysulfated glycosaminoglycans, pulsating electromagnetic field therapy, cold laser therapy, stem cell therapy, and platelet-rich plasma therapy. Because no patients receive all of the above therapies, it is up to the veterinary professional to use judgment to create a treatment plan with the greatest likelihood of success and the least likelihood of side effects.

As the quality of veterinary care improves, animals live longer, thereby increasing the need for treatments for degenerative and geriatric conditions. Taking a proactive, integrative approach to osteoarthritis management is a successful way to maintain quality of life for patients. Our role as veterinary professionals is to educate clients and provide the most effective care possible. Given the relatively limited pharmaceutical treatment options for our patients with osteoarthritis, herbal therapies such as curcumin, boswellia, and cannabis, as well as other nonpharmaceutical options, are viable alternatives worthy of consideration. TVP

References

1. Mobasheri A. Intersection of inflammation and herbal medicine in the treatment of osteoarthritis. *Curr Rheumatol Rep* 2012;14(6):604–616.
2. Chand N. Standardized turmeric and curcumin. In: Gupta RC, Srivastava A, Lall R, eds. *Nutraceuticals in Veterinary Medicine.* New York City: Springer; 2019:10-12.
3. Innes JF, Fuller CJ, Grover ER, et al. Randomised, double-blind, placebo controlled parallel group study of P54FP for the treatment of dogs with osteoarthritis. *Vet Rec* 2003;152(15):457-460.
4. Zhang Z, Leong DJ, Xu L, et al. Curcumin slows osteoarthritis progression and relieves osteoarthritis-associated pain symptoms in a post-traumatic osteoarthritis mouse model. *Arthritis Res Ther* 2016;18(1):128.
5. Nelson KM, Dahlin JL, Bisson J, et al. The essential medicinal chemistry of curcumin. *J Med Chem* 2017;60(5):1620–1637.
6. Spiridakis N. How much curcumin is there in powdered turmeric? livestrong.com/article/543411-how-much-curcumin-is-there-in-powdered-turmeric. Accessed August 2020.
7. Wynn SG, Fougère B. Veterinary clinical uses of medicinal plants. In: Wynn SG, Fougère B, eds. *Veterinary Herbal Medicine*. St. Louis, MO: Mosby Elsevier; 2007:652-654.
8. Siddiqui MZ. *Boswellia serrata*, a potential antiinflammatory agent: an overview. *Indian J Pharm Sci* 2011;73(3):255–261.
9. Gupta R, Doss R, Lall R, et al. Nutraceuticals in arthritis. In: Gupta RC, Srivastava A, Lall R, eds. *Nutraceuticals in Veterinary Medicine.* New York City: Springer; 2019:374.
10. Reichling J, Schmökel H, Fitzi J, et al. Dietary support with *Boswellia* resin in canine inflammatory joint and spinal disease. *Schweizer Archiv Für Tierheilkunde* 2004;146(2): 71-79.
11. Muller C, Morales P, Reggio PH. Cannabinoid ligands targeting TRP channels. *Front Mol Neurosci* 2019;11:487.
12. Ruhaak LR, Felth J, Karlsson PC, et al. Evaluation of the cyclooxygenase inhibiting effects of six major cannabinoids isolated from *Cannabis sativa*. *Biol Pharm Bull* 2011;34(5):774-778.
13. Gamble L, Boesch JM, Frye CW, et al. Pharmacokinetics, safety, and clinical efficacy of cannabidiol treatment in osteoarthritic dogs. *Front Vet Sci* 2018;5;165.
14. Lynch ME, Campbell F. Cannabinoids for treatment of chronic non-cancer pain; a systematic review of randomized trials. *Br J Clin Pharmacol* 2011;72(5):735–744.

Gary Richter

Dr. Richter is a graduate of the University of Florida College of Veterinary Medicine and is certified in acupuncture, chiropractic, and Western herbology. His book on integrative medicine, *The Ultimate Pet Health Guide*, was released in 2017. In addition to full-time practice, Dr. Richter is a vocal advocate for the safe use of medical cannabis for animals. He is also the current president of the American College of Veterinary Botanical Medicine and co-president and a founding member of the Veterinary Cannabis Society, a nonprofit society dedicated to education and advocacy in support of the use of medical cannabis in veterinary patients.