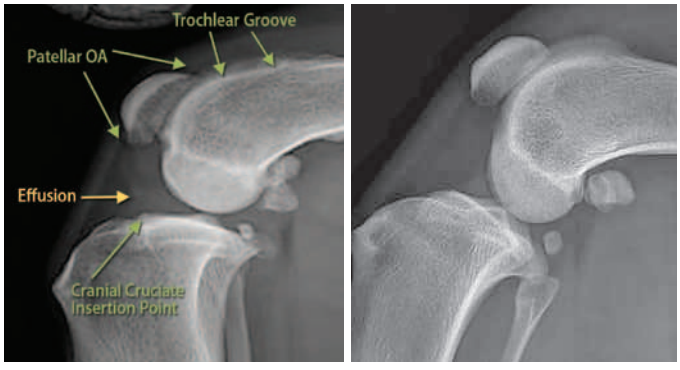
Management of Osteoarthritis in Performance Dogs

By Peter J. Lotsikas, DVM, Diplomate ACVS

The stage is set. Your seasoned 10-year-old dog has nearly qualified for the ASCA Finals. No worries, it is the middle of the season, and you have four months to accomplish this goal. That is, until your dog comes up lame. Maybe it is just a sprain or a pulled muscle? No, much worse—your dog has developed a cruciate tear. Now you are no longer worried about the finals, but whether or not this is a career-ending injury. Even if your dog gets back to competition level, what consequences will the injury have? Arthritis?

These are the questions that went through Sally's mind when she brought Dia to see me this past May. Sally has three Aussies, but Dia is clearly her fiercest competitor when it comes to agility. We discussed retirement, knee braces, surgery, and the recovery. Neither Sally nor Dia were ready for the leisure life. Ultimately I performed a TPLO surgery to stabilize Dia's right stifle. Dia recovered well with lots of hard work and rehabilitation therapy, and won her qualifying PSJ by 2 seconds 14 weeks after surgery. She went on to compete and place 10th in her class at the ASCA Agility Finals. Not bad for a dog we debated about retiring!

Now our focus has changed from not if we can get her back to competition, but how to maintain her there. The "X" factor, of course, is arthritis. Dia had mild to moderate degenerative joint changes in the right stifle at the time of surgery. While her muscle mass is symmetric and she is running well, photographs reveal a different story. She slightly favors the right leg on take-off over jumps. In addition, mild muscle tremors are noted after heavy exercise. Subtle but important, clues to the underlying condition in her stifle, osteoarthritis.



Here are two x-rays, one of Dia's stifle (left) and one of a normal stifle (right). In Dia's stifle, the green arrows indicate the typical areas where OA will develop—along the trochlear groove, at the top and bottom of the patella, and at the insertion point of the cranial cruciate ligament. The rupture of Dia's cranial cruciate ligament resulted in degradative byproducts, thus the presence of inflammation and radiographic evidence of effusion (see yellow arrow).

What Is **Osteoarthritis?**

Dia's story is not unique. In fact, osteoarthritis (OA) affects nearly one out of five dogs over one year of age in the U.S. (Johnston SA, 1997). OA develops as the result of joint instability, direct or indirect damage to the joint surface, or from faulty bone and cartilage development. Dogs that are elderly, obese, or that have had a long athletic career are more likely to suffer from OA.

In all animals, the ends of bones are capped with a hard but slippery tissue called articular cartilage. This material protects the bone ends by absorbing shock and reducing friction between bones during movement. Cartilage derives its nutrition from fluid within the joint, called synovial fluid. The normal structure and function of articular cartilage can be upset relatively easily. However, the body is designed to repair itself, and why the body's repair mechanisms fail and OA develops is still incompletely understood.

Osteoarthritis is defined as the breakdown and eventual loss of cartilage within a joint. Once the cartilage starts to wear away, the underlying bone becomes exposed, causing painful rubbing of bone against bone. With enough loss of cartilage, the joint collapses on itself, resulting in loss of normal joint shape and joint instability. The body's response to loss of cartilage and joint laxity is thickening of supporting structures, and production of bone spurs along the edges of the joint. These pieces of bone or cartilage can break off and float around inside the joint space. The effect is like having a pebble in your shoe, though substantially more painful. The result is a vicious cycle of pain and inflammation, ultimately reducing the ability of that joint to fully flex and extend.

The early stages of osteoarthritis are often subtle and can manifest as limping, sensitivity to touch in certain areas, stiffness (especially after rest), and difficulty doing normal day-to-day tasks (rising, lying down, or climbing stairs). In performance dogs, it may be more understated, showing up only as a slower course time or dropping a bar. These signs are often attributed to old age in dogs, but age in itself is not a disease. While there have been no studies looking at the prevalence of OA specifically in performance dogs, one would expect an increased incidence in agility dogs due to a lifetime of training and competing over varying terrain.

X-rays are the most readily available and inexpensive method of confirming the presence of OA. Unfortunately, by the time degenerative changes are noted on x-rays, it is nearly impossible to reverse the changes that have already occurred and it is extremely difficult to halt the progression of disease. An earlier diagnosis can be obtained by retrieving fluid from within the joint via a needle (arthrocentesis) and examining that fluid under a microscope to help determine if inflammation is present. This procedure is quick and easy to perform under moderate sedation.

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Options for **Managing OA**

As a veterinary orthopedic surgeon, I am often asked about the best way to prevent and to treat osteoarthritis. While most dog owners are familiar with non-steroidal anti-inflammatory drugs (NSAIDs), many are unaware of the alternative options for medically managing OA. Many of these treatments have few side effects and can significantly reduce the pain and dysfunction of OA. A vast array of alternatives are available and those alternatives have just as many opinions about their potential benefits.

NSAIDs

Nonsteroidal anti-inflammatory drugs are commonly used for the treatment of OA. Examples of these drugs include Deramaxx, Etogesic, Metacam, Previcox, Rimadyl, and Zubrin. These drugs are excellent at managing the discomfort associated with OA. In general, NSAIDs are safe if used and monitored properly. Unfortunately, all of these drugs have the potential to produce undesirable side effects, including gastrointestinal, liver, and kidney damage. In addition, the main function they serve is to reduce inflammation and pain (cartilage degradation), but these drugs do little to promote cartilage health (cartilage formation). So in our practice, we often recommend using NSAIDs to offset the trauma of competition by using them the day before and the day following a trial. If long-term administration is necessary, we titrate the drug to the lowest dose possible that relieves clinical signs. We recommend a 48-hour wash-out period between the use of similar drugs within the NSAID family and recommend routine laboratory work be performed every 4-6 months with extended use.

Glucosamine/Chondroitin

Glucosamine and chondroitin are some of the most widely used products on the market. They both are building blocks of the normal cartilage matrix. When given in combination, glucosamine and chondroitin sulfate reportedly support cartilage production and protect existing cartilage by inhibiting enzymes in the joints that break down cartilage. Results of several studies support that their combination has a significant anti-inflammatory effect against laboratory-induced and naturally occurring joint inflammation. Glucosamine and chondroitin products are naturally occurring compounds, are safe to use, and have few side effects (most commonly gastrointestinal upset). However, because these compounds are dietary supplements, label claims are not federally regulated. Purity is dependent on the manufacturer and can vary among brands. Choosing the right supplement can be difficult.

When looking for a glucosamine supplement, several things should be considered.

- One is the formulation of glucosamine as a hydrochloride (HCL) versus a sulfate preparation. Both are well absorbed by the gastrointestinal system. However, glucosamine HCL is preferred, because it is a more stable compound and does not require additives. Therefore, glucosamine HCL is 99% pure, as compared to the approximate 80% purity of a sulfate combination. Thus, you need to administer less to your dog to get the same benefit, saving money.
- Another consideration when selecting a glucosamine-chondroitin product is brand reliability. For my clients, I often recommend products from a local company (Nutramax Laboratories in Edgewater, Maryland) because I am familiar with their products (Cosequin and Dasuquin). Nutramax has a strong in-house research and development team, and independent studies support their products' safety and efficacy. For brands that I am less familiar with, I recommend owners investigate the product on their own through internet review sites. One site that I find helpful is www.ConsumerLabs.com, where independent studies are reviewed for canine and human supplements. This is a subscription website.

More recently, glucosamine-chondroitin sulfate products are being combined with additional anti-inflammatory agents. Nutramax laboratories newest product Dasuquin is similar to its widely used product Cosequin, but has the added benefit of avocado soybean unsaponifiables (ASU) and green tea polyphenols. These ingredients are reported to work in combination with glucosamine and chondroitin sulfate to lower the expression of inflammatory mediators. Methylsulonylmethane (MSM) is another natural-occurring anti-inflammatory that is being added to supplements. These ingredients are thought to enhance the effectiveness of glucosamine-chondroitin and provide additional pain relief.

Essential Fatty Acids

Fatty acids are found in many types of food and can be categorized as omega-6 or omega-3. While omega-6 fatty acids are not "bad," they should be consumed in moderation, as excessive amounts of omega-6 fatty acids or a high omega-6/omega-3 ratio is thought to promote the development of many diseases, including cardiovascular disease, cancer, inflammatory, and autoimmune diseases. On the other hand, increased levels of omega-3 fatty acids (a low omega-6/omega-3 ratio) exert suppressive effects on the development of these conditions. The perfect ratio of omega-6 to omega-3 fatty acids has yet to be determined, but is thought to be around 3-4:1 in the dog. Essential fatty acids (EFAs) are specific omega-3 fatty acids (docosahexaenoic acid, or DHA, and eicosapentaenoic acid, or EPA) found in fatty fish. Fish do not actually produce omega-3 fatty acids, but instead accumulate them from either consuming microalgae or other fish that have consumed microalgae. The concentration of EFAs is therefore highest in predatory fish like salmon, tuna, and cod. Essential fatty acids act by replacing harmful arachidonic acid in the cell wall, thereby reducing inflammation. They may also block the expression of certain genes that perpetuate the development of osteoarthritis. Foods supplemented with omega-3 fatty acids are available. You can also buy EFAs in capsule and liquid form to add to your dog's regular diet.

Green-lipped Mussel

Shellfish supplements have been used as a traditional remedy for arthritis in humans. The New Zealand green-lipped mussel (GLM), in particular, has been shown to have beneficial effects for treatment of chronic mild to moderate osteoarthritis. GLM contains a unique omega-3 fatty acid, which is thought to reduce inflammation by blocking two important inflammatory pathways.

Heat processing of GLM has been shown to destroy its activity. Therefore, the processing of whole GLM and incorporation of the GLM product into food products is difficult. It is most readily available as a freeze-dried powder or incorporated into a capsule. There is relatively strong data that daily doses of GLM are effective at reducing total arthritic scores and scores for joint pain and joint swelling after 6-8 weeks of administration. I typically will try GLM in patients that show minimal to no improvement on glucosamine/chondroitin. The brand I recommend is Glycoflex, because it combines the benefit of GLM with glucosamine and chondroitin.

Adequan

Adequan is an injectable polysulfated glycosaminoglycan (PSGAG) available for use in dogs. Adequan Canine is the only FDA-approved product of its type in the arthritis treatment market. Polysulfated glycosaminoglycan is made from an extract from the lung and trachea of cows. The principle component present in PSGAG is chondroitin sulfate. Adequan stimulates cartilage repair processes, binds to damaged cartilage, and suppresses the enzymes that deteriorate joints. Adequan has been evaluated as an effective treatment of OA in adult dogs with no local or systemic adverse reactions related to the drug observed. I often use Adequan in conjunction with oral supplements during periods of heavy activity.

Hyaluronic Acid

Another option for the treatment of OA is an injectable medication called hyaluronic acid (HA). HA has been widely used as an injection directly into the affected joint space for the treatment of OA in animals and humans. Hyaluronan is secreted by cartilage cells and is one of the major molecular components of joint fluid, contributing to its viscous, slippery quality. Injectable HA is considered to be a synthetic joint lubricant, and protects the joint in a manner similar to how motor oil protects the moving parts of an engine. Other possible mechanisms by which HA may act therapeutically include controlling the leakiness of the joint membrane, scavenging free radicals, and renewal of the cartilage in the joint by promotion of cartilage matrix synthesis. To date, there is limited information provided by literature regarding the use of intra-articular HA for the treatment of OA in dogs. In our practice, we use HA injections to treat mild OA, or in patients that do not have x-ray evidence of arthritis or disease but demonstrate low-grade lameness associated with heavy exercise. This often allows the patient to return to competition level.

HA is also available in an oral form. Unfortunately, there are no studies supporting the efficacy of HA in an oral form. At this time, due to the lack of data on oral HA, it is not recommended for use as an oral joint protective supplement.

Corticosteroids

The use of intra-articular steroids has been looked down upon in the veterinary community for many years. In fact, it is difficult to find a published dose for intra-articular use in dogs. Steroids are extremely effective at reducing inflammation by inhibiting major inflammatory mediators and may also have a protective effect on the cartilage matrix by reducing degradative enzymes. However, there is concern that long-term use may depress normal cartilage cell metabolism, composition, and repair. Systemic side effects typically seen with oral administration of steroids (increased water and food consumption, increased urination, agitation, weight gain) are minimal with intra-articular use. In our practice, we generally reserve intra-articular administration of steroids for severe cases of osteoarthritis that are unresponsive to other methods of treatment. We do not recommend oral administration of steroids for the treatment of non-immune mediated osteoarthritis.

Stem Cell Therapy

Intra-articular use of stem cells is a hot topic in veterinary medicine previously discussed in *CR* November 2008. Stem cells are isolated or cultured from fat collected from the patient and injected directly into the affected joints. While a direct understanding of how stem cells work in patients with chronic arthritis is not available at this time, preliminary research suggests relief of clinical signs is primarily derived through anti-inflammatory and immunomodulatory effects. Preliminary data on the use of stem cells for chronic OA is promising, but long-term clinical trials are needed.

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So, Which Product **Should I Choose?**

This article is an abbreviated introduction to the medical management of joint health. What was once perceived as holistic and novel has now become mainstream in the treatment and prevention of OA. Although many products are available, not all products are effective in all patients. Until randomized, double-blind, placebo-based studies are independently performed on a large number of patients, there will still be more questions than answers with regard to the best treatment of OA.

Currently, Dia is on an oral glucosamine supplement (Dasuquin), and uses Metacam as needed before and after trials. Equally important to the medication/supplementation is the change in Dia's exercise plan. Dia does more strength training now with less course work, and receives maintenance rehabilitation therapy. In addition, we have altered her warm-up and cool down periods to help prevent muscle injury and preserve joint range of motion.

As in Dia's case, supplementation should be part of a balanced plan of weight control, exercise, and NSAIDS when needed. I would recommend consulting with your primary veterinarian before starting your dog on a supplement. Your vet may offer additional insight and experience to help you choose the right supplement for your dog's specific needs.

Dr. Peter Lotsikas is a Diplomate of the American College of Veterinary Surgeons. He graduated with a BS degree in Biology from Virginia Tech and a DVM degree from the Virginia-Maryland Regional College of Veterinary Medicine. He then completed a general small animal internship at Kansas State University, followed by a surgical internship at Dallas Veterinary Surgical Center. Dr. Lotsikas received his formal surgical residency training at Iowa State University. He now practices at the Veterinary Orthopedic & Sports Medicine Group (VOSM) in Annapolis Junction, Maryland. Additional information about Dr. Lotsikas is available at www.VOSM.com

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