



## Osteoarthritis with Dr. Duncan Lascelles, PhD

The following interview was originally released by the AKC Canine Health Foundation as a podcast. If you prefer to listen to the interview, the podcast is available at: [www.akcchf.org/news-events/multimedia/podcasts/osteoarthritis](http://www.akcchf.org/news-events/multimedia/podcasts/osteoarthritis).

In this interview, Dr. Duncan Lascelles, an expert in clinical pain management and general and orthopedic surgery at North Carolina State University College of Veterinary Medicine discusses canine osteoarthritis.

**AKC Canine Health Foundation (CHF):** Can you tell us what osteoarthritis is and what causes this disease?

**Dr. Duncan Lascelles (Lascelles):** Osteoarthritis is a term we use to describe the progressive destruction of various components of synovial joints. That is the mobile joints between bones. The destruction of the tissues involves deterioration of the cartilage, the subchondral bone, the synovial membrane—that is the lining on the inside of the joint—and also the capsule that surrounds the joint.

This destruction is associated with pain at some point, and that could either be early on in the disease process or later on. In fact, that pain can become a disease in its own right. So there are changes, both within the joint and within the sensory system, within the central nervous system, that can result in pain being almost a disease in its own right.

**CHF:** How many dogs are affected by osteoarthritis? Is it a common problem?

**Lascelles:** It is a very common problem. It is thought that at any one time, 20-30% of all dogs show signs of clinical osteoarthritis, which means that there is pain associated with their osteoarthritis. So firstly they have osteoarthritis, secondly pain is associated with the osteoarthritis, and thirdly that pain is altering their ability to perform certain activities.

So when we think of the number of dogs that are in the U.S., this converts to millions and millions of dogs with painful osteoarthritis.

**CHF:** What are some of the clinical symptoms of osteoarthritis?

**Lascelles:** Because osteoarthritis can be associated with pain, this joint pain results in decreased mobility of individuals and also a decreased ability of these individual dogs to perform their normal, everyday activities.



**CHF:** Do you think osteoarthritis affects the dog's quality of life?

**Lascelles:** I think it does. If we define quality of life as being able to engage in and enjoy normal, everyday activities, then absolutely. Osteoarthritis will decrease quality of life because it curtails a dog's ability to perform these normal activities. Osteoarthritis-associated pain curtails the dog's ability to fully engage in activities that are involved in that that very special human-animal bond.

**CHF:** What should a dog owner do if they are concerned that their dog may have symptoms of osteoarthritis?

**Lascelles:** If someone is concerned that their dog may have signs of osteoarthritis, then they should seek out veterinary advice and take their dog to a veterinarian for evaluation.

**CHF:** What will their veterinarian do to diagnose this disease? Is it relatively straightforward for a veterinarian to identify the source of pain or the specific joints that are affected?

**Lascelles:** It is relatively straightforward. As one delves into the complexities associated with the disease, it becomes less straightforward. But the initial evaluation and diagnosis of osteoarthritis-associated pain can be performed relatively straightforwardly.

First, the veterinarian will perform an examination, in particular, an orthopedic examination, evaluating joints and the rest of the musculoskeletal system. The assessment of pain associated with particular joints is ascertained by manipulating those joints. So the veterinarian will manipulate joints, put them through a range of motion and evaluate the reaction to that manipulation.

The second stage is to determine if the joint pain that may be found is due to osteoarthritis. And this involves taking radiographs, very often under sedation in order to get high-quality images. It involves taking radiographs of the joints that are suspected to have osteoarthritis present.

**CHF:** What changes in the joint can be seen on a radiograph and what is the doctor looking for?

**Lascelles:** In order to diagnose the disease of osteoarthritis, we're looking for changes on the radiograph, such as evidence that the joint has an excessive amount of fluid inside it. We're looking for evidence of what we call osteophytes which are often referred to as bone spurs, so little areas of new bone that occur usually at the periphery of the joint, where the joint capsule attaches to the bone.

And we're also looking for other features, such as a hardening of the subchondral bone. That is, the bone layer beneath the cartilage, beneath the surface of the cartilage. This is indicative of pathology, or abnormalities associated with osteoarthritis.



**CHF:** Once osteoarthritis is diagnosed, can it be cured?

**Lascalles:** Unfortunately, we have no way of curing osteoarthritis. There are thought to be some ways of slowing down the progression, but once the disease has been initiated, it is progressive, it will be progressive, and there are no known cures at the moment.

The main aim of our treatment as veterinarians is to eliminate or to decrease to the minimum the pain associated with the osteoarthritis and also to prevent pain from becoming a disease or problem in its own right.

**CHF:** So how do veterinarians treat osteoarthritis?

**Lascalles:** The main thrust of treatment of osteoarthritis revolves around the alleviation of pain associated with this disease. There are an awful lot of postulated treatments for pain associated with osteoarthritis, everything from drugs through acupuncture through to herbal supplements. The treatments that have most evidence associated with them as evidence of efficacy are drugs such as nonsteroidal anti-inflammatories, increasing exercise, and also dietary modulation. That is, altering both the composition of the diet and the quantity of the diet.

**CHF:** Can you tell us a little about the drugs commonly used to manage the pain associated with osteoarthritis?

**Lascalles:** We use drugs to manage pain associated with osteoarthritis in order to also allow us to instigate other therapies, such as exercise. For example, if a dog is painful and we want to use exercise as a pain-relieving modality, we first need to alleviate the pain to allow that exercise to take place.

And the drugs that we use most often to effect pain relief are the drugs called the nonsteroidal anti-inflammatories. These are drugs like ibuprofen, naproxen, and aspirin. However, it's very important to realize that the drugs we take as humans, drugs like ibuprofen, Celebrex, naproxen and aspirin are not appropriate for dogs. And there are drugs of the same class, the same type, that have been specially developed for dogs and are a lot safer in dogs than using these human nonsteroidals.

**CHF:** Are there any other health problems that exacerbate the pain and progression of osteoarthritis?

**Lascalles:** There are several health problems that exacerbate both the disease and complicate the treatment of the disease, osteoarthritis. The biggest one is obesity, carrying excess body weight, and this is a problem for two reasons.



Firstly, the excess body weight associated with obesity means that dogs have to take more weight through these painful joints. So the joints are loaded more, are stimulated more, and are potentially more painful.

In addition, we now know that fat is not inert. It doesn't just sit there and do nothing other than just add excess weight. Fat is also active, and when an animal is in an obese state, it has higher levels of pro-inflammatory mediators in its circulation that are coming from the fat. And these pro-inflammatory mediators can, in some circumstances, make the pain that is present worse and make treatment of that pain more difficult. So obesity is a particular problem because of those two aspects.

Another factor that can make the treatment of pain associated with osteoarthritis more difficult is poor conditioning of the musculoskeletal system. So joint pain can lead to a decrease in muscle tone and mass and this, in turn, can lead to a decrease in control over joints, and a decrease in control over joints can heighten the pain associated with them.

And another area is neurological disease. Neurological disease makes it more difficult for dogs to have that control over painful joints that is needed to minimize the pain associated with osteoarthritis.

**CHF:** Is there anything we have learned from human osteoarthritis research that might help the dog?

**Lascelles:** As veterinarians, we use a lot of information from human medicine to help guide us in the treatments that may be useful for controlling canine osteoarthritis-associated pain. For example, we know from human medicine that exercise is extremely beneficial. We know from human medicine that decreasing obesity is useful.

One of the more recent things we've learned from human medicine is that something called central sensitization occurs in association with osteoarthritis. This relates to is an idea I mentioned earlier where the pain that is coming from a joint, the pain associated with osteoarthritis, can actually cause alterations in the sensory system. It can alter the way the central nervous system works, and that alteration is called central sensitization. Central sensitization comes about because of input into the central nervous system of painful signals.

So you can imagine with a disease like osteoarthritis that is present for a long period of time, there has been over a period of time a lot of input of painful signals to the central nervous system. This input alters the way the central nervous system works and we can reach a point where the central nervous system itself is now so altered that it is producing the painful signals.

In fact, we know from human medicine that in 20-40% of humans with osteoarthritis pain, the predominant drive to that pain comes from the central nervous system.



Essentially what that means is that the central nervous system is more painful than the joints in the periphery.

This is a very important concept when we're trying to do our very best to treat pain associated with osteoarthritis. We need to pay attention not just to the joints in the periphery, but also to the alterations of the central nervous system.

**CHF:** Is there anything we can do to help dogs with osteoarthritis regain mobility and strength?

**Lascelles:** There are things we can do to help dogs with osteoarthritis regain mobility and strength, and I touched on these earlier. This is the idea of exercise, but in order to allow exercise to take place, we need to effect pain relief. So what we do is use drugs and also dietary supplements to effect—that is, to produce pain relief.

Once we have pain relief on board, then we gradually build up the amount of exercise that these dogs are getting. This exercise can be as simple as leash-walking, gradually increasing duration of leash-walking. This increase in leash-walking we tend to do over several weeks to months. This simple form of exercise will allow dogs to build up strength and regain mobility.

We can also use what we call targeted therapeutic exercises or rehabilitation exercises in order to stretch muscles that have become tense and contracted, and gradually increase the range of motion of joints. These targeted therapeutic exercises can be very effective in allowing dogs to regain mobility and also to build up strength.

**CHF:** Is osteoarthritis a normal part of the aging process?

**Lascelles:** That's an interesting question because osteoarthritis certainly is an age-related disease. That is, the older we get, the older our pets get, the more likely we are, and the more likely our pets are to suffer from osteoarthritis. So it certainly has an age-related component, but I wouldn't say it's necessarily a normal part of the aging process because there are many factors, such as obesity, that accelerate that disease process. If we can prevent obesity—and studies have shown this in dogs—if we prevent obesity, then we can very significantly delay the onset of osteoarthritis.

**CHF:** Is osteoarthritis associated with any other orthopedic problems?

**Lascelles:** Osteoarthritis is associated with other orthopedic problems. In fact, if we think about the causes of osteoarthritis, osteoarthritis can either occur just because it's going to occur, and that's called primary osteoarthritis, or, and far more commonly, osteoarthritis occurs as a result of some other disease—that could be a fracture involving the joint and that could be an anterior cruciate ligament rupture, or what we call in dogs, the cranial cruciate ligament rupture, that leads to joint instability.



There are other diseases, such as osteochondrosis dissecans and elbow dysplasia that will lead to osteoarthritis. So usually osteoarthritis has an underlying orthopedic disease that initiates it. In trying to limit the progression of osteoarthritis as veterinary surgeons, what we try and do is to treat those initiating diseases as effectively and as early on as we can.

**CHF:** Earlier in our conversation, you mentioned that 20-30% of dogs are affected by osteoarthritis and experience the pain associated with the disease - that's an overwhelming number of dogs. In your opinion, where are gaps in knowledge with respect to osteoarthritis and what sort of research needs to be done?

**Lascelles:** We've made great strides over the last few years in understanding the pain associated with osteoarthritis in dogs and how to treat it, but there's a lot more that needs to be done. We only have one class of drugs that are approved for use in dogs for osteoarthritis pain, and that's the nonsteroidal anti-inflammatories. We need drugs that act in different ways, drugs beyond the nonsteroidals that we can use as veterinarians, to treat pain associated with osteoarthritis.

We also need to know what other therapies work best. As I mentioned earlier, there are a plethora of treatments that are suggested to be effective for the pain associated with osteoarthritis. But we truly don't know whether these treatments work, and if they do, how effective they are. We need this information in order to be able to direct our clients to the most effective therapies for their pet's osteoarthritis.

Another area in which we need greater understanding is how to measure the pain associated with osteoarthritis and how to determine when pain is mainly due to the joint itself and then the other situation, when a lot of pain is coming from an altered central nervous system. If we could understand when this occurs and how to measure pain associated with an altered central nervous system that may lead us to being able to evaluate drugs that would more effectively treat pain associated with the altered central nervous system.

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