

Treatment and management of osteoarthritis in dogs and cats

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Tim Watson BVM&S, PhD, MRCVS, discusses the prevalence of degenerative joint disease in canine and feline pets and explains the role of nutraceuticals as a method of therapy

Summary

OSTEOARTHRITIS is a degenerative joint condition involving destruction of the cartilage lining joint surfaces. It affects 20 per cent of dogs and cats, is accompanied by pain and reduced mobility, and is a frequent reason for owners seeking veterinary attention for their pet. Treatment with pain-relieving anti-inflammatory medicines is often life-long, and is given together with surgery – to correct any underlying joint disease – and physical therapies like swimming. A number of joint care products are also available, in the form of dietary supplements, tablets and capsules, as well as in treats and pet foods. These offer the potential to relieve pain, arrest further deterioration of affected joints and aid their repair. Owners are often attracted by their own personal experiences, together with feeling these supplements are safe and natural.

Joint care products for dogs and cats contain one or more of the nutraceuticals glucosamine, chondroitin sulphate, omega-3 polyunsaturated fatty acids, antioxidants and minerals. Evaluation of scientific studies shows existence of moderate-to-good evidence for efficacy of products containing omega-3 polyunsaturated fatty acids, extract of green-lipped mussels and a combination of chondroitin sulphate, glucosamine and manganese in dogs with osteoarthritis. Evidence for benefit in cats is not so strong, but clinical experiences suggest they can relieve pain and improve mobility.

Key words

osteoarthritis, nutraceutical, dog, cat

OSTEOARTHRITIS – also known as degenerative joint disease – affects approximately 20 per cent of all middle-aged and geriatric dogs. It is a progressive condition in which there is damage to one or more joints, with destruction of the cartilage that lines its surface and exposure of underlying bone ([Figure 1](#)). This is accompanied by pain and reduction in mobility and usually requires life-long treatment.

About 40 per cent of large breed dogs – such as German shepherd dogs and Labrador retrievers – are affected, but it is less common in medium and small dog breeds. This is because large dogs are prone to developmental joint diseases, such as dysplasia and osteochondritis dissecans (commonly referred to as OCD), as well as traumatic injuries including cruciate ligament rupture. Obesity and excessive exercise also increase wear and tear on joints, and contribute to the development of osteoarthritis ([Figure 2](#)).

While the prevalence of osteoarthritis and associated lameness in cats is less well documented, there is radiographic evidence of joint disease in around 20 per cent of cats. In common with dogs, it is more prevalent in older animals and those that are overweight.

Treating dogs and cats with osteoarthritis

Osteoarthritis is a common reason for owners to seek veterinary attention for their animals, but treatment is not curative because, once established, changes within the joint are irreversible. The aim is to relieve pain, lessen inflammation, prevent further cartilage degeneration, improve mobility and thus enhance quality of life.

Therapy often involves several approaches, which include:

- medicines – specifically NSAIDs, prescribed to reduce pain and inflammation;
- surgery to correct any underlying joint disease or injury;
- joint care and nutritional products, often called nutraceuticals, that help protect and repair cartilage, as well as modifying inflammation;
- physical therapy – for example, swimming and controlled exercise, often in conjunction with a weight loss programme; and
- alternative therapies – for example, acupuncture

What are nutraceuticals?

Nutraceuticals are defined as dietary components that provide health benefits beyond their traditional nutritional value. They sit somewhere between a dietary supplement and a pharmaceutical agent. Popularity of nutraceuticals for managing osteoarthritis in dogs and cats stems from their use in humans, the belief they are safer or more natural than prescription medicines and the fact owners are able to purchase them without prescription or repeated veterinary examinations.

A multitude of joint care products, tailored for dogs and cats, are available in the form of tablets, capsules, powders or liquids that can be administered alone or added to food. Nutraceuticals are also incorporated into certain treats and foods, most notably those sold through veterinary or specialist pet shop channels.

Each of these products contains one or more of the following ingredients:

- glucosamine;
- chondroitin sulphate;
- polyunsaturated fatty acids; and
- antioxidants and micronutrients.

Glucosamine and chondroitin sulphate

Glucosamine and chondroitin sulphate are so-called chondroprotective agents that have the potential to stop – or even reverse – the process of cartilage destruction that is fundamental to progression of osteoarthritis. They do this by increasing the production of cartilage and/or inhibiting its degradation.

Glucosamine is a building block for compounds called glycosaminoglycans, which form the matrix of cartilage and are produced by cartilage cells called chondrocytes. While these cells are able to make their own glucosamine from glucose and the amino acid glutamine, the process is slow and inadequate in times of high demand. Thus, when a joint is under pressure and there is a need for greater glycosaminoglycan production, additional supplies of glucosamine are likely to be of benefit. Glucosamine is a small molecule that is rapidly absorbed from the gastrointestinal tract following consumption. It has also been shown to have mild anti-inflammatory properties.

Chondroitin sulphates are the major type of glycosaminoglycans in cartilage. Dietary supplements are generally derived from bovine cartilage, although some are extracted from pig, chicken or mussel cartilage. Like glucosamine, chondroitin sulphate stimulates cartilage production, inhibits

inflammation and blocks its degradation. In contrast to glucosamine, some chondroitin sulphate molecules are large and are unlikely to be absorbed following digestion. Products containing lower molecular weight forms are likely to be of greater benefit.

There have also been concerns that some products – especially cheaper ones – do not actually contain the amount of chondroitin sulphate claimed on the label. Nutraceuticals are not subject to the same stringent regulatory controls as prescription medicines and so advice is, therefore, to check the content on label is certified.

Omega-3 polyunsaturated fatty acids

Polyunsaturated fatty acids contained within cell membranes play a key role in initiating and regulating inflammatory responses, such as those that follow injury to a joint. In general, fatty acids belonging to the omega-6 series promote inflammation, whereas omega-3 fatty acids mediate responses that are anti or less inflammatory.

It is possible to alter the relative amounts of omega-6 and omega-3 fatty acids in cell membranes through dietary modifications. Marine fish oils are a rich source of the long chain omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which have been shown to moderate inflammation in the joints of dogs with cruciate ligament injuries.

It is also known EPA has the ability to regulate some of the genes responsible for cartilage destruction, thereby modifying progression of osteoarthritis.

Antioxidants and other micronutrients

Antioxidants and other micronutrients can also play a role in reducing inflammation in osteoarthritis because of the role free radicals play in the disease process. Dietary supplementation with antioxidants such as vitamin E and selenium bolsters reserves and increases capacity to “mop up” potentially damaging free radicals.

Zinc and manganese are key components of several enzymes involved in the production of cartilage. Ensuring adequate dietary consumption during times of high requirements may help protect joints.

Combining nutraceuticals

Many products contain combinations of nutraceuticals on the basis that multiple compounds work, through different mechanisms, to provide additional benefits. One product that appears to combine several functional ingredients is the supplement prepared from the New Zealand green-lipped mussel ([Figure 3](#)).

Shellfish supplements have long been used as a traditional remedy for arthritis by humans, and green-lipped mussels contain chondroitin sulphates, omega-3 fatty acids, vitamins E and C, zinc, copper and manganese. They also contain a unique fatty acid called eicosatetraenoic acid that has powerful anti-inflammatory effects and is free from adverse side effects seen with many prescription NSAIDs.

It is thought these agents act in synergy to reduce inflammation and pain, arrest cartilage destruction, enable production of healthy joint fluid and support repair of cartilage.

Do joint care supplements work?

Nutraceuticals are not subject to the same regulatory controls as veterinary medicines and this means no proof of efficacy is required. This leads some to question whether they actually provide any clinical benefit.

While there have been a number of studies into the efficacy of joint care supplements in dogs and cats, many of these trials were uncontrolled, without a placebo or dummy comparison. There is also the problem that symptoms of osteoarthritis wax and wane, so it can be difficult to separate true treatment effects from natural changes in symptoms. For instance, in one controlled clinical study of green-lipped mussel in dogs, 91 per cent of dogs given the placebo treatment had improved over the 112 day period of the trial (Pollard et al, 2006).

The results of 17 trials evaluating the impact of nutraceuticals on osteoarthritis in dogs and cats were reviewed (Vandeweerd et al, 2012), and the authors concluded the strength of evidence was low for all nutraceuticals, with the notable exception of diets supplemented with omega-3 fatty acids, including green-lipped mussels, in dogs. An earlier review had found moderate evidence for benefits of green-lipped mussels and a combination of chondroitin sulphate, glucosamine and manganese (Aragon et al, 2007).

Another article looking at the management of osteoarthritis in cats concluded there is, as yet, no published data to support the usefulness of nutraceuticals (Bennett et al, 2012). The authors did, however, report studies in their clinic suggest some pain-relieving effect. A separate study looking at a diet rich in omega-3 fatty acids and supplemented with greenlipped mussel and glucosamine/chondroitin sulphate did find improvements in mobility of cats affected by degenerative joint disease (Lascelles et al, 2010).

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Figure 1. Schematic representation of osteoarthritis in the knee, in which there is erosion of the cartilage (depicted in light blue) lining the ends of the femur and tibia, with exposure and remodelling of the underlying bone.



Figure 2. Obesity is an important risk factor for the development of osteoarthritis in both dogs and cats.

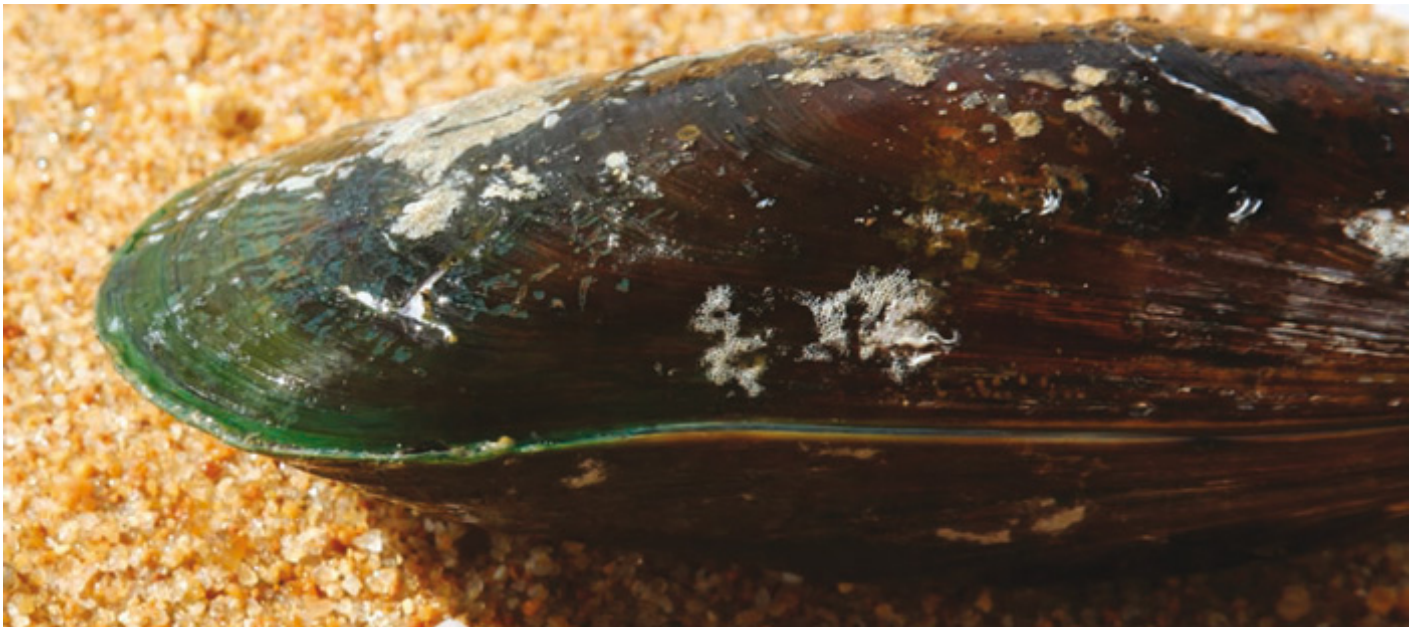


Figure 3. Indigenous coastal communities have long recognised the anti-arthritis effects of shellfish extracts. Supplements prepared from green-lipped mussels contain several ingredients that can improve joint health.

IMAGE: Richard Giddins/Wikimedia Commons.

