

## **Nutritional management of osteoarthritis in dogs and cats**

Arthritis is a chronic degenerative disease leading to abnormal changes in the joint. These changes occur when cartilage is worn away faster than it can be replaced. Cartilage acts as a cushion to protect the bones, so that when cartilage is degraded, bone and nerve endings are exposed, causing pain, inflammation, swelling and reduced mobility. Arthritis is insidious and progressive, resulting in gradual development of joint pain, stiffness, limited movement and reduced quality of life.

### Incidence of arthritis in dogs and cats

Studies have shown that arthritis affects 1 in 5 adult (over the age of 1 year) dogs. Note this is 20% of ALL breeds and sizes of adult dogs, not just large breeds. Small and medium breeds are also susceptible, and there is a 22% incidence of arthritis in small breed dogs over 7 years old.<sup>1</sup> The percentage of animals afflicted with arthritis increases with age.<sup>2</sup>

It has been widely assumed that osteoarthritis is rare in cats, and there are a number of potential reasons why feline arthritis is under-recognised.

- Small size and weight – cats that are light and agile are able to compensate for arthritis, sometimes even when it is severe
- Cats are very adept at modifying their lifestyles to adapt to pain or disability, and are able to hide signs of lameness
- The inactive lifestyle of many cats makes arthritis difficult to detect
- Reduced exercise tolerance or exercise-exacerbated lameness is often not seen in cats as it would be in dogs on lead exercise
- It can be hard to determine pain in cats on clinical exam – many cats will not tolerate palpation and manipulation of their limbs
- The insidious nature of the condition, which may cause owners to attribute reduced activity to old age
- Cats may have bilateral disease, which can mask signs of lameness

In a study of 100 client owned cats, 61% over the age of 6 years had osteoarthritis in at least one joint (48% in > 1 joint, 25% bilateral). In this same study, 82% of cats older than 14 years had arthritis in at least one joint,<sup>4</sup> but only 13% of owners reported their cats as lame.

Assessing cats for arthritis requires a different approach than in dogs. Generally signs are more subtle, but do vary in severity and nature between individuals. Most studies suggest that overt signs of arthritis are uncommon in cats, and lameness is often not the main clinical feature. Changes in lifestyle and behaviour provide clues that the cat is in chronic pain.

The most commonly reported and consistent signs of feline arthritis are a reduced ability or willingness to jump, a reduction in the height that they are willing to jump, and increased lethargy or sleeping. These signs can easily be overlooked as due to 'old age' rather than as signs of arthritis. Asking owners of all older cats (over 6 years) to fill in a mobility and activity-based questionnaire may be helpful in diagnosing many cats silently suffering chronic pain.

Other reported clinical signs of arthritis in cats include:

- Reduced interactions with people and/or other pets
- Difficulty going up or down stairs
- Reduced grooming activity; unkempt appearance
- Vocalisation or resentment of handling
- Difficulty negotiating litter box

### The Cycle of Arthritis

Any form of stress can cause damage to chondrocytes and initiate the arthritis cycle. Most often, this stress is related to trauma or injury, but it can also be due to normal wear and tear over time. Damage, with or without signs of inflammation, activates enzymes in the chondrocytes that cause cartilage degradation. Degradation of the cartilage occurs before the dog or cat begins to show obvious signs of inflammation.

Unless the cycle of arthritis is disrupted, further degradation of the cartilage causes damage to the cartilage matrix and eventually leads to structural or functional failure of the joint. Although arthritis is not curable, early intervention is key, as without treatment the pet will continue to lose cartilage, resulting in the need for more aggressive treatments such as surgery.

Thus there are two components to the management of arthritis: controlling the inflammation and interrupting the damage to the cartilage.

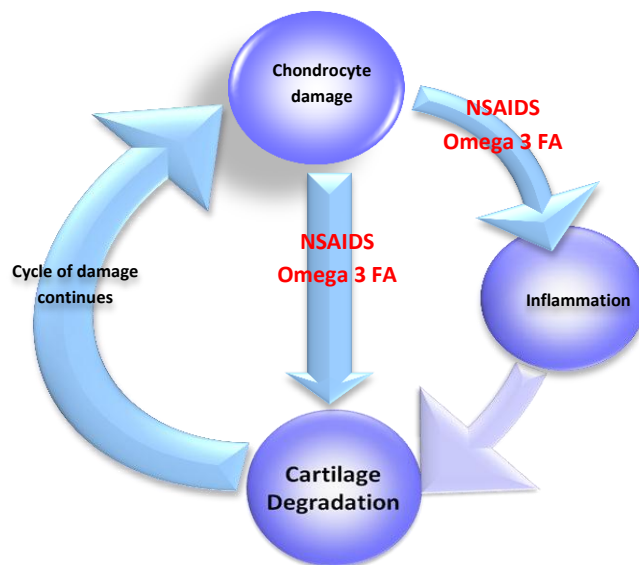


Figure 1. The Cycle of Arthritis. The key is to manage inflammation and cartilage degradation simultaneously

## Treatment options for arthritis in dogs

- Physical rehabilitation
- NSAIDs
- Weight management
- Nutraceuticals
  - green-lipped mussel
  - glucosamine and chondroitin
  - omega-3 fatty acids

### *Physical rehabilitation*

Passive range of motion exercises, low impact, low-intensity exercise and massage may help to manage the pain of arthritis in dogs.

### *NSAIDS*

Non-steroidal anti-inflammatory drugs are the cornerstone of management for most dogs with osteoarthritis. However, since NSAIDs carry some risk of adverse side effects it is important to minimise the dose and duration of treatment.

### *Weight reduction*

Weight reduction should be considered an integral part of the management of pain associated with arthritis, and offers significant pain relief. There are several studies showing improvement in lameness and pain with weight loss in dogs with only mild to moderate obesity (that is, 10 to 20% over ideal weight). These studies emphasise how important it is that even mildly overweight dogs with arthritis are in ideal body condition.<sup>5,6,7</sup>

## Treatment options for arthritis in cats

Therapeutic options for cats with arthritis should also involve maintenance of an optimal body weight and encouragement of gentle exercise and physiotherapy. The environment should be modified to reduce stress and to minimise the need to jump up or down or make difficult manoeuvres.

### *NSAIDS*

Meloxicam is registered for use in cats in Australia at 0.1mg/kg orally on day 1 then 0.05mg/kg thereafter. The dose should be based on the cat's lean body weight and used for up to 3-4 weeks. There is conflicting data on the safety of its use, with the FDA in the USA warning that repeated use of meloxicam in cats has been associated with acute renal failure and death. An Australian study indicated a reasonable level of safety, even in cats with renal insufficiency.<sup>8</sup>

### *Life-style management*

Treating and managing obesity is important to reduce the severity of arthritis signs, as it is in dogs. The cat's environment can be modified to make life easier, for example by adding steps or ramps, providing shallow litter trays, and keeping things on the same level.

## Evidence for the use of nutraceuticals in the management of arthritis in dogs and cats

The term nutraceutical was coined by a doctor in 1989 for substances having characteristics of both 'nutrients' and 'pharmaceuticals', that is a food that is also a drug. It is not a legal term and has no official regulatory definition. Nutraceuticals commonly used to treat arthritis include:

- Green-lipped mussels
- Glucosamine and chondroitin
- Omega-3 fatty acids

Before recommending a nutraceutical or food or treatment, you should first think about the evidence on which your recommendation is based. Evidence-based medicine (EBM) is the integration of the best research evidence, clinical expertise, and patient values in making decisions about patient management. It is important to know how many studies/animals have been used to evaluate a particular therapy as well as the relative strength of evidence those studies provide.

### *Glucosamine and chondroitin*

Glucosamine and chondroitin are considered safe and may have potential benefits. They are usually included in supplements and diets for arthritis. The rationale for their use is to provide the precursors of the cartilage matrix in excess, which may favour synthesis and repair of articular cartilage. Glucosamine also has mild anti-inflammatory properties. Sources of glucosamine include chitin which forms the shells of crabs, lobsters and prawns. Sources of chondroitin include mammalian cartilage and shark cartilage. As popular as glucosamine and chondroitin supplements are, there are few studies documenting their efficacy, even in human medicine, and the results of the studies are conflicting.<sup>10-13</sup> One explanation for this variability in outcomes may be related to the variability in the quality of the supplements used in each study.<sup>14</sup> It is important to recommend products whose quality assurance and efficacy can be verified. Information on various products can be accessed from [www.consumerlab.com](http://www.consumerlab.com) for a fee.

### *Green-Lipped Mussel (Perna canaliculus) (GLM)*

Formulations of GLM include freeze-dried or oily extracts of the mussel tissue. Heat processing destroys its activity. GLM is purported to be anti-inflammatory due its omega-3 fatty acid content, but it is important to be aware that the fatty acid levels in the GLM powder are much less than in the lipid extract.

In studies evaluating GLM as a treat or powder there are conflicting results. A grade 1 study showed no effect. Of two grade 2 studies, one documented subjective improvement in more dogs receiving GLM as a powder compared to receiving GLM as a treat or incorporated into a food. Interestingly, in the other grade 2 study of client owned dogs, there was no statistically significant improvement during the 56 days of the blinded study, but at the end of an open label study extension, subjective owner evaluation indicated significant improvement. The authors comment that this may be related to a placebo effect.<sup>13, 15-17</sup>

### *Omega-3 fatty acids*

Omega 3 fatty acids are essential, polyunsaturated fatty acids with the first double bond occurring at the 3rd carbon. Good sources of alpha-linoleic acid include flaxseed or flax oil; good sources of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) include cold water marine oils such as menhaden fish oil, salmon oil or herring oil.

The primary benefit of increased dietary omega -3 FA has conventionally been thought to be the production of eicosanoids with low inflammatory activity. If a dog is fed a diet rich in omega- 3 FA, these omega-3 FA are incorporated into cell membranes. Resolvins and protectins generated from EPA and DHA 'switch-on' in the resolution phase of an inflammatory response, acting as 'braking-signals' in inflammation. As well as reducing and helping to resolve inflammation, the omega-3 FA in fish oils disrupt the vicious cycle of arthritis (Figure 1).

1. EPA in the dog and DHA in the cat are selectively stored in chondrocytes where they help to control joint inflammation.
2. EPA/DHA disrupt the signal (mRNA) to make degradative enzymes that cause cartilage damage. EPA/DHA work to "turn down" the gene that leads to cartilage degradation.

3. In the dog we also know that high levels of omega-3 fatty acids and a low ratio of omega-6 fatty acids to omega-3 fatty acids reduce inflammation around the joint.

Studies with a total of 473 dogs support the efficacy of EPA. In one study, NSAID dosage was reduced by an average of 25% in dogs fed an EPA-rich diet.<sup>18</sup> In another study, dogs fed an EPA-rich diet had significantly improved ability to play and rise from a resting position compared to dogs fed a control diet.<sup>19</sup> Force plate analyses were used in a third study to demonstrate that 82% of dogs fed an EPA-rich diet showed a significant improvement in weight-bearing ability.<sup>20</sup> These peer-reviewed, published clinical studies provide strong, scientific evidence that elevates the importance of omega-3 FA as an integral part of an effective arthritis management program in dogs.

Nutraceuticals are also widely used in cats, but there is an absence of robust published data. There is one feline study on the safety of a commercial supplement containing a mixture of chondroitin sulfate, glucosamine, and manganese. No side effects were reported when the product was fed at twice the recommended dose for 30 days.<sup>21</sup>

Research on the efficacy of DHA in the treatment of arthritis in cats has been published in Abstract form. One published and one unpublished study have grade 2 evidence of a significant reduction in inflammation, cartilage destruction, orthopaedic scores and a 49% increase in activity in cats fed a DHA-rich diet for 28 days.<sup>22, 23</sup> A grade 1 study showed that 61% of cats with moderate to severe arthritis had a significant improvement in arthritic scores within 4 weeks,<sup>24</sup> while another open label study suggested significant improvements in both veterinary and owner assessment scores for ability to jump, stiffness, activity, lameness and pain on joint manipulation after 30 days.<sup>25</sup>

### **Evidence Based Medicine**

The following grading system can be used to assess the strength of evidence a particular study provides:

Grade 1: Systematic reviews of multiple studies (meta-analysis) and randomised, controlled clinical trials in client owned animals with naturally occurring disease are the strongest forms of evidence, and are the most likely to predict how a particular therapy will work in your patients.

Grade 2: Randomised, double-blinded, controlled trials in a research setting.

Grade 3: Well-designed but non-randomised clinical studies, experimental models, case reports, epidemiological studies, dramatic results in uncontrolled studies. These studies may or may not predict outcome in your patients.

Grade 4: Expert opinions, pathophysiological rationale, in vitro research. Grade 4 evidence is the lowest level and is the least likely to predict outcome. Unfortunately, this is often the only kind of evidence we have in veterinary medicine for many of the diagnostic tests, therapies and procedures we perform on a routine basis. While grade 4 evidence should not be totally disregarded, preference should be given to stronger evidence when it is available.

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