paw®
PURE ANIMAL WELLBEING
By BLACKMORES

JOINT HEALTH

Osteoarthritis in Dogs & Cats

2022 edition for professional reference only

OSTEOARTHRITIS IN DOGS AND CATS[1]

Osteoarthritis (OA), also referred to as degenerative joint disease (DJD), is the most commonly diagnosed joint disease in both human and veterinary medicine. It is typically characterised by progressive degeneration and remodelling of synovial joints, leading to joint pain and impaired joint function.

Osteoarthritis is a multifactorial disease with a strong genetic component and can be exacerbated by lifestyle choices that impact body condition such as diet and exercise.

1 in 5

Adult dogs suffer from osteoarthritis[1]

80% of dogs over 8 years of age have osteoarthritis[1]

61% of cats 6 years and older have OA in one joint and 48% in more than one joint[3]

PREDISPOSITION AND RISK FACTORS FOR OSTEOARTHRITIS[1,4]

Genetics[1]

Certain breeds are predisposed to OA as a result of both conformation related to breed standards and genetic/heritability components, increasing the likelihood of the development of joint disease.

Conformation[1]

Conformational defects and inherited disorders relating to body, leg size and joint angles make some breeds especially predisposed to developing OA.

Impact and injuries[4]

Impact loads are the most likely to result in injury to articular cartilage. Exercise such as running can lead to arthritic change in an injured joint.

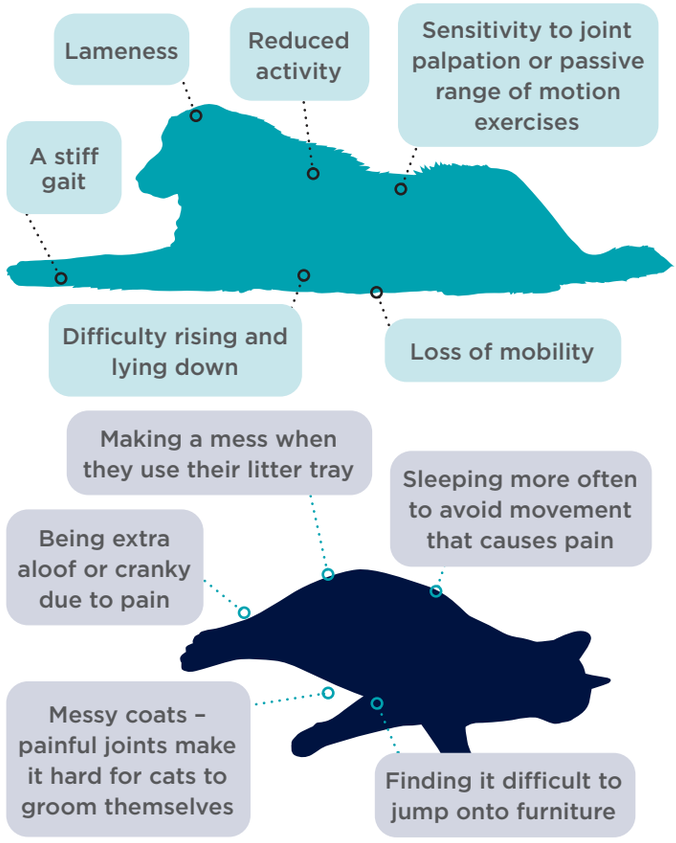
Age

Joint deterioration occurs increasingly with age and therefore the prevalence of OA is higher in older dogs.

Weight[1]

Higher body weight causes an increased load on weight-bearing joints both in larger breed and overweight dogs.

OSTEOARTHRITIS "ON THE OUTSIDE"[6]

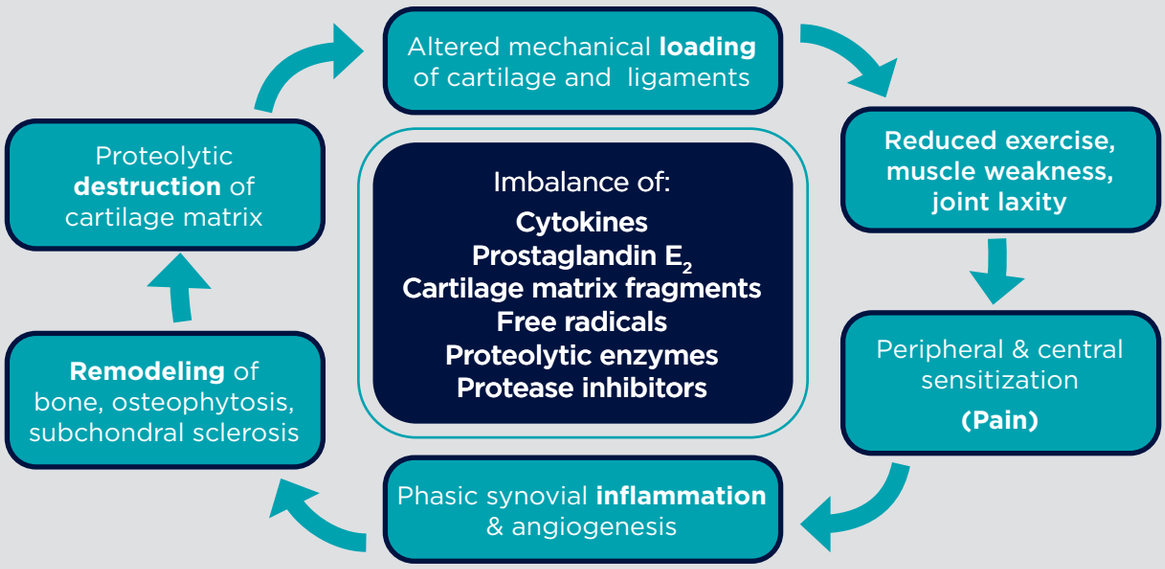


THE VICIOUS CYCLE OF OSTEOARTHRITIS

Both inflammatory and immune processes impact the development and progression of osteoarthritis. Osteoarthritis results from failure of chondrocytes to maintain homeostasis between synthesis and degradation of extracellular matrix (ECM) components.[7]

Activated synoviocytes and chondrocytes release inflammatory cytokines which upregulate genes involved in cartilage degradation. These cytokines also blunt the innate ability for chondrocytes to restore the ECM, leading to further destruction.[7]

The inflammatory and immune processes perpetuate each other which leads to a vicious cycle of osteoarthritis progression, and thus increases the complexity of management of OA.[8]



OSTEOARTHRITIS "ON THE INSIDE"

Cross section of healthy joint (left) and arthritic joint (right)

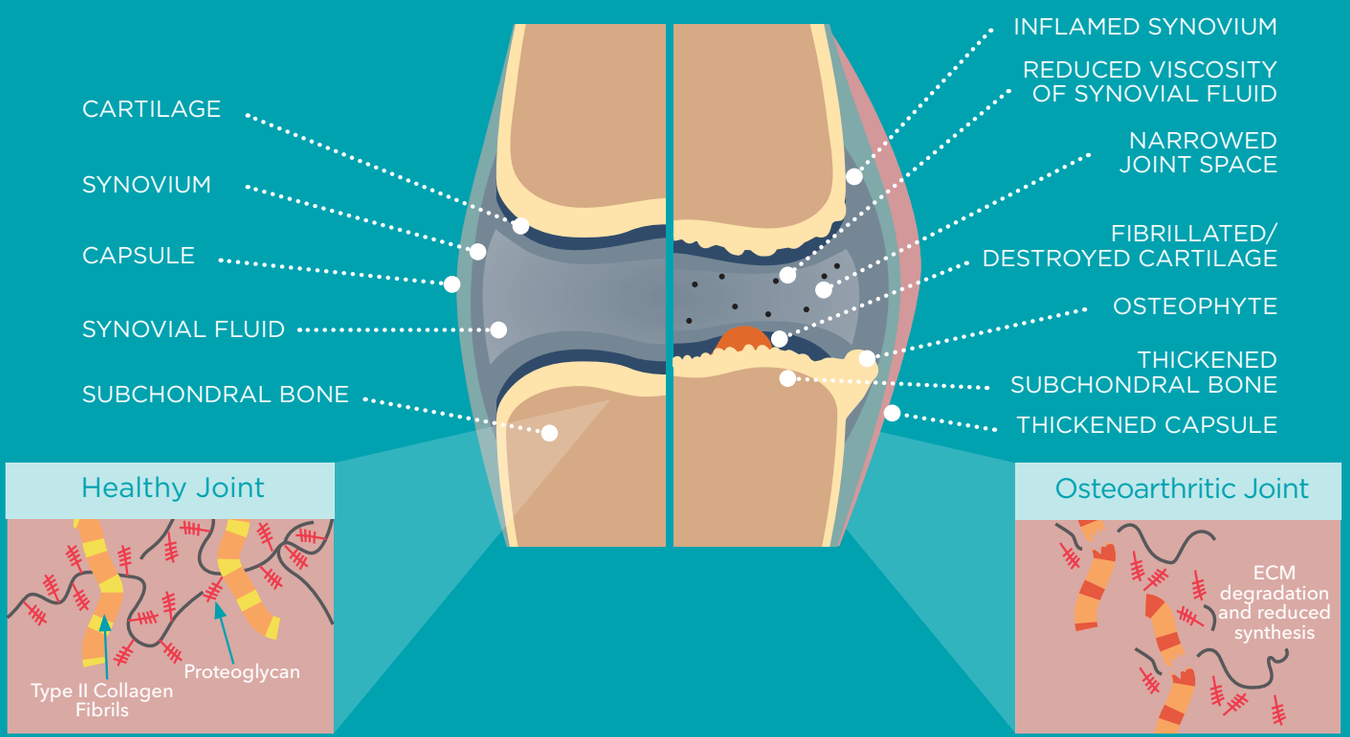


Image 1 shows the cross section of a healthy and arthritic joint and the physical changes that occur during joint degradation

SUPPORTING OSTEOARTHRITIC PATIENTS WITH NUTRACEUTICALS

Once diagnosed, the management of OA in pets is a lifetime commitment, involving a multimodal approach. The aim of long-term management is to control clinical signs by reducing pain, improving mobility and hence quality of life; whilst preventing further cartilage degradation.[12]

OA management therefore requires the long-term use of safe therapies, while the absence of any cure reinforces the importance of prevention. Safe, long-term prevention and alternative solutions can come from dietary supplements, as they have the advantage of having few or no known side effects.[12]

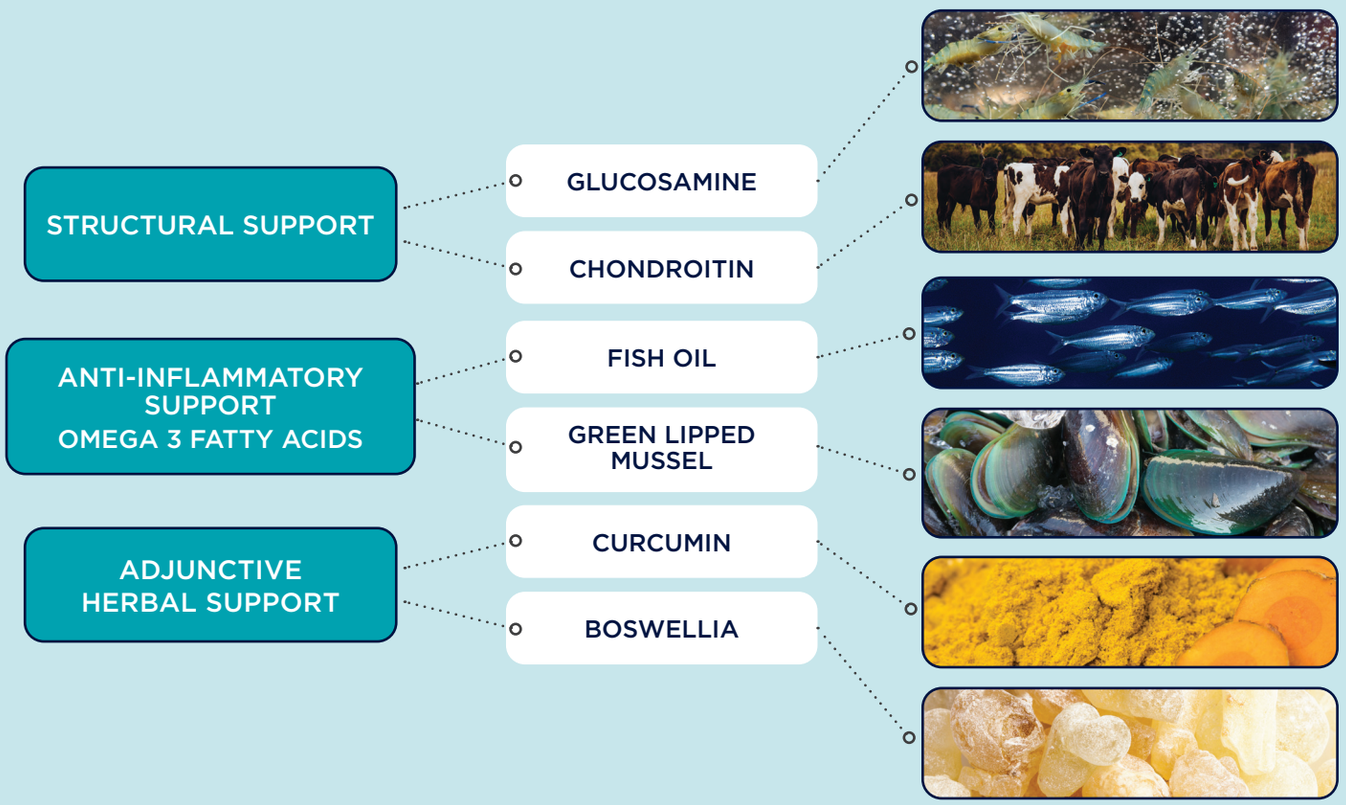
Nutraceutical and pharmaceutical agents used to treat OA are subdivided into those aimed at modifying the clinical signs and those aimed at modifying the structure of the joint. [11]

'Structural modifying' agents, such as glucosamine and chondroitin, are those that are capable of delaying,
stabilising or even repairing osteoarthritic lesions. 'Symptom modifying' agents help to alleviate the clinical signs, for example, green lipped mussel for anti-inflammatory and analgesic support. [11, 13]

While rarely used as monotherapy, some herbs have been shown to be effective when integrated into the management plans of chronic medical ailments affecting companions animals.[14]

The low-down on LOX and leukotrienes with NSAIDs use[15,16]

Non-steroidal anti-inflammatory drugs (NSAIDs) are the competitive inhibitors of COX, the enzyme which mediates the bioconversion of arachidonic acid to inflammatory prostaglandins. Their use is associated with side effects such as gastrointestinal and renal toxicity.[15] As only the COX pathway is inhibited, leukotriene production can be upregulated due to the arachidonate diverting through the 5-LOX pathway.[16]



STRUCTURAL SUPPORT

GLUCOSAMINE AND CHONDROITIN

Chondroprotectives like glucosamine (Glu) and chondroitin sulphate (CS) are essential components of the cartilage metabolism and stimulate important cartilage regeneration processes, thereby adjusting the imbalance of catabolic and anabolic processes in osteoarthritis.[17]

Glucosamine is a precursor of glycosaminoglycan (GAG); a building block of the extracellular cartilage matrix.[18] Glu can delay cartilage degeneration in OA by leading to the:[18]

- Reduction in proteoglycan degradation
- Inhibition of synthesis and activity of degradative enzymes and inflammatory mediators
- Stimulation of GAG and proteoglycan synthesis

These effects may potentially lead to a reduction in pain and swelling as well as to increased mobility of the affected joint.[17]

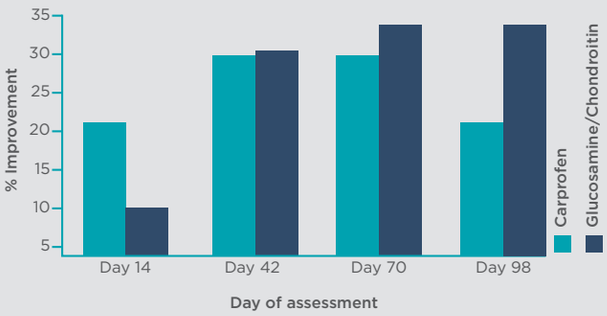
Chondroitin sulphate is the predominant glycosaminoglycan of articular cartilage and is also present in tendons, bones and vertebral discs.[19]

CS increased the hyaluronic acid production in synovial cells, which has a beneficial effect on maintaining viscosity in the synovial fluid. CS stimulates chondrocyte metabolism, leading to the synthesis of collagen and proteoglycans. CS inhibits cartilage destruction processes by degradative enzymes and stimulates the anabolic processes involved in new cartilage formation.[17, 19]

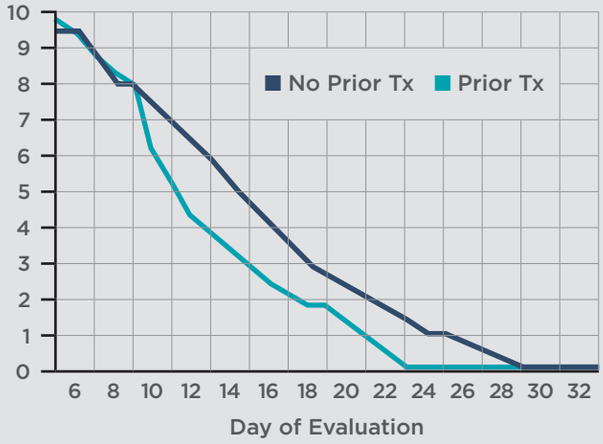
In a randomised, double blind, multicentred study of 70 dogs with confirmed hip or elbow OA, dogs were administered either glucosamine & chondroitin or carprofen for 70 days.

Scale scoring assessments for pain, weight-bearing and condition were performed on days 0, 14, 42, 70 and 98. Statistically significant improvements were found for both glucosamine/chondroitin and carprofen test groups for pain, weight-bearing and condition scores.

Dogs receiving glucosamine and chondroitin experienced improvement in pain scores similar to carprofen from day 42 and also showed a carry-over effect even after treatment was stopped on day 70. [20]



In a study of 32 healthy dogs with experimentally induced osteoarthritis, dogs treated with glucosamine & chondroitin three weeks prior to induction of synovitis experienced more rapid improvements in lameness after the procedure.[21]



Graph: Lameness scores of dogs that received glucosamine & chondroitin supplementation prior to induction of synovitis, against those that did not receive pre-treatment.

THE BIOAVAILABILITY OF CHONDROITIN[19]

The form and source of chondroitin sulphate influences its pharmacokinetic profile. Chondroitin sulphate of bovine origin is superior to that obtained from shark cartilage because of differences in molecular mass and degree of sulfation. The molecular weight of chondroitin affects its bioavailability.[19]

ANTI-INFLAMMATORY SUPPORT

OMEGA-3 FATTY ACIDS

Omega-3 and omega-6 fatty acids are considered essential because dogs and cats lack the enzyme to create the double bond in the omega 3 and omega 6 positions.[23] Omega-3 and omega-6 fatty acids are named for where the double bonds occur.[22]

Dietary sources of omegas 3 & 6 contain dihomo-gamma-linolenic acid (DGLA), arachadonic acid (AA) and eicosapentaenoic acid (EPA), which are incorporated into cellular membranes and are released after stimulation of the cell by inflammation, hormones or trauma. They are oxidised by COX to prostaglandins and thromboxanes, or by LOX to leukotrienes.[23]

The COX pathway causes release of essential fatty acids which then form eicosanoids. When AA is released, pro-inflammatory eicosanoids are produced. When EPA is released, anti-inflammatory eicosanoids are produced.[23]

FISH OIL

Indication for EPA/DHA rich fish oil in the management of osteoarthritis cases:[24,25]

- Mild to chronic osteoarthritis, as part of multi-modal therapy
- Potentially as an NSAID-sparing adjunct in cases of severe osteoarthritis
- Supplementation with EPA/DHA is beneficial as it reduces PGE2 production through competition with less inflammatory prostaglandins, as well as reduction of thromboxanes that may in turn suppress proinflammatory mediators IL-1, IL-2 and TNF in cartilage.

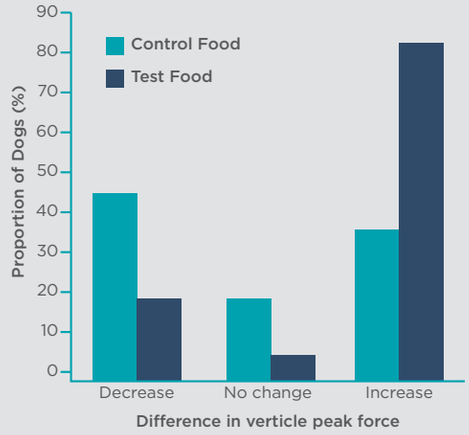
GREEN LIPPED MUSSEL (PERNA CANALICULUS)

Green-lipped mussel (GLM) is endemic to the coastal waters of NZ and has long been recognized for its anti-inflammatory benefits. GLM contains a range of bioactive lipids, including EPA, docosahexaenoic acid (DHA) and eicosatetraenoic acid (ETA), alongside anti-oxidants and glycosaminoglycans (GAGs).[27]

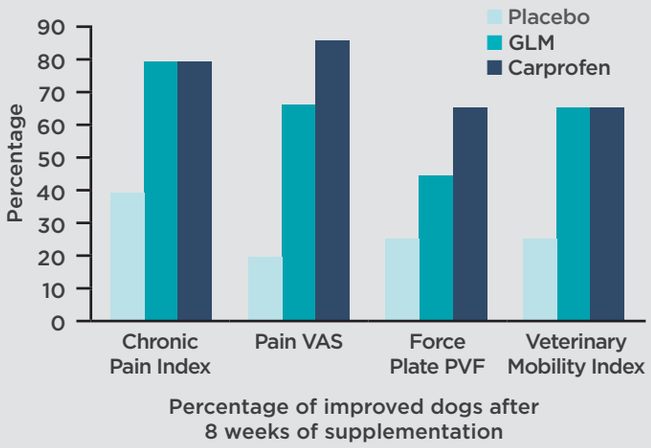
While the benefits of GLM are widely attributed to its lipid content, GLM also contains many other potentially beneficial nutrients including, vitamins E & C, zinc, copper and manganese.[27]

Clinical trial evaluating the effects of supplementation of fish oil on weight bearing in dogs with osteoarthritis.[26]

Thirty-eight dogs with OA across two university clinics were fed a commercial food containing 3.5% fish oil (containing omega-3 fatty acids EPA/DHA). Orthopaedic evaluations and force-plate analysis of the most severely affected limb of each dog was conducted on day 0 and 90. Change in mean peak vertical force between day 0 and 90 was significant for the test-food group (5.6%) but not for the control food group (0.4%). Improvement was seen in 82% of the dogs in the test food group.



Forty-five dogs with chronic pain and osteoarthritis were divided into three treatment groups & given carprofen, placebo or GLM. By week eight, dogs in the carprofen and GLM groups showed an 80% improvement in the owner evaluated chronic pain index and 67% in the veterinary mobility index.[29]



Graph 4: percentage of improved dogs using different assessment methods after 8 weeks of treatment on a placebo, GLM or carprofen.

ADJUNCTIVE HERBAL SUPPORT

CURCUMIN

Curcumin is a micronutrient commonly found in the dietary spice turmeric. *Curcuma longa* has been shown to exhibit therapeutic potential in various chronic illnesses and is known to be a potent antioxidant, anti-inflammatory, antiseptic and anticancer agent.[30]

In vivo canine studies have shown that curcumin is similar to NSAIDs in suppressing the production and catabolic action of pro-inflammatory cytokines such as interleukin-1 (IL-1) and tumour necrosis factor-alpha (TNF- α), that are known to play a key role in the pathogenesis of OA.[30]

Curcumin has also been shown to be an effective scavenger of reactive oxygen species (ROS) and reactive nitrogen species *in vitro*, which is of particular importance considering that the degradation of cartilage results from the combination of mechanical stress and an increase of matrix metalloproteinases (MMPs) and ROS.[30] *In vivo* it may have indirect antioxidant properties linked to its ability to inhibit inflammatory enzymes like MMP or via enhanced glutathione synthesis.[31]

SUMMARY OF THE BIOLOGICAL ACTIONS OF CURCUMIN ON HUMAN AND ANIMAL JOINT TISSUE[11]

Antioxidant effects

- Scavenges reactive oxygen and nitrogen species *in vitro*
- Inhibits IL-1b-induced nitrous oxide (NO) production by bovine and human chondrocytes and human cartilage explants
- Inhibits IL-1b-induced superoxide dismutase activity in bovine chondrocytes in monolayer

Anti-inflammatory effects

- Inhibits NF-kB-dependent gene transcription in chondrocytes
- Inhibits COX-2, but not COX-1, gene expression in IL-1b-treated bovine chondrocytes in monolayer
- Inhibits IL-6 and IL-8 gene expression by bovine and human chondrocytes
- Inhibits IL-6, IL-8 and PGE2 production by human chondrocytes and cartilage explants

Anti-catabolic effects

- Decreases cell viability of adherent synoviocytes
- Inhibits IL-1b-induced glycosaminoglycan release from canine and human OA cartilage explants
- Decreases MMP-3 synthesis in chondrocytes in alginate beads and in human cartilage explants
- Suppresses IL-1b and OSM-induced MMP-1, MMP-3, MMP-9 and MMP-13 gene expression by human chondrocytes via inhibition of NFkB activation and nuclear translocation

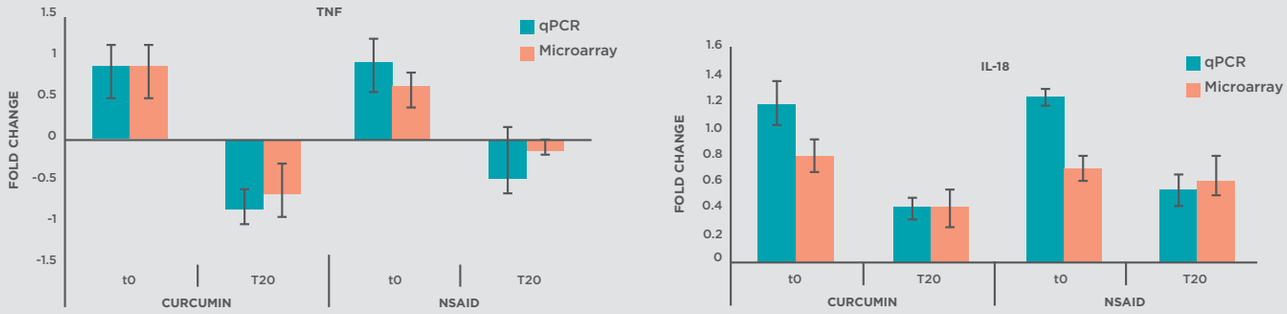
Anabolic effects

- Reverses the IL-1b-induced inhibition of type II collagen and b1-integrin gene expression in human chondrocytes

CURCUMIN-PHOSPHOLIPID-COMPLEX INCREASES ABSORPTION

In its pure form, the bioavailability of curcumin may be limited. Therefore, different strategies are required to improve the absorption of curcumin.[31] Formulations including a phospholipid complex have been shown to increase absorption by 29-fold when compared to curcumin on its own. [32]

Twelve OA affected dogs were randomly assigned to two groups. Group one was treated with curcumin & the second group was treated with the NSAID firocoxib. After 20 days, curcumin treatment showed a strong downregulation of the expression of pro-inflammatory cytokine tumour-necrosis factor alpha (TNF-a). Furthermore, unlike firocoxib, curcumin administration was shown to significantly downregulate the early responding inflammatory cytokine interleukin 18 (IL-18).[30]



Graph 4 & 5. mRNA expression of selected genes as determined by real time PCR and microarray analyses. The gene expression level determined by real time PCR was normalised to geometric mean of BACT and MRPS7. Error bars indicate ±SD.

BOSWELLIA

Boswellia serrata is a tree found in India, Northern Africa, and in the Middle East. Strips of boswellia bark are peeled away, yielding a gummy oleo-resin. Extracts of this gummy exudate have been traditionally used (in the Ayurvedic system) as an anti-arthritic, astringent, stimulant, expectorant and antiseptic.[33]

The anti-inflammatory effects of boswellia and boswellic acids have been linked to the ability to inhibit the synthesis of leukotrienes, the chemical mediators of the inflammatory process in various inflammatory diseases, including OA.[34] It is assumed that excessive production of leukotrienes is responsible for maintenance of a chronic inflammatory process and that inhibition may down regulate the process of disease[33]. Boswellia has been demonstrated to be effective in alleviating the clinical signs of OA in dogs.[33]

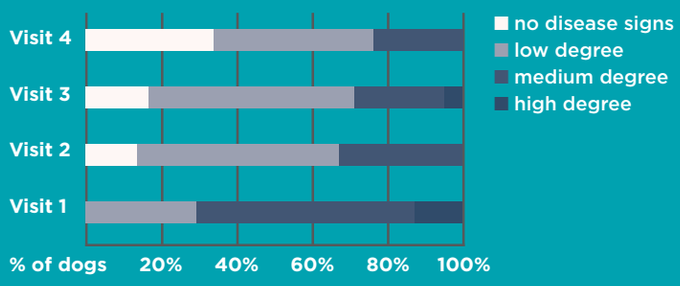
SYNERGISTIC EFFECTS OF CURCUMIN AND BOSWELLIC ACID[36]

In human studies, curcumin in combination with boswellic acid is more effective at reducing pain related symptoms in patients with OA, than curcumin alone. Combining *Curcuma longa* and *Boswellia serrata* extracts increases the efficacy of OA treatment presumably due to synergistic effects of curcumin and boswellic acid.

BOSWELLIC ACID ANTI-INFLAMMATORY ACTIVITY

Boswellic acid is mainly responsible for many of the pharmacological effects of the *Boswellia serrata* tree, including its anti-inflammatory activity.[35] Look for the boswellic acid content when recommending this ingredient.

Twenty-nine dogs suffering from osteoarthritis or dysplastic joint disease were selected for a study based on physical examination, history and radiographs. The daily meal of each dog was supplemented with a standardised extract of boswellia resin at 400 mg per 10 kg per day for 6 weeks. In 71% of dogs there was a significant improvement in most evaluated clinical signs. In addition, the frequency of external factors; "lameness when moving" and "lameness after a long rest" decreased in frequency throughout the 6-week period.[35]



Graph: Changing degrees of the clinical disease state of osteoarthritis in the efficacy population before, during and after treatment with boswellia resin observed between visits 1, 2, 3 & 4, on days 1, 14, 28 and 42 respectively.

THE ACTIONS OF NATURAL INGREDIENTS ON THE INFLAMMATORY PATHWAYS

When used in combination, natural ingredients have been found to block a wide array of inflammatory mediators.

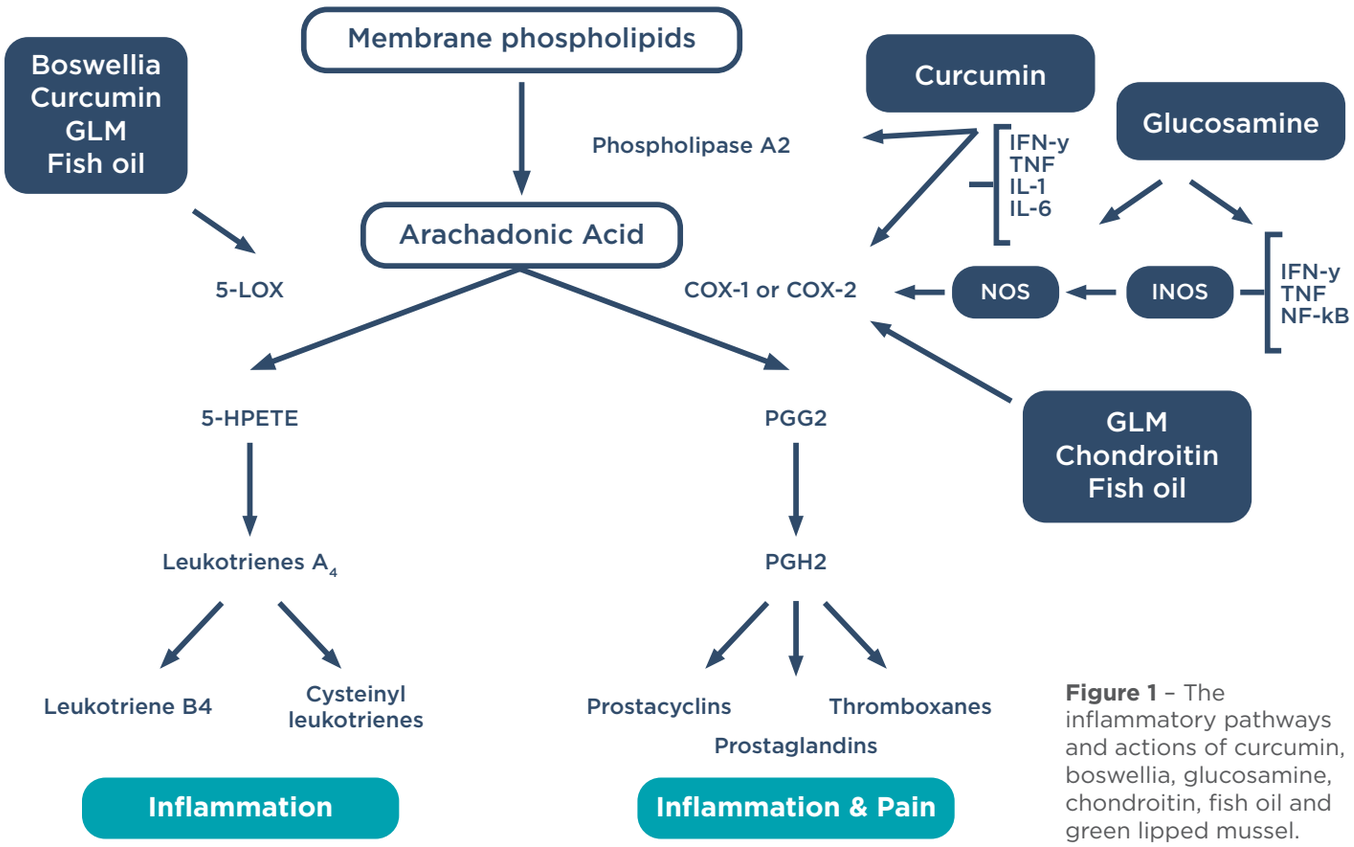


Figure 1 – The inflammatory pathways and actions of curcumin, boswellia, glucosamine, chondroitin, fish oil and green lipped mussel.

EFFECTS OF PAW OSTEOADVANCED ON IMPROVING MOBILITY SCORES IN DOGS SUFFERING FROM OSTEOARTHRITIS[37]

Background

In a 28-day trial 55 dogs with osteoarthritis were administered PAW Osteoadvanced, a triple action anti-inflammatory fish & chickpea based chew containing a combination of natural ingredients proven to reduce inflammation and nourish osteoarthritic joints. An eighty-four percent improvement in mobility was observed at the end of the trial period.

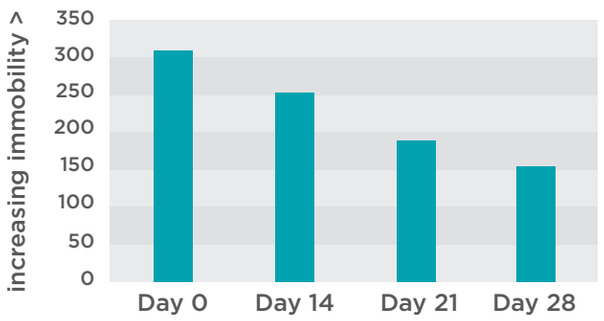
Method

Seventy-one pet owners and their dogs from across Australia participated in the trial. Each dog experienced reduced mobility from osteoarthritis. The age of the dogs in the trial ranged from 2.5 – 17 years with the average age 11 years. Dog owners were provided with 28-days' supply of Osteoadvanced to be administered to the dog once a day at the label dose rate. The owners were requested to complete a questionnaire assessing the dog's mobility prior to stating treatment then at day 14, 21 and 28. The questionnaire assessed mobility across four areas – walking, running, moving after rest and play. Responses were given on a scale of 0 – 4 (0 = no mobility problems; 4 = impossible to do). Osteoadvanced is a chew containing green lipped mussel 500mg, glucosamine hydrochloride 500mg, chondroitin sulphate 169mg, Curcuma longa phospholipid complex 100mg (equivalent to curcuminoids 20mg) and *Boswellia serrata* resin extract 40mg (equivalent to boswellic acid 27mg).

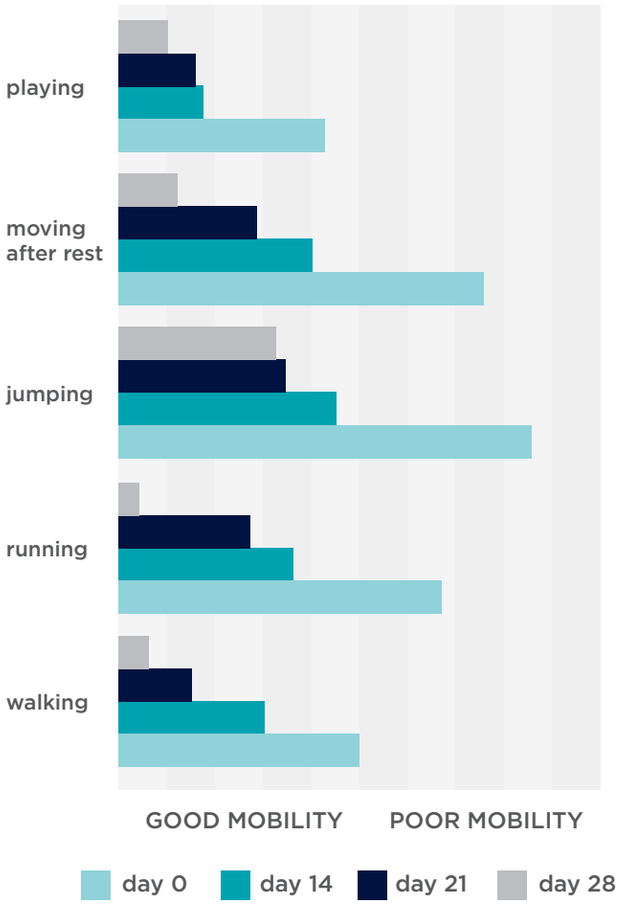
Results

Of the 71 participants enrolled in the trial, two did not complete the trial due to ongoing unrelated medical issues and 14 pet owners did not complete the questionnaire. A total of 55 completed the trial with 84 percent of pet owners recording improved mobility at the end of trial period. At 28 days, almost all participants reported no problem with walking compared to the start of the trial.

Cumulative scores on mobility across all assessable functions



Cummulative owner-reported changes in mobility



Improve mobility in dogs suffering from osteoarthritis[37]

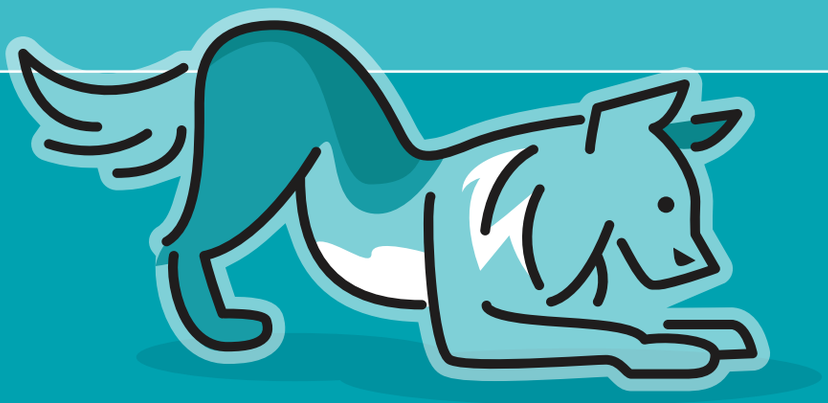
In a multi centered trial of 55 dogs, owners observed mobility improvements within 2 weeks of supplementing daily with **PAW Osteoadvanced.***

AFTER 2 WEEKS
60%

AFTER 3 WEEKS
76%

AFTER 4 WEEKS
84%

% of owners who observed mobility improvements across measures such as walking, running, jumping, moving after rest & playing as a result of daily supplementation of **PAW Osteoadvanced.**



*all dogs were assessed for trial suitability based on strict inclusion criteria and assessed weekly by their owners

CHOOSING THE RIGHT PAW JOINT SUPPORT SOLUTION FOR YOUR PATIENTS

Please read the label and follow the directions for use

JOINT PROTECT

PAW Osteocare® Joint Protect chews for small dogs

- Contain tasty fish and chickpea protein.
- Specifically designed for daily use in small dogs
- Support for healthy joints, improving mobility and protecting against joint damage.
- Glucosamine, chondroitin, manganese and ascorbic acid to effectively support joint cartilage health.

Key ingredients: each 2.5g chew contains: Glucosamine sulphate 250mg, Chondroitin sulphate 125mg, Vitamin C 20mg, MSM 12.5mg, Manganese gluconate 11mg

Size: 30 chews

Dosage (Daily)	Dog's weight (kg)	
	1-7.4	7.5-15
	1 chew	2 chews

Application: Feed daily

Warnings/prescribing information: For animal treatment only

PAW Osteocare® Joint Protect Chews

- Contains glucosamine & chondroitin sulfate to provide cartilage nutrition for optimal joint cartilage health and joint function.
- Balanced combination of other nutrients for joint health such as MSM that work together to maintain the health of your dog's joints.
- Highly palatable fish & chickpea protein chew that is easy to give to dogs on a daily basis.

Key ingredients: each 5g chew contains: Glucosamine sulfate 500mg, MSM 25mg, Chondroitin sulfate 250mg, Manganese gluconate 22mg, Vitamin C 40mg

Size: 60 & 100 chews

Dosage (Daily)	Dog's weight (kg)		
	5-10	11-25	25+
	½ Chew	1 Chew	2 Chews

Application: Feed daily

Warnings/prescribing information: For animal treatment only

MILD – MODERATE OA MANAGEMENT

PAW Osteosupport® Joint Care Powder for Dogs & Cats

- 100% natural green lipped mussel powder manufactured using a one-step proprietary process (Perna128®) to minimise temperature, enzymatic or oxidative damage to essential fatty acids for a highly concentrated product.
- Effective at reducing inflammation
- High levels of Omega 3 (EPA, DHA & ETA) for fast, effective joint pain relief for dogs & cats
- Includes a natural source of glycosaminoglycans (chondroitin 6 sulfate): required for cartilage production
- Easy-to-use capsule in a powder format. Open capsule contents and sprinkle over food.

Active Ingredients: each 500mg capsule contains: Green Lipped Mussel 500mg

Size: Dogs: 80 & 150 capsules
Cats 60 capsules

Dog's weight (kg)	<25	25+
Dosage (Daily)	1 capsule	2 capsules
Dosage for Cats (Daily)	Feed one capsule daily.	

Application: To be given daily (either whole or opened and sprinkled directly onto food).

Warnings/prescribing information: Use with precaution in pregnant or lactating animals. Contraindicated in animals with an allergy to seafood. For animal consumption only.

MILD – MODERATE OA MANAGEMENT (CONTINUED...)

PAW Fish Oil 500: Veterinary strength concentrated omega-3 supplement

- Rich in omega-3 fatty acids, EPA and DHA to support joint health.
- Formulated with EPA/DHA ratios (55:45) recommended for dogs based on nutritional standards published by the National Research Council, USA.
- Concentrated low volume formulation, reduces diarrhoea risk and excessive calories.
- Mercury, dioxin and PCB tested.
- No added colours or artificial flavours.

Key ingredients/1ml:
Eicosapentaenoic acid (EPA): 275mg
Docosahexaenoic acid (DHA): 225mg
(1 pump = 0.5ml)

Size: 200ml pump bottle

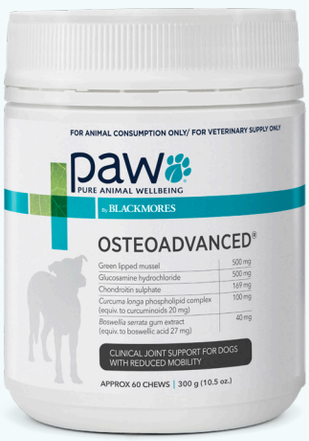
Dosage: 1ml (2 pumps) per 7kg body weight.

Warnings/prescribing information:

- Fish oil is generally safe and well tolerated. The NRC safe upper limit is 370 mg/kg$^{0.75}$
- The most commonly expected adverse events are mild, self-limiting gastrointestinal signs.
- Other uncommon or rare side effects may include platelet inhibition, delayed wound healing, weight gain and altered immune function. Consider discontinuing high doses for 2-3 weeks prior to and following surgery.
- Hyperglycaemia is a potential adverse effect and caution should be used in diabetic patients receiving insulin concurrently.
- Store below 25° (air conditioning).
- Protect from light & store in a dry place.

MODERATE – SEVERE OA MANAGEMENT

PAW OsteoAdvanced: Clinical joint support chews



- Carefully selected ingredients may help to relieve the symptoms of osteoarthritis in dogs
- Curcumin, *Boswellia serrata* and green-lipped mussel provide anti-inflammatory support for arthritic joints in dogs
- Glucosamine and chondroitin support healthy joint cartilage
- Boswellia supports overall joint health and mobility
- Highly palatable fish & chickpea based chew that is easy to give to dogs on a daily basis

Active Ingredient: Each 5g chew contains:
Green lipped mussel 500mg, Glucosamine hydrochloride 500mg, Chondroitin sulphate 169mg, *Curcuma longa* phospholipid complex (equivalent to curcuminoids 20mg) 100mg, *Boswellia serrata* resin extract (equiv. to boswellic acid 27mg) 40mg

Size: 300g (Approx. 60 x 5g chews)

Warnings/prescribing information:

For animal consumption only. For veterinary supply only.
Use with precaution in pregnant or lactating animals. This product contains seafood. This product is not an alternative treatment in acute joint inflammation.

DECIDING WHICH PAW JOINT CARE PRODUCT TO RECOMMEND

Is the dog showing symptoms of osteoarthritis?

- ☐ Lameness
- ☐ Reluctance to exercise or jump
- ☐ Weight gain
- ☐ Stiffness
- ☐ Pain when touched in certain places (legs, hips, spine)

YES...

Is the pain mild-moderate or moderate-severe?

YES...

Start the dog on a **glucosamine & chondroitin supplement** daily to help nourish and support the joint cartilage and potentially delay the onset of osteoarthritis and it's associated symptoms.

Try recommending:

NO...

Could the dog be predisposed to osteoarthritis later in life?

- ☐ Large or giant breed dog
- ☐ Highly active lifestyle
- ☐ Breed known to suffer from conformation concerns

YES...

Start the dog on a **glucosamine & chondroitin supplement** daily to help nourish and support the joint cartilage and potentially delay the onset of osteoarthritis and it's associated symptoms.

Try recommending:

NO...

Is the dog >5 years of age?

NO...

The dog likely doesn't need any intervention at this point in time - reassess when the dog reaches 5 years of age

Mild-moderate

Does the dog lead a healthy lifestyle?

- ☐ Healthy weight
- ☐ Moderate/low impact exercise
- ☐ Premium diet

OR

Moderate-severe

As part of a multi modal treatment plan (inc, healthy lifestyle, immediate pain relief & surgical intervention where needed) start the dog on a **glucosamine & chondroitin supplement** daily to help nourish and support the joint cartilage, in conjunction with a combination of natural anti-inflammatory ingredients such as **green lipped mussel, curcumin & boswellia** to reduce the severity of the associated pain*

Try recommending:

YES

As part of a multi modal treatment plan (inc, healthy lifestyle, immediate pain relief & surgical intervention where needed) start the dog on a **glucosamine & chondroitin supplement** daily to help nourish and support the joint cartilage, in conjunction with a combination of natural anti-inflammatory ingredients such as **green lipped mussel, curcumin & boswellia** to reduce the severity of the associated pain*

Try recommending:

NO

Address lifestyle issues:

- ☐ Reduce weight
- ☐ Begin low impact exercise routine
- ☐ Change diet

Start the dog on a **glucosamine & chondroitin supplement** daily to help nourish and support the joint cartilage and delay the onset of osteoarthritis and it's associated symptoms.

Try recommending:

In conjunction with a **green lipped mussel** OR **fish oil supplement** to reduce inflammation and associated pain whilst lifestyle concerns are being addressed.

Try recommending:

Reassess pain once ideal weight and exercise are acheived.

* review role of NSAIDs/disease modifying drugs if immediate pain relief is required
* this flow-chart is designed to be used in conjunction with a multimodal treatment protocol where pharmaceutical intervention may be required as an adjunct to natural therapies

OSTEOARTHRITIS AFFECTS CATS TOO

82% of cats over the age of 14 have osteoarthritis in at least one joint. Signs to look for include:

- ☐ Sleeping more often to avoid movement that causes pain.
- ☐ Being extra aloof or cranky due to pain.
- ☐ Finding it difficult to jump onto furniture.
- ☐ Making a mess when they use their litter tray.

Start the cat on a **green lipped mussel supplement** to reduce inflammation.*

Try recommending:

Introducing the PAW Practitioner Range

Developed for vets, by vets.

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