

## NSAIDs in Geriatric Patients



By Kate Cummings, DVM, DACVAA  
[angell.org/anesthesia](http://angell.org/anesthesia)  
617-541-5048

Non-steroidal anti-inflammatory drugs (NSAIDs) are at the forefront of pain management in human and veterinary species. Their benefits include an extended duration of action and analgesic efficacy. Other advantages include multiple formulations (injectable and oral), a large selection of veterinary-labeled products, non-controlled, and non-sedating. However, as with anything, there are disadvantages ranging from mild to severe in dogs and cats. In order to safely administer NSAIDs to geriatric patients, veterinarians need to understand the mechanism of action, potential adverse side effects, and dosing strategies. Most importantly, veterinarians need to educate clients about the importance of pain management in their geriatric pet, but make them very aware of the risks associated with NSAID administration.

### Mechanism of Action

Traditional NSAIDs are inhibitors of cyclooxygenase (COX), working to limit the production of prostanoids – prostaglandins, thromboxanes, and prostacyclins – the products of arachadonic acid breakdown. Prostanoids are important in both health (e.g. gastroprotection, clotting, renal blood flow) and disease (e.g. pain, inflammation, and cancer progression). Two COX isoforms, COX-1 and COX-2, are both constitutively expressed and induced. COX-1 expression occurs across almost all tissues and aids in preserving homeostasis. COX-2 is more inducible, increasing in production in tissues where injury occurs. COX-1 has some part in amplifying nociception, but COX-2 has a larger role in pain pathophysiology.

Individual NSAIDs inhibit COX enzymes differently. Since COX-1 is more of a house-keeping enzyme, its inhibition is thought to cause the most NSAID-induced side effects. In an attempt to avoid this, NSAIDs with a greater propensity for COX-2 suppression have been developed and termed “COX-2 selective” or “COX-2 preferential,” mainly meaning drugs that inhibit COX-2 primarily and have less affinity for COX-1. COX-2 selective or preferential



NSAIDs are not without risk though – acute kidney injury (AKI), thromboembolic disease, and gastric ulceration are still possible, which is consistent with the physiological role of COX-2 in a number of tissues.

### **Adverse Effects**

Adverse effects most commonly reported relate to the gastrointestinal (GI), renal, and hepatic systems. Most of the appreciated adverse effects are better documented and researched in dogs. Information is still quite lacking in cats. Dogs are extremely sensitive to the GI effects of NSAIDs. Any patient, dog or cat, displaying inappetance, vomiting, diarrhea, melena, or lethargy could have gastric irritation or ulceration and medication should be stopped. NSAIDs decrease renal autoregulation, impacting the amount of blood flow the kidney receives. NSAIDs should not be used in patients that are dehydrated, hypotensive, or hypovolemic. Given the large percentage of geriatric cats with some degree of chronic kidney disease, NSAID use should be conservative long term and appropriate monitoring is advisable. Hepatotoxicity is a rare side effect of NSAIDs. More importantly, an adequately functioning liver is necessary for drug metabolism to avoid toxicity. Lastly, NSAIDs should be avoided in patients that are hypoproteinemic or thrombocytopenic/coagulopathic (naturally or drug-induced) as risk of toxicity or bleeding increases, respectively, with these disturbances and concurrent NSAID administration.

### **Administration and Pain Management**

NSAIDs work peripherally and centrally to elicit their analgesic effects. They can be used to treat or prevent pain in the acute or chronic settings, following injury, and in cancer patients. NSAIDs work synergistically with other analgesics, allowing for dose reduction. Oral bioavailability is excellent following administration and with most NSAIDs, it is recommended to give with food (read prescribing information for drugs periodically to ensure safest administration practices). With chronic NSAID use in geriatric patients, doses should never be exceeded and can often be reduced to the minimum effective dose that produces a desirable effect. Dogs in particular may not have a desirable effect on one NSAID, in which case it is often useful to try a different NSAID given the appropriate washout period (~3 days). This does NOT hold true for adverse effects – attempting to switch to an alternative NSAID in patients that had undesirable side effects on one NSAID should be done cautiously, if at all.

Geriatric pets deserve adequate comfort during their later years and safe administration of NSAIDs is possible – the main goal is finding the minimum dose needed to keep the pet's quality of life as optimal at home as possible while not causing any major systemic adverse effects. To accomplish this (likely the most important step), client education is essential. Thorough history taking is a must as many pet owners may not realize their pet is already on an NSAID (e.g. aspirin) or on a medication that should not be given concurrently with an NSAID (e.g. steroid). Adverse drug events more commonly follow improper use of NSAIDs, and this can be lethal. Clients need to be aware of risks associated with both short- and long-term NSAID therapy. It's recommended to have take-home guidelines describing the type of medication, administration instructions, and any clinical signs to watch out for at home that would prompt immediate cessation of the drug and veterinary examination.