

# Acute and Chronic Pancreatitis: What to Do?

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Pancreatitis is an inflammatory disease of the exocrine pancreas. It can be divided into acute and chronic types based upon histological findings. Two main forms have been described. Neutrophilic inflammation and varying amounts of pancreatic acinar cell and peripancreatic fat necrosis characterize acute pancreatitis. Chronic pancreatitis is characterized by lymphocytic inflammation, fibrosis and acinar atrophy. While the cell types involved differ in this description, they appear to represent, in some studies, different points on a continuum of disease.

Diagnosis of both forms is difficult. There may be comorbidities that complicate signs. Clinical signs may be vague or mild. The diagnostic tools like imaging or clinical tests can lack sensitivity and specificity. Biopsy samples may be difficult to interpret or unavailable for many reasons.

There appears to be a strong association in several studies between pancreatitis, inflammatory bowel disease (IBD) and cholangitis, giving rise to the term "triaditis". This may be partially explained by the proximity of the common bile duct and major pancreatic duct in the duodenal papilla. Enteric bacteria were found in >1/3 of cases supporting the suspicion of a relationship between pancreatitis and the translocation of bacteria from the gut. Vomiting, a common sign in cats with IBD or cholangitis may also raise intraluminal pressure and further increase the risk of pancreaticobiliary reflux. The relationship between cholangitis and pancreatitis has recently been challenged however, though its relationship with IBD has not.

Ischemia is another recognized cause of acute pancreatitis. Inadvertent compression or ligation and hypotension during surgery can cause ischemia of the pancreas. Careful surgical technique and anesthetic monitoring prevent these events from occurring. The pancreas can be the cause of ischemia if fibrosis, edema or inflammation compromise pancreatic blood flow. Other causes like infectious agents, hypercalcemia, drug reactions and nutritional imbalances have been reported but are rare. Most commonly pancreatitis is considered idiopathic as no obvious cause can be found.

Serum feline pancreatic lipase immunoreactivity (fPLI) is the most recent addition to laboratory tests seeking a useful diagnostic ante-mortem test for feline pancreatitis. There are two tests, developed by the same laboratory. SpecfPLI is a quantitative test for which concentrations >5.3 are consistent with pancreatitis. A grey zone is found from 3.5-5.3ug/l and is notable on the Spec test and on the Snap fPLI test, which is a semi-quantitative test. A positive Snap fPLI includes the grey zone when it is positive so results should be confirmed by Spec fPLI. The sensitivity of the Spec fPLI is still without adequate data. Moderate to severe pancreatitis was 100% sensitive in one study but much lower, 54%, for mild pancreatitis based upon histopathology. However, the number of patients was small and there was some bias evident on patient selection for histopathology. More studies are needed to properly evaluate sensitivity and specificity of SpecfPLI. Snap fPLI has not been independently validated. Importantly, fibrosis or atrophy from long-standing chronic pancreatitis would not be expected to increase fPLI.

Other abnormal laboratory findings have been observed but are not diagnostic as well. From 26-55% of cats have a normocytic, normochromic nonregenerative or regenerative anemia. Less than half have a leukocytosis. Leukopenia may be present and has a poorer prognosis. Other hematological findings are non-specific and cannot distinguish between acute, chronic or suppurative pancreatitis. Biochemistry abnormal values are often present but are not specific for pancreatitis and may represent comorbid conditions with pancreatitis.

Abdominal radiographs are may be suggestive of cranial loss of serosal detail or a mass effect but are largely useful to rule out concomitant conditions like intestinal obstruction. Ultrasound is relatively specific in differentiating pancreatitis from other GI disease but cannot differentiate between acute and chronic forms. Hypoechoic pancreas, hyperechoic peripancreatic adipose or abdominal effusion is relatively specific for pancreatitis in cats. Mild forms of pancreatitis are more difficult to discern than moderate to severe forms on ultrasound. In some cats, the pancreas is more difficult to detect and is dependent on operator experience.

The use of endosonography may improve the general visualization but did not alter the diagnosis of pancreatitis in one study. Ultrasound is still recommended for diagnosis of pancreatitis and will reveal other abnormal findings such as pancreatic masses, cysts or stones. Computed tomography has not been helpful and is not recommended for diagnosis. Magnetic resonance imaging is the modality of choice in humans and may be helpful in cats.

Histopathology remains the gold standard for ante-mortem diagnosis though there are limitations to this as well. Cats with severe pancreatitis are poor candidates for anesthesia. Even for those patients stable enough, the results may not alter treatment planning and patient management. Patients undergoing laparotomy or laparoscopy for other reasons should have the pancreas biopsied. Focal lesions may be visible as well as more generalized changes that will guide sample collection. Multiple samples are recommended as lesions can be geographically distributed or very mild and difficult to discern. Mild changes may not explain the patient's clinical signs as well

Despite the challenges of diagnosis, pancreatitis is an important condition. Anorexia and weight loss found with pancreatitis can cause concurrent hepatic lipidosis. Several studies have shown the relationship between Diabetes Mellitus (DM) and pancreatitis. Other concurrent diseases can be complicated by the presence of pancreatic inflammation most notably IBD. End-stage CP can result in exocrine pancreatic insufficiency.

Management of pancreatitis is comprised of three main aspects: nutrition and antiemetic therapy, fluid and electrolyte correction and analgesia. A high protein, low carbohydrate, moderate fat diet is the recommended formulation. While fasting is not recommended, gradual reintroduction of food should be instituted to avoid the electrolyte and other disturbances that occur with refeeding syndrome. Though nausea may be difficult to discern, it should be treated to insure adequate intake of food. NK-1 receptor antagonist maropitant and 5HT<sub>3</sub> antagonists are beneficial. Maropitant may also relieve some of the pain associated with pancreatitis. Cobalamin deficiency is common in cats and should be addressed with B12 injections weekly for 6 weeks and every 1-2 months thereafter. Appetite improvements with the use of cobalamin supplementation have been reported.

If voluntary food intake is not rapidly restored a nasoesophageal tube for short-term use or an esophagostomy or gastrostomy tube may be required. The goal of a nasoesophageal tube is for stabilization until anesthetic risk is lowered adequately to permit a more lasting tube to be placed. In the case of severe malnutrition and persistent anorexia, partial parental nutrition along with some enteral nutrition has been shown to maintain gut wall barrier function in humans.

Vomiting, anorexia and diarrhea can lead to severe dehydration and electrolyte disturbances. Hypokalemia and hypocalcemia are no uncommon. Aggressive fluid therapy is required to correct pancreatic hypoperfusion.

Pain is a common feature of pancreatitis though difficult to evaluate in cats. Buprenorphine, oxymorphone or fentanyl may be good choices. .

Comorbidities must be treated at the same time, insulin for DM, therapy for diabetic ketoacidosis, cholangitis or inflammatory bowel disease. Plasma (20ml/kg i.v.) or colloids (10-20ml/kg/day i.v.) may be indicated in the presence of hypoproteinemia or shock. Colloids such as dextran 70 and hetastarch may also have antithrombotic effects that help maintain the microcirculation.

Prophylactic broad-spectrum antibiotics (e.g. amoxicillin ± enrofloxacin depending on severity) may be warranted in patients with shock, fever, diabetes mellitus or evidence of breakdown of the GI barrier. Bacterial translocation has been demonstrated in experimental feline pancreatitis using distinct *E.coli* placed in the colon, and other sites e.g. bile, and colonization was prevented with cefotaxime (50mg/kg TID). A recent study revealed that bacterial infection is present in the pancreas of 35% (11/31) of cats with moderate to severe pancreatitis. The high frequency of infection (71%, 5/7) in acute necrotizing and suppurative pancreatitis may be linked to the poor prognosis associated with this form of pancreatitis. These localization and type of intrapancreatic bacteria suggests translocation of enteric bacteria is a likely source of infection

Coagulation abnormalities should be pursued and treatment with parenteral vitamin K can be assessed. Where a coagulopathy e.g. DIC, or hypoproteinemia are present, or the patient with pancreatitis is deteriorating, fresh frozen plasma (10-20 ml/kg) may be beneficial in alleviating the coagulopathy, hypoproteinemia and restoring a more normal protease-antiprotease balance. The administration of heparin (75-150 IU/kg TID) may be potentially useful in ameliorating DIC, promoting adequate microcirculation in the pancreas and clearing lipemic serum. In experimental pancreatitis isovolemic rehydration with dextran has also been shown to promote pancreatic microcirculation in dogs. A dopamine infusion (5µg/kg/min) had a protective effect when administered to cats within 12 hrs. of induction of experimental pancreatitis. H<sub>1</sub> and H<sub>2</sub>- antagonists blocked the progression of edematous to hemorrhagic pancreatitis in experimental cats and may be beneficial in patients .

Oral pancreatic enzyme extracts have been reported to reduce pain in humans with chronic pancreatitis, though this is controversial. The presence of a protease mediated negative feedback system has not been described in cats.

# Complicated Senior Cats: Managing a Patient's Multiple Conditions

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Old age is not a disease. Both veterinarians and owners must resist the temptation to ascribe signs of illness to aging. Some signs of illness such as chronic pain, dehydration or hypokalemia may lead to clinical signs that owners scribe to “slowing down” with old age. Many problems of senior cats are chronic and progressive so that early diagnosis and treatment is important for pain management and quality of life. It can also be tempting to find a “diagnosis” and treat for that without continually evaluating the “whole” cat. The focus on a single diagnosis and treatment plan can neglect common comorbid conditions that can dramatically affect quality of life. A hyperthyroid cat, for example, may suffer from other conditions more common in older cats; overgrown nails, decreased olfactory sensing, which can impact appetite, muscle atrophy and osteoarthritis or periodontal disease.

For these reasons and a host of others, comprehensive wellness examinations, history assessment and a minimum database are recommended every 6 months for seniors. Health status may change rapidly in this group and early detection and treatment is important to preserve quality of life. Signs of illness in cats are often quite subtle and easy for owners to overlook. The minimum database includes a complete blood count (CBC), a full serum chemistry panel with electrolytes, a full urinalysis and total T4. Early detection of a decline in renal function will be found in declining urine specific gravity before BUN and Creatinine are beyond the normal range, making the urinalysis a critical part of information gathering. Depending upon risk factors, fecal examination and retrovirus testing may also be indicated. Blood pressure measurement should also be included in any cat with known risk factors.

Because senior cats' response to vaccination is largely unknown and immune function may be affected by both aging and the presence of chronic disease, vaccinations should be given according to the AAFP Feline Vaccine Advisory Panel for all cats.

The home environment is critical to wellness. Staff members should be trained to educate owners about enrichment, stress identification and modification for aging changes. Senior cats may benefit by an additional heat source such as a heated bed or one placed close to a heat source. Resting or hiding areas that are inaccessible to other pets, quiet and easily accessible for the senior may help with stress reduction. Litterboxes should be large and shallow with low sides and placed in quiet locations. If the home has multiple stories, boxes should be placed on each. Night-lights may be helpful with declining vision. Multiple fresh water sources can encourage moisture consumption in cats that may be prone to dehydration because of reduced urine concentrating ability.

In senior cats, cognitive dysfunction (CD) is now recognized as an important problem. Formal diagnostic criteria have yet to be established. It is a diagnosis of exclusion. The most common signs are disorientation in time and space, altered learning, house soiling, altered interactions (e.g. attention seeking, anxiety, irritability) changes in activity (wandering or pacing) changes in sleep patterns, decreased appetite, decreased grooming and increased vocalization. Medical problems such as hyperthyroidism, hypertension, pain of osteoarthritis, or chronic kidney disease can mimic many of these signs and so must be excluded before presuming CD.

Published studies are lacking on the efficacy of treatment. Therapies extrapolated from studies in humans and dogs include antioxidant enriched diets, supplements phosphatidylserine, omega-3 fatty acids, Vitamins E and C, L-carnitine. One ingredient found in supplements for dogs, alpha-lipoic acid, is toxic in cats. SAME improved activity and awareness in dogs and is commonly used in cats with hepatic disease. No trials with these supplements have been published for cats with CD. Therapies for cats with CD are anecdotal.

There is evidence of cholinergic decline in senior cats so drugs with anticholinergic activity (e.g. some SSRIs such as paroxetine and TCAs) should be avoided. Selegiline (Anipryl), which has been anecdotally reported to be useful in cats and proven beneficial in dogs for CD, should not be combined with SSRIs or TCAs. Environmental enrichment and Feliway have often been recommended but no studies in cats show benefit. In fact, in cats with CD modifications to the environment may be detrimental. Regular and predictable routines are most desirable. Any changes should take place slowly.

## **Hyperthyroidism and chronic kidney disease (CKD)**

The presence of these occurring concurrently affects not only the diagnosis but also the treatment and prognosis. A more cautious approach to treatment is required. The relationship between the two is not known. Hyperthyroidism may damage the kidneys or the consequent hypertension may contribute to renal damage. Hyperthyroidism seems to mask a decline in renal function by increasing renal blood flow and hence glomerular filtration rate (GFR).

Diagnosis is complicated by the suppression of thyroid hormones by a concurrent illness or “sick euthyroid”. Cats with both an upper reference range normal Creatinine and TT4 are likely to have both hyperthyroidism and CKD. A TT4 can be repeated in a few weeks or a free T4 by equilibrium dialysis can be done though it carries a slightly higher risk of false-positive results. The presence of CKD can affect hematology results. Erythrocytosis occasionally seen in hyperthyroidism may be masked by anemia of CKD.

Presently the assessment of kidney function depends upon elevated BUN and Creatinine with a reduced urine specific gravity. However concentrations of BUN can be increased by the polyphagia of hyperthyroid, Creatinine reduced because these cats are thin and have lost lean body condition, while increased GFR can reduce both. Urine specific gravity can be low because of either disease; both increase the risk of urinary tract infection.

All treatments for hyperthyroidism can worsen kidney function. Hyperthyroidism increases renal blood flow and GFR. Treatment may lower GFR by up to 50%, which may unmask previously unrecognized kidney disease. Treatment may initiate a crisis. Affected cats become azotemic and may start to show significant decreases in renal function by 4 weeks of treatment. No significant differences in pretreatment parameters have been shown between cats that will become azotemic after treatment and cats that will not. GFR, iohexol clearance and other assessment tools are not readily available in practice yet.

For these reasons, treatment with medical management for all cats should precede any other form of therapy. Medical management is reversible, can be reduced, and induces euthyroid states more gradually. Radioiodine and surgery may result in acute destabilization. Medical management should continue for a period of time, months before considering curative, permanent treatments.

If a cat is known to have CKD at the time of diagnosis, treatment with a lower dose of medication should be given at the start. For methimazole, 1.25mg- 5 mg once daily with frequent checks of renal parameters, titrating the dose upward. Renal parameters should be monitored at 3 and 6 weeks following start of therapy.

Attaining a euthyroid state should be the goal unless this level of thyroid hormone worsens renal parameters. Ongoing management should aim for a balance between the two conditions. Individual response to therapy should guide treatment. For example, if euthyroidism causes significant renal dysfunction, suboptimal control of hyperthyroidism may yield a patient that maintains weight and body condition.

### **Heart failure and chronic kidney disease (cardiorenal syndrome or CRS)**

In the cat, the incidence of chronic abnormalities in cardiac function (e.g. congestive heart failure) causing progressive and permanent chronic kidney disease is unknown. A study of 102 cats with hypertrophic cardiomyopathy reported 59% prevalence for azotemia as compared to 20% for age-matched controls.

CRS occurs when worsening renal function limits diuresis despite clinical volume overload associated with heart failure. In cats being treated for chronic heart failure, declining renal function should be anticipated. The diagnostic marker for CKD, isosthenuria, cannot be relied upon in cats being treated with diuretics. Monitoring of Creatinine especially should be used to discern trends in renal function. A progressive rise even within the normal range should alert the practitioner, along with clinical signs: PU/PD, hyporexia, anorexia, weight loss and vomiting.

A minimum database should include abdominal ultrasound to assess for typical changes in renal architecture and to identify underlying causes that may have specific treatments, such as neoplasia, pyelonephritis, and nephrolithiasis. Blood pressure monitoring should be included as well as hypotension from therapy can decrease renal perfusion. The usual diagnostic imaging; echocardiogram, thoracic radiographs are important for type of cardiac disease, risk assessment, and treatment planning.

Goals of treatment are to recognize CRS, reverse it as much as possible and deal with the renal consequences of heart failure and the complex relationship between heart failure and renal injury. The difficult balance is to “dry out” the heart failure and hydrate the kidneys. Different therapeutic strategies are based upon the degree of compromise of each organ.

ACE inhibitors are the mainstay of therapy for CRS especially in the presence of hypertension or proteinuria. Cats with CRS should be hydrated before starting therapy. Low dose benazepril or enalapril 0.25mg/kg Q 24 hours can be increased to provide better control for heart failure. Benazepril is metabolized in the liver, Enalapril in the kidneys. Therefore, cats with CRS may need a lower dose of enalapril than benazepril. Initiation of therapy may show a transient increase in BUN/Creatinine concentrations. If persistent, lowering the dose is usually sufficient.

If azotemia is becoming a concern, the first step is to lower the dose of diuretics. The goal is to find the lowest effective dose that controls heart failure. The dose must be continuously reassessed. The ideal dose for an individual patient achieves the threshold rate of drug excretion. An individual HF patient that is not responsive to 5mg of furosemide per 24 hour for example will need 10 mg per 24 hours, not 5mg every 12 hours. Adequate natriuresis can be grossly assessed by observation of increased urine volume and decreased specific gravity. Periodic drainage of pleural fluid or ascites can be used to avoid excessive diuretic use.

In the event that diuretic resistance occurs, several options are available to correct fluid balance. A CRI of furosemide (0.3-0.6mg/kg/hour IV) inhibits sodium resorption more effectively than oral or IV Boluses. Once the volume overload has resolved, most cats will again respond to oral therapy. Another loop diuretic, torsemide has superior diuretic action and long half-life. (0.3mg/kg PO Q 24 hours) It appears to be 10 times more potent than furosemide. Dual-diuretic therapy can be considered when furosemide dose needs to be decreased. Spironolactone (1-2 mg/kg Q 12 hours) may cause severe facial pruritus and must be used with caution. Aldosterone sometimes causes significant hyperkalemia. Each work at different sites within the nephron and if tolerated may be helpful.

Systemic hypertension is common in CKD and by increasing afterload increases the cardiac workload. Hypertension worsens both CKD and heart failure. If present, amlodipine (0.625 mg/cat PO Q 24 hours) should be added. Blood pressure monitoring is critical to avoid the effects of iatrogenic hypotension.

In advanced CRS, a positive inotrope (pimobendan) may improve azotemia, demeanor and appetite and allow reduction in diuretic dose.

Dietary modification should consider both conditions. Sodium restriction is sometimes needed and the extent to which it is required will vary. Distilled or low sodium water may be offered for drinking if more sodium restriction is needed than can be provided with diet. Clients should be cautioned not to feed high sodium treats. Lower phosphorus diets may be helpful in managing kidney disease but may result in the loss of lean body condition. High quality protein should be given to the level that it does not worsen azotemia. Omega-3 polyunsaturated fatty acids have been shown to be beneficial in both cardiac and renal conditions. Many renal diets are supplemented or if given separately EPA 40mg/kg/day, DHA 25mg/kg/day.

Fluid administration is a balance between improving renal blood flow without precipitating congestive heart failure. Fluids should be given slowly to correct azotemia, tailored to the individual's ability to tolerate. Abrupt changes in weight, a new gallop heart sound and/or heart rate may indicate impending congestive event and justify fluid rate reduction. Sometimes a low-dose CRI of furosemide will be indicated concurrently in cats with end-stage CRS. SQ fluids may be less likely to trigger a congestive event and can be given every 24-48 hours via a balanced electrolyte solution and adjusted to the individual patient's ability to tolerate. In fragile patients, a smaller volume of fluids, as little as 30mls every 48 hours may be necessary, titrating slowly upward if the expected effect on uremia is not evident. Electrolytes should be monitored closely, especially potassium, as hypokalemia can trigger arrhythmia. Correction can take place through fluid therapy or oral means.

Although renal function may remain stable for a period of time in cats with heart failure, when CRS occurs it leads to frequent hospitalization, difficulty maintaining good quality of life and eventually euthanasia. The therapy described here is directed at improving quality of life for cats with CRS. Whether they contribute to prolonged survival is unknown.

# Concord with Cats: Avoiding the Rodeo

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The veterinary visit can be thought of as a number of discrete chapters in a short story, each one key to the conclusion. In a well written short story, the development of the characters, the trajectory of the story and the place within which the story is told all combine to achieve a single purpose, the satisfactory conclusion. So it is particularly with the feline visit.

The opening chapter of this story begins at least 30-45 minutes before arriving at the veterinary establishment. In the home environment, the companion cat has a set of expectations and routine that he expects to be unchanging in the home range he has established whether entirely inside or inside and out. Suddenly and often with great drama, an object, a box, appears that has not been seen in the home range since the last, well-remembered crisis six months ago. What follows is a dramatic spike in the story as the owner chases the cat or finds the hiding place and snatches the resistant cat, shoving him into the box. No matter what happens next, a great change has occurred in this character, our cat's physical state. The human has changed, too. Both are now highly aroused, but not in a good way. The human is by turns, anxious, angry, frustrated. The cat is anxious, frightened and having flashbacks about the last time a similar event occurred. One could imagine a form of post-traumatic stress.

The rest of the story will not go well for either character introduced so far or for the ones to come unless this opening is rewritten. The details that need to be revised are not complex, but are not known to the human character. The veterinary team who will not be introduced until later in this version of the story must be introduced before the initial crisis occurs. The character is instructed by the veterinary team to purchase the "right" (easily disassembled, sturdy, top loading) sort of carrier, and to leave the carrier out in the house not stowed in the garage where it accumulates debris and dead insect carcasses. This clean carrier is placed in an open area with bedding made of familiar soft material or a shirt from the favorite person and an open door. Highly valued treats are placed occasionally in the carrier and often it becomes a safe place to take a nap.

Occasional rides in the carrier are taken to the ATM, the coffee shop or post office when weather permits. Our human character becomes adept at carrying it without banging it around, good strength training and muscle control. The carrier and car are sprayed with feline facial pheromone to add to a sense of calm and familiarity. Our cat character is not fed before any of these trips to prevent car sickness and increase the likelihood that a high value treat will be a good reinforcement for any activity that comes later. Having learned from the veterinary team how to make the carrier and car ride a pleasant experience, the remainder of the story can develop more peaceably.

In the next chapter of this new version of the feline veterinary visit story, the cat is brought to this highly necessary check up for preservation of good health and well being because the human character understands how important this is. As they arrive, they are ushered immediately into an exam room. The team member who escorts them may put the carrier on the floor and open the door to it. By leaving the room to the owner and cat for a few moments, the odds increase that the cat will come willingly out of the carrier and explore and become familiar with the room.

The next character, the veterinarian, enters the room quietly and introduces him or herself to the owner. They begin a conversation that involves the history of the patient and the context within which this cat's story unfolds. As they talk, the veterinarian begins the examination from a distance, commenting upon what she observes regarding gait, mentation, coat quality, respiration and emotional state. If the requisite exit from the carrier has not occurred by the time the veterinarian has entered the room, the top half of the carrier should be removed if possible. In addition to all the other "tools" of the physical exam, a number of zipties should be stocked in each room for safe reassembly of the often precariously assembled carrier.

The assessment of the previously mentioned characteristics can be made as the carrier is taken apart. The next chapter of the examination begins as the cat chooses the most comfortable place for this stranger to touch him. It may be in the bottom half of the carrier, on the exam table covered with a clean white fluffy towel or some other venue that seems appropriate to the cat. This chapter requires the veterinarian to be highly aware of changes to the emotional state of the patient and to adjust the tempo and the system examined accordingly. For example, many cats do not like to be touched on the ventrum, so abdominal palpation takes place later on. Most cats do not like to be stared at, therefore, the ophthalmic part of the exam is last or late in the visit. Each system is slowly and quietly examined. Talking to the client through each step as the systems are described.

Normal findings are also described as you work your way through the process in whatever order the cat is willing to allow. Watching for clues to arousal that indicate what is acceptable and not. Video and still photos of these steps will be used to exemplify good ideas for keeping the cat from a state of arousal that may end your ability to interact calmly and fully with the client. The goals here are twofold, to do a complete physical exam and to solidify the relationship you have with the client. A calm environment allows for conscientious completion of both of these goals.

When a cat becomes more aroused than can be examined without assistance, many techniques are available to make this part of the exam successful and as calm as possible. As few people as possible should be in the exam room at any given moment. When a new person is required, they are introduced to the client and their role explained. The goal is to prevent struggling. Towel techniques and other forms of gentle restraint will be shown in video and still photos. These concepts are hard to learn without visual examples.

The examination room should be the only part of the establishment an outpatient cat experiences. The “back” of the hospital is a place the owners are wary of and will often ask when their cat returns if it was their cat that was crying out. The patient has also become acclimated to the room and is at least somewhat familiar with that environment. To introduce the commotion of more people, animals, equipment, sounds and smells is likely to alter the patient from mildly to highly aroused. Therefore, the exam room should be fully equipped to perform most common procedures without moving in and out of the room. The client should be offered the opportunity to leave the exam room if there is blood or urine to be collected or any other act that might cause the owner to be nervous or phobic.

Finally, despite the rewriting of this story to have a different trajectory than the usual feline visit to the veterinary practice, the level of arousal of the patient may be too high to fully examine. The client should receive a full explanation of why this is so, what is recommended and why sedation is more desirable than the struggle to restrain. Examples of language to use and appropriate drugs and doses will be discussed.

There are, again, three goals of the feline veterinary visit:

- To achieve a high quality physical examination and other appropriate diagnostic steps;
- To create and maintain a trusting relationship with the client; and
- To insure that the visit is successful enough that the client will be willing to return

Throughout this presentation as many video and still photo examples of techniques, activities and flow will be included.

### **Pharma options for occasional use with highly aroused cats**

#### **Carry Out**

- 100 mg Gabapentin 2 hours before visit
- 0.5- 1.0 mg Alprazolam 1 hour before visit. Can be started 36 hours before visit given every 12 hours for 3 doses in very, very tough cats
- not a replacement for Feliway, disassembling carrier, dark, quiet room and soft voices
- additional sedation may be necessary for procedures

#### **Eat-in**

- 0.02 mg/Kg Buprenorphine transmucosally
- Butorphanol 0.2 mg/# and 0.005 mg/# Dexdomitor +/- 1 mg/# Ketamine
- Hydromorphone/midazolam
- Again, no substitute for environmental consideration

### **References**

- Sharon L. Crowell-Davis, Terry M. Curtis, and Rebecca J. Knowles  
Social organization in the cat: A modern understanding  
Journal of Feline Medicine and Surgery February 2004 6: 19-28  
Vicki Thayer. Deciphering the Cat: The medical History and Physical Examination  
The Cat: Clinical Medicine and Management, ed. Susan Little, 2012 Saunders.  
2011 AAFP/ISFM Feline-Friendly Handling Guidelines  
2012 AAFP/ISFM Feline-Friendly Nursing Care Guidelines

# Old, Thin Cats: Is it Really Only Age-Related?

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In both people and companion animals, cachexia and sarcopenia are 2 important syndromes that occur in a variety of chronic diseases and aging, respectively. Although cachexia has been recognized in people for over 2,000 years, only recently has it become acknowledged as a common and detrimental finding that is associated with increased morbidity and mortality, and with this observation has come rapidly expanding interest and research. Both of these syndromes are becoming increasingly important in human and veterinary medicine because of their high prevalence and adverse clinical effects, and a better understanding of the mechanisms underlying these syndromes is critical for optimal patient care, whether human or veterinary.

Cachexia is defined as loss of weight and muscle mass secondary to chronic inflammation or disease. Sarcopenia, “poverty of flesh”, is an age-related loss of lean body mass. Sarcopenia is not caused by disease, is a gradual process and progresses with age. Loss of muscle can occur without fat loss or a decrease in Body Condition Score (BCS). Individual cats, particularly those with long coats or a history of obesity may appear to have a high BCS and yet be under muscled.

One of the keys to the management of cachexia and sarcopenia in dogs and cats is recognizing it in its earliest stages. To achieve this, BCS and Muscle Condition Score (MCS) must be consistently assessed. The goal for BCS in a healthy cat is 4–5 on a 9-point BCS scale. However, in certain diseases (eg, CHF, CKD), a slightly higher BCS may be desirable (ie, a BCS of 6–7/9), although further research is required to make specific recommendations. Even in animals with these diseases, obesity (BCS > 7/9) should be avoided.

The MCS differs from the BCS in that it specifically evaluates muscle mass. Evaluation of muscle mass includes visual examination and palpation of the head, scapulae, epaxial muscles over the thoracic and lumbar vertebrae, and pelvic bones.

In people, the loss of LBM has direct and deleterious effects on strength, immune function, wound healing, and survival. In fact, cachexia is an independent predictor of survival in people. The specific deleterious effects of muscle loss have not been as well studied in dogs and cats although there are studies associating thin body condition with decreased survival.

The weight loss that occurs in cachexia is unlike that seen in a healthy animal that loses weight. In a healthy animal that is receiving insufficient calories to meet requirements, metabolic adaptations allow fat to be used as the primary fuel source, thus preserving LBM. Conversely, acute and chronic diseases alter concentrations of a variety of mediators (eg, inflammatory cytokines, catecholamines, cortisol, insulin, glucagon), which then decrease the ability to make metabolic adaptations required to switch to fat utilization, and amino acids continue to be used as a primary source of energy. Therefore, muscle and LBM quickly are catabolized.

Numerous other factors can contribute to muscle and weight loss. Maintenance energy requirements vary with age, genetics, health status and gender (intact or altered). In presence of some disease states, maintenance energy requirements increase significantly. Decreased nutrient absorption is another possible mechanism for muscle loss in cachexia and sarcopenia. Studies in cats have shown decreased digestive ability. One investigator showed a reduced ability to digest protein in 20% of geriatric cats with about 33% having a significant reduction in ability to digest dietary fat. Micronutrient absorption, potassium, phosphorus, sodium, choline, B vitamins and Vitamin E, is also decreased.

Cats derive most of their energy requirements from protein and are metabolically less able to handle decreased amounts of protein and increased amounts of carbohydrates to maintain their energy requirements. Omnivores adapt to lower dietary protein by down regulation of their protein metabolism (protein sparing) but cats have been proven to be unable to make this physiologic adaptation. This preferential use of protein for energy can have clinical effects when cats are ill or anorectic as protein malnourishment can occur.

An important problem in cardiac and other forms of cachexia is a decreased calorie intake. The anorexia may be secondary to fatigue, dyspnea, or may be because of medication toxicity or alterations in appetite that often accompany CHF, cancer, and CKD in cats. Absolute food intake may decrease in animals with these diseases, but there also may be altered food preferences, cyclical appetite, and other issues that negatively affect overall food intake. Anorexia, for example, is present in 34–84% of dogs and cats with heart disease.

Increased energy requirements, alterations in nutrient absorption, and decreased energy intake all likely play important roles in the pathogenesis of cachexia by causing a net calorie deficit. However, a healthy animal that has a calorie deficit, either as a consequence of decreased food intake or increased energy requirements, would primarily lose fat. Therefore, these factors are not sufficient to explain the muscle and LBM loss and relative sparing of fat that are the hallmarks of cachexia and sarcopenia. This discrepancy suggests that metabolic alterations also are present.

Because of the important implications of cachexia and sarcopenia on morbidity and mortality in people, there is now extensive research into the prevention, diagnosis, and treatment of these syndromes. There are exciting opportunities for new and effective

targets to decrease energy requirements, enhance energy intake, improve nutrient absorption, and modify metabolic alterations to prevent and even reverse the effects of both cachexia and sarcopenia.

A 2008 study on longevity in aging cats studied in a controlled environment for 5 years showed that all cats lost weight over time. However, cats supplemented with dietary antioxidants, prebiotic chicory root and a blend of Omega 3 and 6 fatty acids had a beneficial effect over a commercially fed diet alone or one supplemented only with antioxidants (Vitamin E and beta carotene). Cats in the fully supplemented group lost less weight, lived longer, had better LBM scores, improved fecal flora and fewer diseases.

In many cases, practical methods to help owners manage their animal's appetite are critical to success. This is particularly important because anorexia is one of the most common contributing causes to an owner's decision to euthanize his or her pet.

Any issues that potentially can affect food intake should be addressed, whether physical or environmental. Dental disease, for example, can substantially impair food intake in an otherwise healthy or sick animal. Pain (eg, back or joint) can decrease an animal's mobility and make it more difficult to secure adequate food intake. Environmental issues also can negatively impact food intake. Multipet households may impede the ability of an individual animal to gain access to food (eg, a more frail or timid animal may be crowded out from the food bowl). Stress often can increase for animals after diagnosis of any illness because of lifestyle changes (eg, medication administration, new foods), as well as increased stress on the part of the owner, which may be detected by the animal.

Once environmental issues are ruled out as a cause of weight loss, a nutritional screening is crucial. Older cats may need 5-6 g of protein/kg to prevent protein catabolism. Reduced digestive ability indicate that a high energy, highly digestible diet may be needed. Some kitten formulas may be more appropriate. Folate and cobalamin supplementation may be useful. Commercial cat foods vary quite widely in caloric density. Specific formulas should be investigated for adequacy.

Cachexia should be anticipated in animals with chronic diseases such as CHF, CKD, cancer, and others. Consistently evaluating MCS in all patients will help identify muscle loss at an early, mild stage in aging or ill animals, rather than waiting until muscle loss is moderate or severe, when it may be more difficult to successfully manage. Similarly, as animals age, muscle loss is likely to occur, even in healthy individuals. Therefore, muscle mass should be thoroughly evaluated in geriatric cats and dogs.

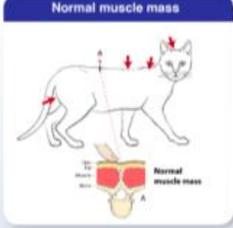
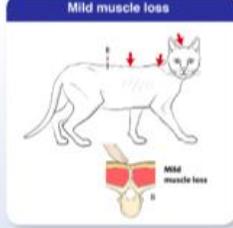
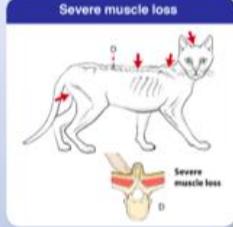
## References

- Freeman, L. Cachexia and Sarcopenia: Emerging Syndromes of Importance in Dogs and Cats. *J Vet Intern Med* 2012;26:3-17
- V. Paul Doria-Rose, DVM, and Janet M. Scarlett, DVM, PhD. Mortality rates and causes of death among emaciated cats. *JAVMA* Feb 2000, Vol. 216, No. 3, Pages 347-351
- Finn E, Freeman LM, Rush JE, et al. The relationship between body weight, body condition, and survival in cats with heart failure. *J Vet Intern Med.* 2010;24:1369-1374.  
<http://www.wsava.org/nutrition-toolkit>



### Muscle Condition Score

Muscle condition score is assessed by visualization and palpation of the spine, scapulae, skull, and wings of the ribs. Muscle loss is typically first noted in the axial muscles on each side of the spine; muscle loss at other sites can be more variable. Muscle condition score is graded as normal, mild loss, moderate loss, or severe loss. Note that if animals can have significant muscle loss even if they are overweight (body condition score > 5/9). Conversely, animals can have a low body condition score (< 4/9) but have minimal muscle loss. Therefore, assessing both body condition score and muscle condition score on every animal at every visit is important. Palpation is especially important with mild muscle loss and in animals that are overweight. An example of each score is shown below.

Normal muscle mass	Mild muscle loss
	
Moderate muscle loss	Severe muscle loss
	

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# Pandora Syndrome: Much More than FIC

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Lower urinary tract signs (LUTS) – dysuria, periuria, pollakiuria and stranguria – are a common reason pet cats are brought to veterinary practices. When presented with a cat with these signs clinicians need to know whether this is the first episode or whether it is a chronic, recurrent disease as well as what other health problems the cat may have. Armed with this information an appropriate diagnostic plan can be made.

Cats may have multiple reasons for their clinical signs as well as other medical conditions and environmental requirements that need to be addressed. For example, Buffington et al. have presented evidence that some cats with severe, chronic LUTS seem to have a functional rather than a structural lower urinary tract disorder and that periuria can occur in apparently healthy cats exposed to stressful circumstances. There is significant overlap at the present time among treatment recommendations for some LUT disorders particularly with regard to ensuring that the patient's environmental needs are met.

Severe chronic idiopathic LUTS has been described as a naturally occurring model of interstitial cystitis in women. Interstitial cystitis (IC) has been defined as a disease of chronic irritative voiding signs, sterile and cytologically negative urine and cystoscopic observation of submucosal petechial hemorrhages. The same description in which cystoscopy was not performed in cats but in which other appropriate diagnostic procedures did not identify a cause became defined as Feline Interstitial Cystitis (FIC)

In addition to epithelial abnormalities identified in the bladder of cats with FIC, investigators found significant alterations in components of acetylcholine synthesis and release in the esophageal mucosa from cats with FIC. This suggested that changes in the nonneuronal cholinergic system may contribute to alterations in cell-to-cell contacts and possibly communication with underlying cells that may, in turn, contribute to changes in sensory function and visceral hyperalgesia. Differences in sensory neuron anatomy and physiology also are present in cats with FIC suggesting a more widespread abnormality of sensory neuron function. The acoustic startle response is a reflex motor protective response to a perceived threat. It is a brainstem reflex response to unexpected auditory stimuli and is increased in cats with FIC.

Differences in sympathetic nervous system function have also been identified in cats with FIC. Among them are changes in the brain stem in the region associated with the most important source of norepinephrine in cats and humans. It is involved in such brain functions as vigilance, arousal and analgesia and mediates the visceral response to stress. Other changes in brainstem help to explain the waxing and waning course of symptoms and the aggravation of signs by environment stressors.

Some cats with FIC appear to have abnormalities in the hypothalamic-pituitary-adrenal axis such that there is a decrease in serum cortisol secretion compared with healthy cats. Adrenal glands in these cats were grossly smaller in cats with FIC when compared to healthy cats.

Cats with FIC often have variable combinations of comorbid disorders such as behavioral, endocrine, cardiovascular and GI problems. External stressors appear to exacerbate clinical signs of these disorders. Many human beings with IC suffer from variable combinations of comorbid disorders as well. These appear to have no consistent pattern of onset and so cannot be attributed to LUTS but rather may be some common disorder affecting more than one organ which then responds in its own way.

Ongoing research in both humans and cats with chronic LUTS has begun to include a more comprehensive evaluation of the entire patient. Nosology is defined as the classification of diseases. Until a better understanding of the larger picture of cats presenting with LUTS, naming this constellation of symptoms and organs systems involved should remain vague and not reflect only LUTS. Dr. Buffington has suggested “Pandora’s Syndrome” He and his colleagues, Drs. Westropp and Chew propose tentative criteria for diagnosis of Pandora syndrome:

1. Presence of clinical signs referable to other organ systems in addition to chronic idiopathic signs for which the patient is being evaluated
2. Evidence of early adverse experience (e.g abandonment, orphaning) and which may differ by individual
3. Waxing and waning of severity of clinical signs with events that (presumably) activate the central stress response system
4. Resolution of signs with effective multimodal environmental modification

Whatever the eventual name, restricting the description of these patients to their LUTS does not capture all of the currently recognized features of the syndrome. A more comprehensive evaluation of cats with these and other chronic idiopathic signs may result in a more complete diagnosis and lead to additional treatment approaches that may improve outcomes. For example, the relationship between the environment and health is quadratic rather than linear, with both deficient and threatening environment increasing the risk of poor health outcomes.

Individual patients presenting with chronic LUTS benefit by a more comprehensive evaluation to elucidate the effect on risk for Pandora syndrome. Included in this history should be:

- Where the cat was obtained
- Any other health or behavior problems that may be present
- Structure of the cat's environment – amount of time indoors, activity level, availability and management of resources, other cats in the home, people living with the cat.
- Presences of signs referable to other organ systems
- Perceived allergic responses to skin, lung or GI tract
- Any unusual or problematic behaviors

The physical exam should be performed with evaluation of the lower urinary tract last to avoid being distracted and missing other abnormalities such as over-grooming, obesity, acne, cardiac abnormalities or GI tract issues.

For an initial episode in an apparently healthy, young unobstructed patient, the most likely explanation is either a sickness behavior in an otherwise healthy cat or acute idiopathic LUTS. After ruling out other causes of LUTS, the client should be counseled regarding individually tailored multimodal environmental modification (MEMO) to make sure the cat's environmental needs are being met. The client can also be taught to look for other signs of sickness behaviors and to evaluate response to MEMO for adequacy of accommodation.

**Table 1**

Forms used as part of the evaluation of cats presented the Ohio State University Veterinary Medical Center for evaluation of chronic lower urinary tract signs. These forms have not been formally validated beyond their face validity for cases in the authors' practice area. They are offered as an example of an instrument that could be developed and validated for broader use

**Cat and client history form**

Cat's name \_\_\_\_\_ Owner name \_\_\_\_\_ Date \_\_\_\_\_

Contact information: Telephone:  \_\_\_\_\_ E-mail:  \_\_\_\_\_  
 Please check preferred method of contact

Cat Information: Breed \_\_\_\_\_ Color \_\_\_\_\_ Date of Birth \_\_\_\_\_ Weight  lb  kg

Owned for? \_\_\_\_\_ years \_\_\_\_\_ months;  M  F  Neutered? If yes, date: \_\_\_\_\_

(month/year)

Declawed?  N  Y If yes, Front only  All four paws

Body Condition (please check box that looks most like your cat):

<input type="checkbox"/> Skinny	<input type="checkbox"/> Lean	<input type="checkbox"/> Moderate	<input type="checkbox"/> Stout	<input type="checkbox"/> Obese
				

Please check the boxes that best apply to your cat:

Diet: (please be as specific as you can, eg, Buckeye Best (company) Adult Chicken and Rice (flavor)

Wet food: name \_\_\_\_\_ None 25% 50% 75% 100%

Dry food: name \_\_\_\_\_ None 25% 50% 75% 100%

How many hours each day, on average: does your cat spend indoors? Indoor only 18-24 12-18 6-12

0-6 Is time outside supervised? Yes No

If you have more than one cat, what is their relationship? Not related

Littermate Sibling Parent-Offspring Other (\_\_\_\_\_)

**Where did you obtain your cat (source)?**

- Shelter  Offspring from a pet I already own(ed)  
 Purchased from a friend  Gift  
 Purchased from a breeder  Purchased from a pet shop  
 Stray/orphan  Other \_\_\_\_\_

**Does your cat frequently (please check all that apply):**

- Try to escape  
 Pace at outside doors  
 Cry at outside doors  
 Hide  
 Act fearful  
 Act friendly  
 Follow owners around the home  
 Destroy things when left alone  
 Act 'depressed' (little interest in feeding, grooming, environment, etc.)

**Housing** (\_\_\_\_): *Apartment:*  studio  1-2 bedrooms  3 or more bedrooms,  
 Zip Code \_\_\_\_\_

*House:*  attached/twin duplex  attached, 3 or more units,  single  
 other \_\_\_\_\_

Total Cats \_\_\_\_\_ Total Dogs \_\_\_\_\_ Other Pets \_\_\_\_\_

Other People \_\_\_\_\_

**Please help us understand what your cat does around the house by placing a check (✓) in the box next to each behavior that best describes how commonly your cat does each of the behaviors described below**

Does your cat:	All of the time	Most of the time	A good Bit of the Time	Some of the time	A little bit of the time	None of the Time	Does Not apply
Leave household articles (furniture, drapes, clothing, plants, etc) alone	<input type="checkbox"/>						
Eat small amounts calmly at intervals throughout the day	<input type="checkbox"/>						
Drink small amounts calmly at intervals throughout the day	<input type="checkbox"/>						
Use the litterbox	<input type="checkbox"/>						
Get along with people in the home	<input type="checkbox"/>						
Get along with other pets in the home	<input type="checkbox"/>						
Remain calm when left alone	<input type="checkbox"/>						
Stay relaxed during normal, everyday handling (grooming, petting)	<input type="checkbox"/>						
Calm down quickly if startled or excited	<input type="checkbox"/>						
React calmly to everyday events (telephone or doorbell ringing)	<input type="checkbox"/>						
Play well with people	<input type="checkbox"/>						
Play well with other family cats	<input type="checkbox"/>						
Show affection without acting clingy or annoying	<input type="checkbox"/>						
Tolerate confinement in a carrier (including travel)	<input type="checkbox"/>						
Groom entire body calmly	<input type="checkbox"/>						
Use scratching posts	<input type="checkbox"/>						
Play with toys	<input type="checkbox"/>						

Comments; anything else your cat regularly does or does not do that you think might be helpful for us to know about?

**Health history**

The cat's condition today is \_\_\_\_\_

Previous illnesses or surgeries \_\_\_\_\_

Current medications \_\_\_\_\_

**Directions:** For items below, please use the following choices to describe how many times you have seen your pet experience the symptom, adding **comments/explanation** as appropriate.

**Score =**

**0** = I have **NEVER** seen it

**1** = I have seen it **at least ONCE**

**2** = I see it **at least ONCE per YEAR**

**3** = I see it **at least ONCE per MONTH**

**4** = I see it **at least ONCE per WEEK**

**5** = I see it **DAILY**

Score	How often does your cat:	Comments/explanation
	Cough	
	Sneeze	
	Have difficulty breathing	
	Stop eating	
	Vomit <input type="checkbox"/> food <input type="checkbox"/> hair <input type="checkbox"/> bile <input type="checkbox"/> other	
	Have hairballs	
	Have diarrhea	
	Have constipation	
	Defecate outside the litter box	
	Strain to urinate	
	Have frequent attempts to urinate	
	Urinate outside the litter box	
	Have blood in the urine	
	Spray urine	
	Groom more than cats usually do	
	Shed more than cats usually do	
	Scratch him/herself more than cats usually do	
	Have discharge from eyes	
	Seem fearful	
	Seem to need a great deal of contact or attention	
	Destroy things when left alone	

Please check any of the following diseases your cat has been diagnosed with:

- |                                                          |                                            |
|----------------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Periodontal (dental) disease    | <input type="checkbox"/> Asthma            |
| <input type="checkbox"/> Inflammatory bowel disease      | <input type="checkbox"/> Skin disease      |
| <input type="checkbox"/> Allergies                       | <input type="checkbox"/> Diabetes mellitus |
| <input type="checkbox"/> Cardiomyopathy (heart problems) | <input type="checkbox"/> Obesity           |
| <input type="checkbox"/> Other _____                     |                                            |

**Household resource checklist**

The following questions ask about your cat's resources so we can learn more about the environment your cat(s) live in. Please **✓ DK** if you don't know, **NA** if it does not apply, or **Yes** or **No** after each question. If you have more than one cat, please answer for **all** cats. Resources (food, water, litter and resting areas) for each cat are assumed to be out of (cat) sight of each other, such as around a corner or in another room. If they are in sight of each other, please answer **No**.

<b>Space</b>		<b>DK</b>	<b>NA</b>	<b>Yes</b>	<b>No</b>
1	Each cat has its own resting area in a convenient location that provides some privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Resting areas are located such that another animal cannot sneak up on the cat while it rests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Resting areas are located away from appliances or air ducts that could come on unexpectedly (machinery) while the cat rests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Perches are provided so each cat can look down on its surroundings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Each cat can move about freely, explore, climb, stretch, and play if it chooses to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Each cat has the opportunity to move to a warmer or cooler area if it chooses to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	A radio or TV is left playing when the cat is home alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Food and water</b>					
8	Each cat has its own food bowl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Each cat has its own water bowl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Bowls are located in a convenient location to provide privacy while the cat eats or drinks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Bowls are located such that other animals cannot sneak up on the cat while it eats or drinks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Bowls are washed regularly (at least weekly) with a mild detergent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Bowls are located away from machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Litter boxes</b>					
14	Each cat has its own box (one box per cat, plus one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Boxes are located in convenient, well-ventilated locations that still give each cat some privacy while using it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Boxes are located on more than one level in multi-level houses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Boxes are located so another animal cannot sneak up on the cat during use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Boxes are located away from machinery that could come on unexpectedly during use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	The litter is scooped daily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	The litter is completely replaced weekly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Boxes are washed regularly (at least monthly) with a mild detergent (like dishwashing liquid), rather than strongly scented cleaners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Litter boxes (continued)</b>		<b>DK</b>	<b>NA</b>	<b>Yes</b>	<b>No</b>
22	Unscented clumping litter is used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	A different brand or type of litter is purchased infrequently (less than monthly)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	If a different type of litter is provided, it is put in a separate box so the cat can choose to use it (or not) if it wants to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Social contact</b>					
25	Each cat has the opportunity to play with other animals or the owner if it chooses to on a daily basis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Each cat has the option to disengage from other animals or people in the household at all times	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Do any cats interact with outdoor cats through windows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Body care and activity</b>					
28	Horizontal scratching posts are provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Vertical scratching posts are provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Chew items (eg, cat-safe grasses) are provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Toys to chase that mimic quickly moving prey are provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Toys that can be picked up, carried, and tossed in the air are provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Toys are rotated on a regular basis (at least weekly) to provide novelty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have additional comments on any of the questions, please write them below, including the question #.

By submitting this form, you agree that anonymous information from it may be used for cat health-related research

# The Wheezing Cat: Feline Lower Airway Disease

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Clinical signs of lower airway disease most commonly include coughing with or without periodic respiratory distress. Audible wheezes and prolonged expiration or an expiratory push may be appreciated. Upper airway diseases should result in prolonged inspiratory phase, by contrast. Cats are usually 1 year to about 9 or 10 years when first affected. Kittens with cough should be evaluated for an underlying disease such as parasitic migration or for another cause such as nasopharyngeal polyp. Older cats, while they will continue to have asthma throughout their lives should not develop asthma for the first time as geriatrics. Any time asthma is suspected in an old cat, a complete evaluation should be performed, as a distinct underlying condition is much more likely present.

Some cats have a syndrome more consistent with asthma, reversible bronchoconstriction in response to inhaled allergens. Other cats are more similar to chronic bronchitis with cough, excessive mucous and bronchial thickening. Still others are difficult to distinguish. The underlying cause is often unknown and the role of viral respiratory infections, a common cause of asthma in genetically susceptible infants, is unclear. Some cats are affected seasonally and others year round. Certain cats appear sensitive to environmental contaminants such as dusty cat litter, tobacco smoke or aerosol fragrances. Secondary spontaneous pneumothorax has been reported. Clinical signs of affected cats include cough, wheeze and respiratory distress.

Thoracic radiology is the main source of diagnosis. Affected cats have a bronchial or bronchointerstitial pattern. Hyperinflation due to air trapping and right middle lung lobe collapse from a mucous plug may occur.

Baseline work up is usually unremarkable. In endemic areas, heartworm antigen and antibody testing and Baermann fecal for lungworms is indicated. Bronchoalveolar lavage appears unable to distinguish between chronic bronchitis and asthma but is useful to evaluate for other causes such as neoplasia or infection.

Pre-oxygenate for 10 minutes, intubate using a sterile tube. Infuse 3-6 mls of sterile saline into the tube and collect for cytology.

Acute therapy includes supplemental oxygen therapy, glucocorticoids and bronchodilators. Cats with lower airway disease should improve within 4-6 hours. In acute situations 2-4 mg/cat of dexamethasone IV. 5-10 mg/cat prednisolone may be needed for a period of time. As bronchoconstriction is common, albuterol 1-2 puffs every 6 hours or terbutaline (0.01 mg/kg SQ) is often helpful.

The distinction between cardiac and respiratory distress may be difficult. Rapid assessment by ECG is ideal, however the cardiac biomarker NT pro-BNP may be helpful to exclude a diagnosis of heart disease. Pulmonary infection is not common in cats but must be excluded before commencing corticosteroid therapy.

Chronic therapy is aimed at removal of any identifiable triggers and glucocorticoids. Inhaled corticosteroids reduce the risk of systemic effects but require administration via face mask and spacer. (Aerokat, Trudell Medical, London and Ontario). Typically oral glucocorticoids precede inhaled therapy and are given simultaneously for a period followed by tapering of oral form.

Several drugs have been shown to be of no help: cyproheptadine, cetirizine, zafirlukast, and maropitant.

Fluticasone is the inhaled corticosteroid most commonly used. Dosage is not certain. This author starts fluticasone at 110mcg/cat twice daily. Combination products such fluticasone with the long-acting bronchodilator salmeterol improved efficacy in one study. For cats who do not respond well to oral corticosteroids, the inhaled form is unlikely to be helpful. Cyclosporine has been described as helpful (10 mg/kg PO q 12 hours) with improvement in airway hyperresponsiveness and amelioration of cytologic inflammation. It is a potent immunosuppressive so blood levels should be monitored as well as potential for pathogens to gain a foothold with an impaired immune system. Doxycycline or Azithromycin is prescribed if infection is suspected, but this is uncommon.

Future therapeutic options are promising including rush immunotherapy which has been effective in research cats. Masitinib and fish oil may be useful after further research. Stem cell therapy research is ongoing for long-term disease control.

## **Improving indoor air quality**

Key elements of improved air quality are source control, adequate ventilation (especially in shower, laundry, and cooking areas), maintaining relative humidity between 30-50%, changing air filters on a regular basis, and air duct cleaning as needed. To limit dust accumulation, use a quality vacuum with a high-efficiency filter weekly. Water leaks should be promptly repaired, and after any flooding, areas should be thoroughly cleaned and dried. If materials cannot be dried promptly, they should be replaced. CO monitors should be installed in the home. All gas appliances should be properly functioning or inspected and adequately cleaned and repaired. Gas stoves and heaters should be vented to the outside of the home. Owners should be reminded that gas ranges should never be used as a heat source. Smoke detectors, along with the enforcement of improved building codes, are effective in reducing fire-related deaths. Owners should be cautioned about so-called air purifiers that use ionization as a means of "clearing the air" but actually increase indoor ozone concentrations, at times to levels well in excess of that considered safe. Kerosene heaters should be used only as

indicated by the manufacturer's instructions, and should be refueled outdoors using specially manufactured low-sulfur fuel. Cars, lawn mowers, etc., should never be left running inside a garage or shed, especially if the space is ever used to house a pet

### **Heartworm disease**

In endemic areas, indoor and outdoor cats are at similar risk for infection. The infective L3 stage larva enters the cat through a bite wound, moults to L4 and L5 stages and migrates to the pulmonary arteries as immature adults 70-90 days after infection. Once infected, the cat's natural resistance results in a short period of microfilaremia. The clinical worm burden is also lower in cats, from 1 to 9 worms, than in dogs. The average time for infective larvae to develop into circulating microfilariae in experimental feline infections is about 8 months. Thus, microfilaremia is uncommon (<20%), inconsistent, and transient in cats, and very low numbers are usually produced. The comparable development period in dogs is 5-6.5 months.

There is high mortality of L5 as they arrive in the distal pulmonary arteries in the cat. High mortality of immature adult heartworms is associated with intense pulmonary bronchial and parenchymal response called Heartworm-Associated Respiratory Disease (HARD). Residual pulmonary pathology related to HARD persists even after immature heartworms die. Thus many heartworm infections may be misdiagnosed as feline asthma.

Heartworm disease in cats is characterized by pulmonary eosinophilic bronchial and interstitial reaction associated with immature adults (3-6 months after infection) chronic lung changes associated with mature adult heartworms (6 months – 4 years) and acute respiratory distress associated with the death of worms at any age.

Lesions associated with HARD are initiated by immature larvae as early as 70 to 90 days after infection. The lesions in HARD are characterized by peribronchial fibrosis, interstitial myofibroblasts and fibrosis of alveolar struts. Muscular hypertrophy, villous endarteritis and adventitial cellular infiltrates are common findings in all pulmonary arteries, although caudal arteries are most commonly seen radiographically. Infiltrative interstitial lung disease, reduced clearance of mucous and inflammatory debris are the hallmark of this lung disease as opposed to increased bronchiolar wall reactivity as proposed in asthma models.

Wolbachia are gram-negative bacteria belonging to the order Rickettsia that reside within the body of *D. immitis* and appear within 2 months of exposure to infective larvae. The release of bacteria following worm death has shown to cause upregulation of proinflammatory cytokines, neutrophil recruitment and an increase in specific immunoglobulins, although the role of this intracellular bacteria alone in the pathogenesis of feline heartworm is unclear.

Clinical signs often include coughing or vomiting most commonly associated with immature heartworms arriving in the lungs or death of adult heartworms. The initial arrival of L5 in the distal pulmonary arteries induces diffuse pulmonary infiltrates and often eosinophilic pneumonitis. Clinical signs associated with acute phase subside as the worms mature but lesions remain even in cats who clear infection.

Most infected cats will be asymptomatic during most of infection. Adult heartworm death, even as little as one, may induce acute, potentially fatal disease with acute circulatory collapse or severe respiratory distress. Anorexia and lethargy may be the only presenting complaints. Coughing or intermittent vomiting may occur. The vomiting appears unrelated to eating. Inflammatory mediators and stimulation of the chemoreceptor trigger zone are postulated as the cause.

Positive antibody result indicates infection with L3 which has moulted to L4 and lived at least 2-3 months. Adult heartworms may or may not develop from this infection. ELISA antigen testing is specific for glycoproteins associated mainly with reproductive tract of fully mature female worms, making false-negative results common. Cats presenting with HARD from immature adults will be antigen negative as will those with low worm numbers. Eosinophilic cytology from BAL will be most intense 3-6 months after migration and is intermittent. Thoracic radiology is helpful but not specific. *Aelurostrongylus* and roundworm infection are the most common pulmonary infections to mimic heartworm radiologic signs.

Year round heartworm prevention prevents both patent infection and HARD. When cats were infected with L3 heartworms experimentally and treated with selamectin monthly commencing 28 days later did not develop adult worms but did seroconvert to antibody-positive status. Another study demonstrated that cats pretreated with selamectin 32 and 2 days before L3 infection did not develop HARD or seroconvert to antibody positive. The role of Wolbachia remains to be illuminated. Heartworm in cats is often confused with lungworm, roundworm, bronchitis, asthma, or in many cases overlooked.

# Communications Boot Camp: The Feline Enigma- See More Cats!

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If you build it, will they come? The answer is yes. We know in veterinary medicine, and for most businesses marketing does matter. If you are the only person who knows you are cat friendly, what's the point?

## The Bayer veterinary care usage study 3: Feline findings

Four major reasons cat owners did not take their cats to the veterinarian for routine annual examinations were identified: lack of knowledge, feline resistance to pet carriers and travel, stressful experiences in the veterinary hospital, and cost.

Unlike the situation for dogs, most cats were acquired for free and without forethought. Many were gifts from family or friends or simply strays that showed up on the doorstep. Consequently, most cat owners received little or no initial instruction on proper veterinary care for their new pet. Only 48% of cat owners surveyed had taken their cat to the veterinarian within the preceding year. Many (37%) did not recall their veterinarian ever recommending annual examinations. Further, owners perceived that indoor cats were less likely to get sick and were unaware that cats are adept at hiding signs of illness or injury.

The first phase of the Bayer veterinary care usage study<sup>2</sup> established that feline resistance to pet carriers and travel was a major obstacle to veterinary visits. During focus group sessions conducted for the present phase of the study, cat owners were asked to make collages demonstrating what taking their cat to the veterinarian is like. Most of the collages used pictures from horror films and other sources that reflected a terrible and stressful experience for the cat and owner. Yet, only 18% of cat owners surveyed said they had received any instruction from their veterinarian on how to make bringing the cat to the hospital less stressful.

Once the owner dealt with getting the cat to the veterinary practice, the stress did not end there. More than half of cat owners (57%) were less than completely satisfied with waiting room comfort for their cats, and nearly the same percentage were less than completely satisfied with waiting room comfort for themselves. It was clear from the focus group sessions that for most owners, a veterinary visit was something to be dreaded and endured.

Finally, when asked how satisfied they were with their veterinary experience, cat owners were least satisfied with the value obtained for the money they spent, with 59% rating this factor lowest in satisfaction. When asked which items on a list of 16 concepts would motivate them to take their cat to the veterinarian more often, the top 3 items were cost related: a coupon for 50% off the cost of a veterinary visit (50% of respondents), a low-cost preventive care plan paid monthly (40%), and a 20% discount for multiple pets if brought in within a 30-day period (30%). The cost issue was all the more important because many owners indicated during focus group sessions that they had cats primarily because they perceived cats as low-cost pets.

Perceived value, however, cannot be separated from emotional and perceptual judgement of an experience. If an individual has a positive experience, one that validates their concerns, values their cat, feels respected, and whose feelings are considered has a different perception of cost and value than one who has a negative experience.

Consider the one hour massage:

- Soothing music
- Pleasant aroma
- Excellent technique
- Low relaxing lighting
- Soft massage table bedding
- Cost \$150 gladly paid

Consider the usual cat veterinary visit:

- Stressful carrier and car
- Guilt about upsetting beloved family member
- Perceived lack of understanding
- Beloved cat very fearful
- Owner worried about behavior
- Beloved cat "disappears" into the "back"
- Cost \$150, gladly paid?

One of the most encouraging findings of the study was that 82% of cat owners had a regular veterinary practice, and 83% took a new cat to the veterinarian within the first year of ownership. This suggests there may be a small but critical window for veterinarians to educate owners on proper health care and how to reduce the stress to themselves and their pets in getting cats to the practice. Given the opacity of the feline species regarding manifestation of illness or other health problems, the data also shows that 81% of cat owners believe their cats are healthy. In a study published in 2015, 100 apparently healthy cats over 6 years old were examined by veterinarians. In those 100 cats, 273 health problems were identified or 2-3 per cta. 72% of these cats had some form of periodontal disease. Both Banfield and American Humane Association data will illuminate this further.

Veterinarians recognized the opportunity presented by increasing the number of feline visits. Seventy-seven percent of respondents agreed that cats represent one of the most substantial missed opportunities for the veterinary profession, and 91% agreed that their practices could handle an increase in cat visits without major changes. Although there had been modest improvement between 2010 and 2012, the annual number of visits to veterinarians remained low, with considerable unused capacity; 52% of veterinarians were filling < 70% of their available appointments.

## **How to build your feline patient population. The intent is to communicate we care about cats.**

### **Media matters**

- Helps to drive new business
- Maintains current business/building your community
- Offers information to the public
- You become authoritative source
- Establishes your brand

### **Today, there's a price to pay for not being "social"**

- You're living in the past
- Your competitors are playing
- Missed opportunity: You could be using social to help pets, to build your brand (and your practice)

### **"Word of mouth is the form of advertising," anonymous 1400's**

### **Facebook 101 – set up a fan page**

#### **Content is king – what not to post**

- Anything very personal (ex: My wife and I had good night, starting at 3 a.m.)
- Anything unprofessional – don't let emotions rule (ex: Dr. Joe Smith is a jerk)
- Anything political (ex: Trump should move to Mexico)
- Taking a stand is ok – IF it is about what you do & sincere. Cheap attention grabbers don't work in the long run...people will learn to see through you
- Don't post anything that flies in the face of your brand (ex: a funny video of a child 'pulling a cat's ear')

## **What TO post**

### **Rule of threes**

- Self-Promotion (ex: "This week, introduce a new client and you receive 30% off an exam, or 10% off dentals in February).
- Useful content from you (ex: "Here are my tips on nuisance barking")
- Useful content from (credible) others (ex: "Here's an AAHA video on home dental care)

### **Where to find useful and credible content**

- Trusted colleagues
- Trusted sources (ex .edu's, AAFCO, AAHA, AVMA, also client facing sites – not so 'sciency')
- Trusted blogs
- YouTube
- Pages more popular than you – some may rub off on you...and make them aware (if applicable) and they may link to you or mention you (Google likes that)

### **#1 Problem with social: Feeding insatiable appetite for content**

- Funny pets picture (clients typically offer permission, and likely share with friends)..you take them, clients submit, have a contest
- Photo of giant hair ball or image of foreign bodies ('can you believe I took 3 rubberbands out?')
- Share clients' YouTube videos
- Share funny pet stories, encourage clients to submit their own
- Offer tips (keep pets safe in winter)
- Promote: 'We're offering new test to discover CKD earlier (SDMA)'

## **Multi-task**

- Ideal scenario

Share with yourself – Enhances odds of others sharing, and Multi-purposing makes sense....

Content can first live on your website or a blog (or a blog appearing on your site), or any of these....

- Post on Facebook
- Post a link on Twitter
- Post on Instagram
- Post on GooglePlus, SnapChat

But still you can't do it all –

When should you weigh in on social matters?

Website: Think of it as a repository for everything you/your practice. Links to blog, YouTube page, Twitter, Facebook, Instagram, Google Plus, SnapChat, etc.

Bios, Description of Services, Additional content, Testimonials, Products you sell.

### **YouTube page**

- People see who you are
- With animals seeing is the best way to demonstrate, or explain
- You do NOT need to be a 'TV performer,' just a competent and confident professional
- Provides content for your website and social platforms – people can see you are 'cat focused.'
- Not everyone can get on TV – anyone can get a YouTube page
- Hopefully fun

### **YouTube video tips**

- Shot with a camera vs. phone
- Not just you – you need an animal (choose a client's animal, and client shares)
- If the topic suggests a demo, do it!
- Be professional, but SMILE
- If you goof up while recording, that's what delete is for. No one wants to see your outtakes.
- The goals: support your business/exposure, inform pet owners. NOT go viral

### **Blogs**

- Great way to express yourself, and potentially find an audience, instant marketing
- Can use content on website and in social
- 50 Gazillion blogs out there – but are a 'cat blog'
- How to come up with creative content

### **Podcasting**

#### **Traditional media**

- TV/Radio
- Radio
- Print (bloggers too)

### **If you build it, they will come**

- Contest/promotions online and in clinic (ex: Best dressed for Halloween)
- Open House (ex: Clinic's 5<sup>th</sup> birthday, or bring in special speaker)
- No cost or low cost vaccines; senior citizen day and/or rates; referral discounts; shelter adoption discounts, etc. People like bargains
- Wellness plans
- Kitten/puppy classes
- Community involvement

Traditional communication skills must continue to reinforce the "accessibility" of doctors and staff in the veterinary establishment. Building trust and confidence is required to continue the conversation. In many practices, the first person entering the room is not the doctor, the one person the owner came to see. Since arousal in cats is cumulative, the experience the cat and owner has at the beginning of the visit is pivotal. Recent work on the concept "doctor in first" has demonstrated reduced arousal, more efficient time management and, in the end, better medicine. While the cat becomes acclimated to the room, no one interacts directly with the cat.

This is the time for relationship building with the owner. An open question followed by silence on the part of the doctor will allow the owner to “tell their story” in an uninterrupted manner.

- “how may I be of help to you today”
- “Please tell me what you are noticing at home that brought you here today?”

Research in patient-doctor communication on the human side has convincingly demonstrated that this technique assures that all of the reasons for the visit are stated, that there are no surprises at the end of the visit and that the patient is more satisfied with the encounter. This quiet bonding time with the owner is crucial for building trust. Meanwhile, no one has touched the cat so distractions are kept to a minimum.

The physical exam has already begun at a distance during this conversation. We assess coat quality, gait, demeanor and, most importantly, arousal. One of the most critical skills required for becoming cat friendly is to learn to read how cats communicate their emotional state through their body posture, facial expression and movement. Fear is the #1 cause of “bad behavior” in the veterinary environment. By learning to assess emotional states, we can avoid a fully aroused state that takes a cat 30-40 minutes or longer to recover from. There are also consequences for the next feline patient. Cats leave behind a scent from their pads that indicates stress. Careful cleaning between appointments is not only important for disinfection but also to remove this form of communication between cats.

Three broad types of skills need to be addressed in communication skills training:

1. Content skills – what we communicate. The substance of clients’ questions and our responses, the information we gather and give, the treatment plans we discuss
  2. Process skills – how we do it. The ways we communicate with clients, how we discover history, provide information. The verbal and nonverbal skills we use, how we develop a relationship with the client, the way we organize and structure communication
- Perceptual skills – what the clients and we are thinking and feeling. The internal decision-making, clinical reasoning and problem solving skills we bring to the encounter. Our attitudes, personal capacities for compassion, mindfulness, integrity, respect and flexibility are critical to understanding how to create a successful relationship and achieve the best outcomes. We need to be aware of our feelings and thoughts about the client, about the patient’s condition and other issues that may be concerning the client; awareness of our own self-concept and confidence, of our own biases and distractions.

# No Pain, More Gain: Revealing the Secret Sauce- How a Positive Feline Veterinary Experience WILL Matter

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For people lucky enough to adopt or find a cat as a kitten, early socialization matters. Visiting the veterinarian for the staff to simply pet the kitty, offer treats, and tell the kitten's owner how beautiful that kitten is, serves several purposes:

- Bonds the client further to the practice
- Helps to positively condition the kitten to the veterinary office, and the car travel and carrier to get there.

## **Kitten socialization classes serve many purposes**

Classes for kittens are, in part, based on Guidelines created by the American Association of Feline Practitioners. If puppies can attend kindergarten, why not kittens? Just as socializing dogs saves lives, the same turns out to be true for cats. For one thing, people are more likely to tote their cats to a vet's office if they're willing subjects. The classes are an effective method for kitties to be desensitized to their carriers, to strange people even to dogs. Getting out in the world is enriching! When it comes down to it, puppy classes are about teaching people - same is true here, and topics included are why de-claw is not necessary subtle signs of illness, when to visit the veterinarian and litter box 101. What's more, you can train a cat to do things; the benefits of clicker training for cats are discussed.

Veterinary behaviorists endorse kitten socialization classes. These classes were created about a decade ago in Australia by veterinary behaviorist Dr. Kersti Seksel.

Cats visit the veterinarian less than half as often as dogs, yet there are 20 per cent more dogs than cats in America.

- Fear of the carrier
- Fear of car ride
- Fear of strange places, smells, sounds

Also, people may feel cats are more independent, and therefore, somehow don't require medical attention.

Carrier Training is Key – and even adult cat can be training to a carrier using desensitization and counter conditioning.

If clients can adjust their cat to the car ride, the carrier and the waiting room without fear, anxiety, stress – you've successfully set up your cat for the exam.

Carrier training may encourage clients to do other training, which enhances the human/animal bond, and is enriching for the cat.

The physical presence of other animals in the reception area is a key consideration for reduction of stress. Many strategies for reducing the negative effects can be implemented including, separate entrances, separate waiting areas, or "cat only" days. Voices should be kept low, sounds kept to a minimum, unnecessary odors like perfume or cologne avoided. Visual barriers can be employed to keep cats from seeing dogs or other cats. Staff members must be counseled not to look directly in the face/stare at cats. If a separate space is available, a feline facial pheromone diffuser is helpful

One of the most critical skills required for becoming cat friendly is to learn to read how cats communicate their emotional state through their body posture, facial expression and movement. Fear is the #1 cause of "bad behavior" in the veterinary environment. By learning to assess emotional states, we can avoid a fully aroused state that takes a cat 30-40 minutes to recover from. Cats leave behind a scent from their pads that indicates stress. Careful cleaning between appointments is not only important for disinfection but also to remove this form of communication between cats.

A cat examination room should contain all of the equipment and supplies needed to perform most outpatient services. By approaching in a calm manner, keeping the people in the room to a minimum, using quiet voices, towels for restraint if needed, and being flexible about the order the exam is performed in, there will be more successful experiences than usual. Scruffing or stretching should never be necessary and is counter-productive. In a calm environment the doctor can talk through the exam, making sure clients understand what is being done and the value and importance of the physical exam.

Many gentle techniques are described in the photos in the Cat Friendly Practice (CFP) program that offer ideas regarding restraint. The examination table may be the least necessary piece of equipment in the room. Cats may prefer the bottom of a carrier, a lap, a chair or the floor and should be accommodated. Moving cats by picking them up adds a level of stress to an already fearful cat. The reflex response to fear is to flee thus maintaining all four feet on the floor is very important to a sense of control and reassurance.

Every effort should be made to avoid taking the cat to the “back” of the hospital. The exam room is now somewhat familiar. To move to a foreign space offers new stressors, different smells, bright lights, more animals, people, and noises.

Cats who must be admitted to the hospital have an increased need for a sense of familiar comforts. This can be provided by asking the client to bring known items from home; bedding, brushes, food, bowls or toys. Soft bedding, a place to hide and gentle nursing techniques are critical. For cats who enjoy social interaction, petting, brushing and other forms of interaction can be employed. If the patient is shy, a hiding space can be soothing. If a longer stay is anticipated, do not remove bedding or a hiding place that is not soiled. By marking these objects, the cat will have accommodated himself to the space and become more comfortable. Facial and other “personal” pheromones shouldn’t be eliminated from this space if possible.

The cat ward should be separate from dogs and other animals, big enough so that cats cannot see one another. Cages should not face each other. Cats passing each other for treatment or discharge should be shielded from view. When removing a cat from a hospital enclosure, allow the cat to come forward or use bedding, towels or the bottom of the carrier to slide the patient forward. Do not loom about the cat or block the light.

The entire inventory of equipment, instrumentation, physical facility should be examined to make sure they are appropriately sized for the feline patient.

Happy or at least content cats, means less-stressed clients, means less stressed veterinary staff. Means more likely to return for that next visit.

The AAFP annually conducts an online survey of designated CFPs. The results reflect the views of CFPs that have gone through the process of becoming designated and implement the program in their clinic.

## 2016 Results

- An impressive 98 percent of respondents are satisfied with being designated a CFP.
- When asked which benefits a CFP actually experienced, the top five benefits that respondents selected were:
  1. Less stress on feline patients
  2. Higher satisfaction among current clients with cats
  3. Demonstrated how much we care about our patients
  4. \*Staff learned things about felines they did not know before
  5. ]\*Improved retention or more frequent visits from existing cat owner clients
- \*New benefit listed as compared with previous years
- 79 percent of practices report that they have increased feline visits because of being a CFP.
- 71 percent of practices have received positive feedback on being a CFP from their clients.
- 65 percent of practices attributed their increase in revenue to implementing the CFP program.

Nearly 68 percent of respondents said they gained feline patients by being a designated CFP. Of those practices that gained feline patients, there was a fairly even distribution in the number of patients gained:

- 30 percent — 1 to 5 patients
- 39 percent — 6 to 15 patients
- 20 percent — 16 to 25 patients
- 11 percent – 26 or more

There are 1100 designated Cat Friendly Practices and 600 more in the process. We are now poised to launch a website for cat owners: [catfriendly.com](http://catfriendly.com). In it will be informative pages about all aspects of cats and cat care curated by veterinarians. This site will provide an antidote to the widespread misinformation about cats, veterinary care, health challenges and feline behavior. It will also encourage people to look for a Cat Friendly Practice in their area so that their beloved cat can be given the care he/she deserves.

# The Power of Enrichment- for Your Patients' Health and Your Practice's Well-Being

Steve Dale, DABC  
Steve Dale's Pet World  
Chicago, IL

## Feline enrichment: Brain dead fat cats

Enrichment is quite the Buzz Word

- Environmental
- Behavioral

A matter of manipulating the environment to suit animals' behavior or the match the animal's behavior with the environment.

"Environmental enrichment is a process for improving or enhancing zoo animal environments and care within the context of their inhabitant's behavioral biology and natural history. It is a dynamic process in which changes to structures and husbandry practices are made with the goal of increasing the behavioral choice available to animals and drawing out their species-appropriate behaviors and abilities, thus enhancing their welfare. As the term implies, enrichment typically involves the identification and subsequent addition to the zoo environment of a specific stimulus or characteristic that the occupant(s) needs but which was not previously present." <sup>1</sup>

"The physical environment in the primary enclosures must be enriched by providing means of expressing non-injurious species-typical activities. Examples of environmental enrichment include providing perches, swings, mirrors, and other increased cage complexities; providing objects to manipulate; varied food items; using foraging or task-oriented feeding methods; and providing interaction with the care giver or other familiar and knowledgeable person consistent with personnel safety precautions." <sup>2</sup>

Zoos have long been interested and have participated in providing animals with behavioral enrichment, more than what our companion animals at home receive. <sup>3, 4, 5, 48</sup>

Zoos feeding road kill, hiding food (under ground debris, in pipes, etc.) in exhibits, using 'giant buster cubes,' operant conditioning, orangutan's who paint, chimpanzees who use computers – even allowing great apes to choose their own music. Simply allowing them to choose, indoors or outdoors. Rotating objects in the exhibit which seem stationary, but are not, places to sit to the vines. Choose to give themselves a shower if they so desire. If they pass by a motion detector, they get a shower. A light lets them know that food is in the termite mound, and a condiment inside for chimps varies (mustard, catsup, barbeque cause, jams, etc). Optimum examples are chimpanzees in Chicago, who can blow air on the people. <sup>46, 47, 48, 49</sup>

It's about offering choices and giving control <sup>46</sup> The secret is to think like a cat – lion or a domestic cat.

Using enrichment techniques, zoos have: Lessened stereotypical behaviors, increased animals 'natural tendencies,' enhanced exercise (lowering number of overweight animals, or animals as overweight), slowed the aging process, lessened or eliminated anxious behaviors <sup>47, 48, 49</sup>

Presumably if enrichment techniques can help zoo animals, they can help our companion animals....

Or simply, what grandpa said. "If you don't use it, you lose it." Millions of our purring pals are brain dead – they've lost it upstairs while at the same time they've gained it around their middles. And their owners have no idea because that is how they expect cats to be.

At least 30 to 40 per cent of pets are overweight; 25 per cent obese – and even greater number in cats. These tubby tabbies likely have: <sup>6, 7, 8</sup>

- Change in metabolism
- Significant health issues

The fourth annual Association for Pet Obesity Prevention National Pet Obesity Awareness Day Study found approximately 53% of cats and 55% of dogs are obese or overweight. <sup>51</sup>

The average life span of indoor cats is about 14 years – though this is reduced to 4 years in cats that are allowed to roam free, exposing themselves to the hazards of outdoor life. <sup>9, 10, 11, 12</sup>

- Cars
- Stray Dogs
- Anti Freeze
- Wildlife
- Cold weather/Car hoods
- Cytosoonosis
- Human Cruelty: Shooting, cat napping
- Infectious disease

"The truth is life may be more exhilarating for cats outdoors. However, as a veterinarian my job is to encourage safety and good health," Dr. Nicholas Dodman <sup>9</sup>

Millions of indoor cats are likely clinically depressed. Doing nothing all day, everyday is not normal.” Dr. Karen Overall <sup>15</sup>

### **Advantages of socialization classes for kittens** <sup>17,18,19</sup>

#### ***Kitty classes saves lives!***

- Cats must be vet checked before enrolling – support, in fact, of twice a year visits <sup>20</sup>
- They are desensitized to the carrier
- Desensitized to travel
- Desensitized to strange people, species (canines)
- Learn about proper care – which may enhance health, such as clipping nails, brushing their coats and brushing teeth
- Prevent behavior problems, before they occur
- Understand what is normal cat behavior
- Subtle Signs of Illness <sup>21, 24</sup>
- Feline Heartworm <sup>22, 23, 25, 26</sup>
- Provides a resource should problems occur later

#### **To boost confidence, and just plain fun for kittens and for people**

- “Having an activated prey drive is a requirement for all cats,”
  - Pam Johnson-Bennett <sup>16</sup>
- This is ‘normal’ feline behavior - <sup>27, 28</sup>
- Importance of carrier desensitization/transport <sup>52</sup>

#### **Behavioral/Environmental enrichment** <sup>15, 29, 30, 31, 45, 52, 53</sup>

- Alleviate boredom
- Brain exercise
- Exercise / Burning calories
- Prevent behavior problems
- Assist in dealing with behavior problems if they do occur
- Enjoyment / fun
- Slows onset cognitive changes

A clear link between lack of enrichment and stress, various health problems in cats including cystitis. <sup>31</sup>

- A link between stress and health –
- A link between offering all this to your cat and enhancing the bond

It turns out that the eagerness to work for food and a preference to problem solve has been studied, though not very much specifically for dogs or cats. Studies do indicate that rats, Grizzly bears and other animals actually will choose to work for their meal over a “free meal.” This phenomenon, called contrafreeloading, does contradict the basic tenant that animals are hard-wired to expend the least possible energy for meals to enhance odds of survival. While there isn’t specific data regarding contrafreeloading in dogs and cats – much less senior pets; it appears to be a very real phenomenon for many individuals. <sup>55, 56</sup>

#### **Every house should have** <sup>15, 29, 30, 31</sup>

- High places where cat is allowed
- Scratching post
- Window ledge (not only high – but view outdoors)
- A cozy place (a box, tunnel)
- Room with a view, place(s) to watch the outside world

Enrichment needs evolve as cats age, <sup>52, 53</sup>

#### **Toy story** <sup>29, 30, 32, 45, 52, 53</sup>

- Rotate toys
- Understand the kind of toys your cat likes
- Re-define toys – an empty box can be a toy
- More ideas: Empty box, bottle caps, corks, aluminum foil ball, walnut in bathtub, ping pong ball.
- Novel snacks, particularly in the summer a frozen treat (catsicle) <sup>54</sup>
- Once a day with an interactive toy (with fabric, feathers, Cat Dancer) – that’s the stress busting prescription – <sup>32</sup>
- Feliway, catnip, valerian root, etc.
- Laser light (pro’s and con’s) <sup>15</sup>
- Various other toys, balls, mice toys, etc. <sup>3, 53</sup>

Food Games – feed from Play’n Treat Balls, Scent Games <sup>53</sup>.

Cats are not Anti-Social, Aloof: In fact, they are social <sup>33, 34, 35</sup>

Other furry friends....¼ of cat owners have a dog; ¼ of dog owners have a cat ...living with another cat, or another pet. <sup>36, 37, 40, 44</sup>

## **Training cats: A cat's mind is a terrible thing to waste** <sup>38, 39, 41, 42, 43, 53</sup>

- Harness Training
- Tricks
- Agility

If a cat goes outdoors – protected – great...but then –for certain, protection also against parasites: Heartworm, flea protection. <sup>50</sup>

## **Canine enrichment**

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- Change in metabolism
- Significant health issues

### **All dogs were bred to do something....**

- Dogs do need to have a job <sup>27, 34</sup>;
- On average, a dog spends 15 minutes per day eating....there musty be more to life <sup>12</sup>
- Stimulants <sup>34</sup>

- Visual -Scent Discrimination -Auditory

Still the most bonding thing you can do with a dog....a leash walk! <sup>35</sup>

It turns out that the eagerness to work for food and a preference to problem solve has been studied, though not very much specifically for dogs or cats. Studies do indicate that rats, Grizzly bears and other animals actually will choose to work for their meal over a "free meal." This phenomenon, called contrafreeloading, does contradict the basic tenant that animals are hard-wired to expend the least possible energy for meals to enhance odds of survival<sup>21, 22</sup>. While there isn't specific data regarding contrafreeloading in dogs and cats – much less senior pets; it appears to be a very real phenomenon for many individuals. <sup>35, 36</sup>

Insufficient stimulus can cause: Hyperactivity, destructive chewing, acral lick dermatitis, attention-seeking behaviors, contribute to compulsive disorders, separation anxiety, bad habits in the backyard and certain forms of aggression, and plain old boredom. Dying brain cells. <sup>12, 17, 27, 28, 29, 34</sup>

The choices of how a dog plays, where a dog plays, what toys the dog plays with may be dependent on age, breed and personal preference. Young dogs prefer (require) oral toys and the opportunity to explore environment. Terriers enjoy digging up toys; a

Retriever may simply want to walk around with a toy in his mouth. A herding breed dog may enjoy interactive play, 'herding' a Frisbee disc. <sup>17, 34</sup>

Predictability of toys and time they are left to play has benefits, but so do changes and surprises, if from as a puppy a dog developed that elasticity. <sup>13, 19, 34</sup>

#### **Ideas**

- Feed all means from age and "talent" appropriate treat dispensing balls.
- Read the Paper: Scattering food under newspaper. Turned over boxes Closed boxes with a hole.
- Divide portions of dog's meal in containers or Kong toys or Busy Buddy toys and located around the house, "Sniffing for Supper."
- Placing novel scents in the environment: Rabbit, squired scents from sporting goods stores. Novel herbs, spices and colognes.
- Wading pool for a dog.
- Digging pit in the yard.
- A popsicle of Gatorade, low salt bullion or chicken broth (perhaps with kibble inside or a dog treat or carrot stick). Frozen melon balls.
- Unused washed plastic milk cartons – put some kibble inside, dog rolls it and kibble falls out.
- Training sessions
- Take a dog for walks in new places for new sights and smells.
- Rotates indoor and/or outdoor toys, and encourage play
- Novel walks to new and different places, offers new and different sensations and experiences.
- Doggy door (which critters can't walk into, and can lock if coyotes, snakes are an issue)
- Learning new tricks

#### **Chews toys, in particular, can <sup>13, 18, 34</sup>**

- Offer Dental benefits
- Learn appropriate mouthing behavior as puppies
- Used as a training technique, offering an alternative activity when the family is eating, etc.
- Learn what is 'theirs' to chew on
- Explore their environment via their mouths
- Offers a sense of enjoyment – dogs enjoy chewing ie: a sense of well being

#### **Companionship: Dogs are pack animals**

We know dogs living with canine companions may be more active <sup>13</sup>

- Dogs do best with canines to interact, socialize with, as well as with people <sup>15, 16</sup>
- Another cat, even a pet parrot is helpful. Of course, if you get a parrot – it's the parrot who may be in charge.
- Other pets such as hamsters, gerbils, Guinea pigs – the challenge is to insure their safety and anxiety thresholds.
- Even seeing another dog housed in cages showed that they responded more than toys alone offered. <sup>14, 15</sup>
- Living with pets can solve some problems, be careful not to create new ones. <sup>26</sup>

#### **Impact on aging**

Cognitive enrichment early in life appears to protect against development of age-associated cognitive decline and dementia. <sup>19, 31, 32</sup>

In one study at the University of California-Davis, 62% of 11- to 16-year-old dogs showed signs in at least one category of CDS.<sup>22,</sup>

<sup>23</sup> In a pet owner survey, nearly half of dogs age 8 and older showed at least one sign associated with CDS.<sup>24</sup>

#### **Watch for DISHA <sup>20, 30, 31, 32</sup>**

##### **DISHA**

- Disorientation
- Interactions with humans and other pets have changed
- Sleep-wake cycle changes
- House soiling
- Altered activity levels
- Additionally: Deafness, Anxiety<sup>20, 30, 31, 32</sup>

Diet: Hills BD, or diet for joint problems since pain can cause other changes in pets.

Although the cause of cognitive dysfunction is unknown, autopsies reveal that the brains of old dogs are often clogged with globs of nerve-damaging beta-amyloid plaques similar to those found in the brains of people with Alzheimer's disease. <sup>21</sup>

Treatment may include: Diet (antioxidant fortification), Enrichment . <sup>19, 34</sup> 'You can teach an old dog new tricks:' - - - Stimulating environments suggests improved learning due to induced changes in brain cellular structure which may help to actually grow new neurons when otherwise they would not, and increase existing neurons to injury. Would dogs with stimulated environments learn new tasks? They did – but did best with nutritional supplementation as well. <sup>19</sup>

Having a job may help. And physical benefits of enrichment assist in mobility, and may offer some defense against worsening cognition.<sup>19</sup>

Motor learning (as opposed to mere motor activity) may increase synapse formation in the cerebellar cortex in rats.<sup>19</sup>

An enrichment outlet is good, and may lessen anxiety<sup>21</sup>

Treating with Anipryl earlier may be helpful.<sup>25</sup>

#### Feline references

1. American Zoological Aquarium Association Behavioral Advisory Group, BHAG, (1999).
2. United States Department of Agriculture 1991. [Title 9, CFR \(Code of Federal Register\), Part 3. Animal Welfare: Standards; Final Rule. Federal Register](#) 56(No. 32), 6426-6505.
3. "Behavioral Enrichment in the Zoo," by Hal Markowitz, (1982).
4. "The Zoo Book: The Evolution of Wildlife Conservation Centers," by Linda Koebner, pgs.. 86-90. (1994).
5. "American Zoos," by Steve Dale, (1992)
6. *Therapeutic Exercise and Weight Management*, American Animal Hospital Association, (2005).
7. *Diet and Weight Control*, [www.healthypet.com](http://www.healthypet.com) (AAHA site).
8. *Purina® Study Confirms Link Between Body Fat and Certain Health Conditions*, (2003).
9. Dr. Nicholas Dodman, personal interview, (2003).
10. "The TNR Handbook" Bryan Kordis, Meredith Weiss, Anitra Frazier, Laura Burns and Susan Green, pgs. 1 to 7, (2004).
11. Berkeley, California Animal Services, <http://www.ci.berkeley.ca.us/animalservices/feralpubsafety.html>
12. American Bird Conservancy, *Cats Indoors Initiative*, <http://www.abcbirds.org/cats/index.htm>
13. *Keeping Cats Indoors Isn't Just for the Birds*, the American Humane Society, American Bird Conservancy and the Humane Society of the United States.
14. *Facts on Cats and Wildlife: A Conservation Dilemma*, University of Maine Cooperative Extension, Bulletin 7148.
15. Dr. Karen Overall, personal interview, (2003).
16. "Think Like a Cat," by Pam Johnson-Bennett, pgs. 103 to 124, and personal interviews (2000 to 2007).
17. Feline Behavior Guidelines, American Association of Feline Practitioners, [www.aafponline.org](http://www.aafponline.org), pgs. 22 to 24, (2005).
18. "Training Your Cat," Dr. Kersti Seksel, Hyland House Press, Flemington Victoria Australia, pgs. 39 to 41, (2001).
19. Kitty-K: [www.stevedalepetworld.com](http://www.stevedalepetworld.com)
20. American Association of Feline Practitioners *2006 Feline Vaccine Advisory Panel Report*, [www.aafponline.org](http://www.aafponline.org)
21. Dr. James Richards, director Cornell Feline Health Center, at Cornell University College of Veterinary Medicine, Ithaca, NY, *My Pet World* syndicated newspaper column, Steve Dale, (August, 2006)
22. American Heartworm Society, <http://www.heartwormsociety.org/FelineHeartwormInfo.htm> approved by the Executive Board of the American Heartworm Society (Dr. Charles Thomas Nelson, Dr. Donald W. Doiron; Dr. John W. McCall; Dr. Sheldon B. Rubin; Dr. Lynn F. Buzhardt; Dr. Wallace Graham; Dr. Susan L. Longhofer, Dr. Jorge Guerrero, Dr. Carol Robertson-Plouch; Dr. Allan Paul)
23. <http://www.vetmed.auburn.edu/distance/cardio/>, Dr. Ray Dillon
24. American Association of Feline Practitioners, "Healthy Cats for Life" [www.aafponline.org](http://www.aafponline.org), [www.healthycatsforlife.org](http://www.healthycatsforlife.org)
25. American Association of Feline Practitioners *2006 Feline Vaccine Advisory Panel Report*, [www.aafponline.org](http://www.aafponline.org).
26. World Veterinary Conference Proceedings, 2003, Feline Heartworm, Dr. Clarke Atkins; <http://www.vin.com/proceedings/Proceedings.plx?CID=WSAVA 2003&PID=6533&Category=978&O=Generic>
27. Feline Behavior Guidelines, American Association of Feline Practitioners, [www.aafponline.org](http://www.aafponline.org), pg. 9, (2005).
28. "Clinical Behavioral Medicine for Small Animals," Dr. Karen Overall, Mosby, St. Louis, MO, pgs. 45 and 76, (1997).
29. *Environment Enrichment in Cats*, proceedings AVMA 2006, Dr. Kersti Seksel
30. *Environmental and Social Enrichment for Indoor Cats*, proceedings AVMA, 2004, Dr. Vint Virga.
31. Indoor Pet Initiative, the Ohio State University College of Veterinary Medicine, Dr. Tony Buffington, <http://indoorpet.osu.edu/cats/>
32. "Think Like A Cat," by Pam Johnson-Bennett, pgs. 102 to 123, (2000).
33. Social Cats, by Susan Milius, *Science News*, Sharon Crowell-Davis, (2001)
34. *Social Organization In the Cat: A Modern Understanding*, Journal of Feline Medicine & Surgery, Volume 6, Issue 1, pgs. 19 to 28, Sharon Crowell-Davis, (2004).
35. "The Domestic Cat: The Biology of Its Behavior, edited by Dennis C. Turner, Patrick Bateson (2000).
36. "American Pet Product Manufacturers Association National Pet Ownership Survey," 2005/2006.
37. "U.S. Ownership & Demographics Sourcebook," American Veterinary Medical Association, (2002).
38. "Training Your Cat," Dr. Kersti Seksel, Hyland House Press, Flemington Victoria Australia, pgs. 49 to 53, (2001).
39. "Clicker Training For Cats," by Karen Pryor
40. "PETIQUETTE: Solving Behavior Problems in Your Multi Pet Household, by Amy Shojai (2005).
41. Cat Agility Show Cats OnLine by Lee Harper [http://www.showcatsonline.com/x/cat\\_agility.htm](http://www.showcatsonline.com/x/cat_agility.htm)
42. Cat Fancier's Association Fance Mews Cat Agility by Karen Lawrence <http://www.cfa.org/ezine/archives/agility.html>
43. Cat Guide at Discovery.com <http://animal.discovery.com/guides/cats/training/strategies.html>
44. "Cat vs. Cat," by Pam Johnson-Bennett, (2004).
45. *Age Associated Behavioral Changes*, Dr. Gary Landsberg <http://vet.purdue.edu/vcs505/lec9.pdf>

46. Steve Ross, behavior research specialist Lincoln Park Zoo personal interview, 2004
47. Shepherdson, D. 1989. *Stereotypic Behaviour: what is it and how can it be eliminated or prevented?* Ratel, 16:100-105; 1998; Introduction: Tracing the Path of Environmental Enrichment in Zoos. Pp. 1-14, in *Second nature: environmental enrichment for captive animals* (D. J. Shepherdson, J. D. Mellen, and M. Hutchins, eds.). Smithsonian Institute Press, Washington, District of Columbia, 350 pp.
48. Proceedings North American Veterinary Conference Post Graduate Institute, Craig Schultz, United States Department of Agriculture, "Behavior Techniques in Zoo Animals," 2004.
49. Manufacture, Selection, and Responses to Habitat Enrichment Items for Captive Nonhuman Primates, Mary Baker (et. al). <http://faculty.ucr.edu/~maryb/enrichment.htm>, (in conjunction with San Diego Zoo).
50. Companion Animal Parasite Council, <http://www.capecvet.org/> Guidelines at: <http://www.capecvet.org/?p=Guidelines.ControllingParasites&h=0&s=0>
51. Association for Pet Obesity Prevention, The fourth annual Association for Pet Obesity Prevention (APOP) National Pet Obesity Awareness Day Study with Banfield the Pet Hospital, <http://www.petobesityprevention.com/fat-pets-getting-fatter-according-to-latest-survey/>
52. AAFP-AAHA Feline Lifestage Guidelines, Amy Hoyumpa Vogt, DVM, DABVP (Canine and Feline), Guidelines Co-Chair; Ilona Rodan DVM, DABVP (Feline), Guidelines Co-Chair; Marcus Brown, DVM; Scott Brown, VMD, PhD, DACVIM; C A Tony Buffington, DVM, PhD, DACVN; M J LaRue Forman, DVM, DACVIM; Jacqui Neilson, DVM, DACVB; Andrew Sparkes, BVetMed, PhD, DipECVIM, MRCVS; <http://www.aahanel.org/resources/FelineLifeStageGuidelines.aspx>
53. The Feline Patient, 4<sup>th</sup> Edition, Dr. Gary Norsworthy, Dr. Sharon Fooshee Grace, Dr. Mitchell A. Crystal and Dr. Larry P. Tilly, Wiley Publishing, 2011; Chapter 223 Environmental Enrichment in the Home, Dr. Debra Horwitz (p. 567-570).
54. Creating Novel Cat Snacks, [www.petfinder.com](http://www.petfinder.com), Jane Harrell; <http://www.petfinder.com/blog/2010/07/07/help-your-cat-beat-the-heat/>
55. McGowan, R., Rehn, T., Norling, Y., Keeling, L. "Positive affects and learning: exploring the 'Eureka Effect' in Dogs," *Animal Cognition*, DOI 10.1007/s10071-013-0688-x, 2013. <http://link.springer.com/article/10.1007%2Fs10071-013-0688-x>
56. Inglis, I.R., Forkman, B., Lazarus, J., "Free food or earned food? A review and fuzzy model of contrafreeloading," *Animal Behavior*, 1997 53 1171-1191. <http://www.ncbi.nlm.nih.gov/pubmed/9236014>

#### Canine references

1. American Zoological Aquarium Association Behavioral Advisory Group, BHAG, (1999).
2. United States Department of Agriculture 1991. [Title 9, CFR \(Code of Federal Register\), Part 3. Animal Welfare: Standards: Final Rule. Federal Register](#) 56(No. 32), 6426-6505.
3. "Behavioral Enrichment in the Zoo," by Hal Markowitz, (1982).
4. "The Zoo Book: The Evolution of Wildlife Conservation Centers," by Linda Koebner, pgs.. 86-90. (1994).
5. "American Zoos," by Steve Dale, (1992)
6. *Therapeutic Exercise and Weight Management*, American Animal Hospital Association, (2005).
7. *Diet and Weight Control*, [www.healthypet.com](http://www.healthypet.com) (AAHA site).
8. Steve Ross, behavior research specialist Lincoln Park Zoo personal interview, 2004
9. Shepherdson, D. 1989. *Stereotypic Behaviour: what is it and how can it be eliminated or prevented?* Ratel, 16:100-105; 1998; Introduction: Tracing the Path of Environmental Enrichment in Zoos. Pp. 1-14, in *Second nature: environmental enrichment for captive animals* (D. J. Shepherdson, J. D. Mellen, and M. Hutchins, eds.). Smithsonian Institute Press, Washington, District of Columbia, p. 350.
10. Proceedings North American Veterinary Conference Post Graduate Institute, Craig Schultz, United States Department of Agriculture, "Behavior Techniques in Zoo Animals," 2004.
11. Manufacture, Selection, and Responses to Habitat Enrichment Items for Captive Nonhuman Primates, Mary Baker (et. al). <http://faculty.ucr.edu/~maryb/enrichment.htm>, in conjunction with San Diego Zoo.
12. Dr. Lore Haug, handout Environment Enrichment for Dogs
13. Dr. Debra Horwitz, "Enriching the Environment of Our Pets: The Psychology of Play and Behavior Modification Veterinary Forum," December, 2002.
14. Dr. Andrew Leuscher, "Enriching the Environment of Our Pets: The Psychology of Play and Behavior Modification Veterinary Forum," December, 2002.
15. Hubrecht RC, Scrpell JA, Poole TB: Correlates of Pen Size and Housing Conditions on the Behavior of Kennel Dogs, *Applied Animal Behavior*, Sd 34: 365-383, 1992.
16. Dr. Gary Landsberg, Enriching the Environment of Our Pets: The Psychology of Play and Behavior Modification Veterinary Forum," December, 2002.
17. Dr. Barbara Simpson, Dr. Jacqui Neilson, Landsberg, Horwitz Enriching the Environment of Our Pets: The Psychology of Play and Behavior Modification Veterinary Forum," December, 2002.
18. Personal interview Dr. Jean Hawkins (veterinary dentist), 2006.
19. Neuroprotective Effects of Cognitive Enrichment, Norton W. Milgram, Christina T. Siwak-Tap, Joseph Araujo, Elizabeth Head, *Aging Research Reviews Neurobiology of Aging*, Elsevier, pgs. 354-369, 2006.
20. "Studies of the Infirmities of Aging Dogs Offer Insights for Humans," by Jane Brody, *New York Times*, 2002. (Dr. Gary Landsberg)
21. Handbook of Behavior Problems of the Dog and Cat, by Dr. Gary Landsberg, Dr. Wayne Hunthausen and Dr. Lowell Ackerman, pgs. 269-304; 1997.
22. Neilson JC, Hart BL, Ruehl WW: Cited in Hart BL, Hart LA: Selecting, raising and caring for dogs to avoid problem aggression. *JAVMA*, 210(8):1129-1134; 1997.
23. Ruehl WW, Hart BL: Canine Cognitive Dysfunction. In *Psychopharmacology of Animal Behavior Disorders* (Dodman NH, Schuster L, eds.). Boston: Blackwell Scientific, 1998; pgs. 283-304.
24. Proprietary market research, 1998. Pet owner sample size: 255. Data on file, Pfizer Animal Health.

25. Dr. Nicholas Dodman, personal interview, 2007.
26. PETiQuette: Solving Behavior Problems in Your Multi-Pet Household, by Amy Shojai, 2005.
27. The Culture Class, by Jean Donaldson, 2<sup>nd</sup> Edition, 2005.
28. Don't Shoot the Dog, by Karen Pryor, 1984
29. Pet Behavior Protocols, by Suzanne Hetts, American Animal Hospital Association; p. 131; 1999.
30. Healthy Aging: Focus on Your Pet's Brain, Carleen Brice American Animal Hospital Association, Healthy Pet, 2009; [http://www.healthypet.com/PetCare/PetCareArticle.aspx?art\\_key=e2adc03e-190a-4fd2-87f0-26f10232e427](http://www.healthypet.com/PetCare/PetCareArticle.aspx?art_key=e2adc03e-190a-4fd2-87f0-26f10232e427)
31. Lifelearn: Cognitive Dysfunction in Dogs and Cats, Debra Horwitz, DVM, Diplomate ACVB, Gary Landsberg, DVM, Diplomate ACVB, 2009; [http://pethealthna.lifelearn.com/lliclinic\\_703/index.php?view=pagePrint&pageid=299](http://pethealthna.lifelearn.com/lliclinic_703/index.php?view=pagePrint&pageid=299)
32. Gary Landsberg, DVM, ACVB personal interviews, 2011
33. Association for Pet Obesity Prevention, The fourth annual Association for Pet Obesity Prevention (APOP) National Pet Obesity Awareness Day Study with Banfield the Pet Hospital, <http://www.petobesityprevention.com/fat-pets-getting-fatter-according-to-latest-survey/>
34. Indoor Pet Initiative, the Ohio State University College of Veterinary Medicine, Dr. Tony Buffington, <http://indoorpet.osu.edu/cats/>
35. Mariti, C., Carone, B., Borgognini-Tarli, S., Presciuttini, S., Pierantoni, L., Gazzano, A., 2011a. Considering the dog as part of the system: studying the attachment bond of dogs towards all members of the fostering family (abstract). J. Vet. Behav.: Clin. Appl. Res. 6, 90-91.
- 35 McGowan, R., Rehn, T., Norling, Y., Keeling, L. "Positive affects and learning: exploring the 'Eureka Effect in Dogs,'" *Animal Cognition*, DOI 10.1007/s 10071-013-0688-x, 2013. <http://link.springer.com/article/10.1007%2Fs10071-013-0688-x>
- 36 Inglis, I.R., Forkman, B., Lazarus, J, "Free food or earned food? A review and fuzzy model of contrafreeloading," *Animal Behavior*, 1997 53 1171-1191. <http://www.ncbi.nlm.nih.gov/pubmed/9236014>

# Assessing Acute Pain

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Despite significant advances in pain management for companion animals, pain is still undertreated. One of the main reasons for this is the difficulty in recognizing and “measuring” pain in populations that cannot “self-report”. Lord Kelvin stated that “if you cannot measure it you cannot improve it” and this approach should be taken when treating pain in our patients. To treat pain, we must first look for it, recognize it and quantify it in some way so we can assess the efficacy of our interventions. Pain is a complex multidimensional experience with both sensory and psychological components. The sensory-discriminative component is “how it feels” (type, source and intensity of pain) and the affective-emotional component is “how does it make the animal feel?” The International Association for the Study of Pain (IASP) have recently updated their definition of pain and state that “pain is a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components”

In humans who can self-report, pain is what the patient says it is but in neonates, cognitively impaired people and animals, pain is what the observer says it is. As animal caregivers, we make “proxy” assessments on the patient’s behalf and this puts an extra burden on us, to “get it right”.

## Acute pain assessment

Many attempts have been made to correlate objective measurements such as heart rate and blood pressure with pain. In cats, no study has found a consistently reliable objective measure, which is not surprising since these parameters can be affected by many factors other than pain. Cats suffer from “white coat” syndrome just as humans do; for example, fear and the stress of a journey to a veterinary hospital will alter heart rate, respiratory rate and blood pressure. Mechanical nociceptive threshold testing has proved a useful technique for evaluating both primary (wound) and secondary (remote areas unrelated to the wound) hyperalgesia suggesting that an assessment of wound tenderness should be incorporated into an overall assessment of post-operative pain. Observation from a distance and interacting with the animal are both essential components to an overall assessment. A painful cat may remain very still and quiet because they are painful and without interaction they will be overlooked.

Currently there is no gold standard for assessing pain in cats but some tools do exist. Any system that is used must be valid, reliable and sensitive. Without strictly defined criteria and use of well-trained and experienced observers, many scoring systems are highly variable. Basic pain scales include simple descriptive scales (SDS), numerical rating scales (NRS) and visual analogue scales (VAS), these are considered unidimensional scales as they do not assess all the complex aspects of pain. Holton and others compared the use of a SDS, NRS and VAS for assessing pain in dogs following surgery and reported significant variability between observers, which could be as high as 36%, with all three scales.

It is now accepted that quantitative measurement of behavior is the most reliable method for assessing pain in animals and that if the methodology used to develop and validate these systems is rigorous they can be objective with minimal observer bias. Multidimensional or composite systems are particularly important when self-reporting is not possible. However, they must incorporate components that have been proven as sensitive and specific indicators of pain in the species being studied. Knowledge of the normal behavior for the individual being evaluated is important and deviations from normal behavior may suggest pain, anxiety or fear, or some combination of stressors. Normal behaviors should be maintained post-operatively if a patient is comfortable. Grooming is a normal behavior but licking excessively at a wound or incision can be an indicator of pain, so the two should be differentiated. The occurrence of new behaviors such as a previously friendly cat becoming aggressive, or the loss of a normal behavior, for example a playful and friendly cat becoming reclusive should raise our suspicion that pain may not have been adequately addressed.

## Acute pain assessment tools for cats

We are learning “what pain looks like” in our feline patients and two clinically useful and validated tools are available. Brondani and colleagues developed a multidimensional composite scale based on observing cats that underwent ovariohysterectomy. This tool along with many videos of assessing pain in cats is available at <http://www.animalpain.com.br/en-us/>

Another tool is the Glasgow Composite Measures Pain Scale-Feline (rCMPS-Feline) which has been updated to include facial expressions. This tool was developed using cats undergoing different types of surgery or with medically related pain. It can be downloaded at: [www.newmetrica.com/acute-pain-measurement/](http://www.newmetrica.com/acute-pain-measurement/)

The major assessment domains in cats include:

- Vocalization
- Posture
- Attention to the wound
- Response to people
- Response to palpation of the wound or painful area

- Facial expressions
- Overall demeanor

Cats that adopt a hunched or “tucked-up” posture are likely experiencing pain. In one study detailed behavioral ethograms were constructed for cats before and after abdominal surgery; a hunched or tucked up posture was rarely recorded in cats before surgery but occurred on a frequent basis afterwards.

In general, most cats dislike any restrictive dressings or bandages and may roll around, pay excessive attention to, or try to remove these. These behaviors could indicate pain or dislike of the bandage so it is important to differentiate between these two by performing a careful assessment. When pain has been well managed, it should be possible to palpate gently around the wound or painful area with minimal response by the cat. The facial expressions of pain in cats include changes in ear position, half-shut or “squinty” eyes, and tension in the muzzle which alters whisker position.

### Using pain assessment tools in practice

Each clinic should choose a scoring system that fits their specific needs, and this may require some trial and error. Whichever one is chosen should be user friendly, quick to complete and easily performed by all team members and it should be an integral part of the animal’s evaluation. After temperature, pulse and respiration are checked, pain, which has been coined the “fourth vital sign,” should also be assessed. A scale should include both non-interactive and interactive components and rely heavily on changes in behavior.

The severity of surgery or trauma, the patient’s response to analgesic therapy and the expected duration of action of the analgesic drug(s) administered will help to determine the frequency of evaluations. For example, if an animal is resting comfortably following administration of an opioid, it may not need to be re-assessed for two to four hours. Animals should be allowed to sleep following analgesic therapy. Vital signs can often be checked without unduly disturbing a sleeping animal. In general, animals are not woken up to check their pain status; however, this does not mean they should not receive their scheduled analgesics. Undisturbed observations, coupled with periodic interactive observations (e.g. palpation of the wound) are likely to provide more information than only occasionally observing the animal through the cage door. Routinely using a pain assessment tool enhances the care of patients in the perioperative period.

### Suggested reading

- AAHA/AAFP Pain Management Guidelines: [www.catvets.com/guidelines/practice-guidelines/pain-management-guidelines](http://www.catvets.com/guidelines/practice-guidelines/pain-management-guidelines)
- Brondani JT, Luna SP, Padovani CR. Refinement and initial validation of a multidimensional composite scale for use in assessing acute postoperative pain in cats. *Am J Vet Res.* 2011;72(2):174-83.
- Brondani JT, Mama KR, Luna SP, Wright BD, Niyom S, Ambrosio J, et al. Validation of the English version of the UNESP-Botucatu multidimensional composite pain scale for assessing postoperative pain in cats. *BMC Vet Res.* 2013; 9:143.
- Calvo G, Holden E, Reid J, Scott EM, Firth A, Bell A, et al. Development of a behaviour-based measurement tool with defined intervention level for assessing acute pain in cats. *J Small Anim Pract.* 2014;55(12):622-9.
- Cambridge AJ, Tobias KM, Newberry RC, Sarkar DK. Subjective and objective measurements of postoperative pain in cats. *J Am Vet Med Assoc.* 2000;217(5):685-90.
- Holden E, Calvo G, Collins M, Bell A, Reid J, Scott EM, et al. Evaluation of facial expression in acute pain in cats. *J Small Anim Pract.* 2014;55(12):615-21.
- Holton LL, Scott EM, Nolan AM, Reid J, Welsh E, Flaherty D. Comparison of three methods used for assessment of pain in dogs. *J Am Vet Med Assoc.* 1998;212(1):61-6.
- Quimby JM, Smith ML, Lunn KF. Evaluation of the effects of hospital visit stress on physiologic parameters in the cat. *J Feline Med Surg.* 2011;13(10):733-7.
- Reid J, Scott EM, Calvo G, Nolan AM. Definitive Glasgow acute pain scale for cats: validation and intervention level. *Vet Rec* 2017 doi: 10.1136/vr.104208 [Epub ahead of print]
- Slingsby LS, Jones A, Waterman-Pearson AE. Use of a new finger-mounted device to compare mechanical nociceptive thresholds in cats given pethidine or no medication after castration. *Res Vet Sci.* 2001;70(3):243-6.
- Smith JD, Allen SW, Quandt JE, Tackett RL. Indicators of postoperative pain in cats and correlation with clinical criteria. *Am J Vet Res.* 1996;57(11):1674-8.
- Waran N, Best L, Williams VM, Salinsky J, Dale A, Clarke N. A preliminary study of behaviour-based indicators of pain in cats. *Animal Welfare.* 2007;16(S):105-8.

# Assessing and Managing Chronic Pain

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In cats diseases such as degenerative joint disease (DJD), stomatitis and idiopathic cystitis are associated with long-term pain. Although the precise incidence of DJD is not known for cats, it is more common than previously thought and up to 90% of older cats show radiographic signs of the disease. Due to the nature of chronic pain, such as that associated with DJD the behavioral changes can be insidious, subtle and therefore easily missed. Indeed, many owners assume these changes as inevitable with advancing age and put changes in activity and behavior down to “getting old” rather than “getting sore”. It is common for owners not to realize how debilitated their pet has become until they see improvements following treatment. Chronic pain may also be present in the absence of ongoing clinical disease, for example pain that persists beyond the expected healing time of an acute disease process; examples of this include neuropathic pain following onychectomy, limb or tail amputation (maladaptive pain, persistent post-operative pain). As cats live longer there has been an increased recognition of chronic pain and the negative impact on their quality of life (QoL). In recent years, treatment options for some cancers in companion animals have become a viable alternative to euthanasia, and managing chronic pain and the impact of aggressive treatment protocols has become a challenging and important welfare issue.

Pain recognition and measurement is the key to effective pain management. As previously stated, the behavioral changes associated with chronic pain often develop gradually and may be subtle and easily overlooked. Owner evaluations are the mainstay of the assessment of chronic pain, but how these tools should be constructed optimally for cats is not fully understood. Many of the tools for measuring chronic pain in humans measure its impact on the patient’s QoL and encompass physical and psychological aspects. Although there is not a lot of published data in cats there are some studies assessing QoL or health-related quality of life (HRQoL) in cats with cardiac disease, cancer and diabetes. There is also a growing understanding of behaviors that may be related to musculoskeletal disease in cats. Recently, an owner-directed instrument for the assessment of chronic musculoskeletal pain in cats has been developed and understanding what owners consider to be important for their cat’s quality of life has been investigated. Assessments may need to be individualized based on the cat’s lifestyle (e.g. indoor versus outdoor), however behaviors can be assessed in the following broad categories:

- General mobility (ease of movement, fluidity of movement)
- Performing activities (playing, jumping up and jumping down, using a litter-box)
- Eating, drinking
- Grooming
- Social activities involving people and other pets
- Temperament

Each of these should be assessed and ‘scored’ in some manner (e.g. using either a descriptive, numerical rating or visual analogue scale) and recoded in the patient’s record. Re-evaluation over time will help determine the impact of pain and the efficacy of treatment. It may be helpful to have owners keep a diary of their cat’s activity and behaviors so they can look back and see how things have changed. Additionally, photographs and videos can be dated and catalogued. A validated pain tool for cats with DJD is called the Feline Musculoskeletal Pain Index (FMPI). This tool is frequently updated as new information is added and continued testing occurs. It can be downloaded at:

<https://cvm.ncsu.edu/research/labs/clinical-sciences/comparative-pain-research/clinical-metrology-instruments/>

## Treatment

It is important at the outset of a treatment plan to discuss several things with owners. Many diseases that cause long-term pain are not curable therefore keeping a pet comfortable will require a committed owner and achieving specific goals for the pet usually requires some trial and error. In addition, the cost of long term treatment should not be under-estimated. Quality of Life assessments are essential as is a discussion of euthanasia when suffering can no longer be relieved. These discussions should start early in the course of treatment and be repeated often. If euthanasia is the end point, the goal should be a “week too early and not a day too late”.

The treatment options for DJD include drugs and non-pharmacologic treatments:

### Drugs

#### *Primary analgesics - NSAIDs*

Nonsteroidal anti-inflammatory drugs (NSAIDs) are the mainstay of drug therapy for DJD in all species including humans. In cats, NSAIDs are very effective for alleviating the pain associated with degenerative joint disease and numerous studies show that after intervention, cats become more active and in particular their ability to jump up (and down) improves. Compared to dogs there are fewer NSAIDs to choose from for cats. The only drug with current market authorization for long-term use in cats anywhere in the world is meloxicam (Note: long term use of the oral formulation is not approved by the FDA in the USA). Cats are notoriously difficult to medicate but the liquid formulation of meloxicam is palatable and well accepted by most cats; in addition, the liquid

formulation facilitates accurate dosing. Robenacoxib is also well accepted by cats and has been studied in cats with DJD, with and without kidney disease over a 28-day period. No adverse effects were reported. Using it for more than 3 days is off-label.

Many older cats that have DJD also have renal insufficiency however studies show that, with caution, these cats can still benefit from NSAID administration. The owner and veterinarian should work together to find the lowest effective dose for each individual patient.

#### ***Adjunctive analgesics (e.g. tramadol, amantadine, gabapentin, tricyclic antidepressants)***

Some of the less conventional analgesics including the tricyclic anti-depressants, gabapentin, amantadine and tramadol may play a useful role in chronic pain management, but controlled clinical trials are needed to establish the best doses and dosing intervals for maximum efficacy in cats. Tricyclic antidepressants such as amitriptyline, clomipramine and imipramine have been used in humans for many years to treat chronic pain, in particular neuropathic pain, and are thought to act by altering the actions of serotonin and nor-adrenaline both centrally and peripherally. In humans, the anticonvulsant gabapentin has a wide margin of safety and is clinically effective in chronic neuropathic pain conditions although the exact mechanism of action is not clear.

#### **Non-pharmacologic therapies**

Nutritional supplements or nutraceuticals may be beneficial in animals with DJD, however there are few well controlled studies in animals and because these supplements are not classified as drugs, there is little oversight of quality control and no requirement to prove efficacy prior to marketing. However, some of the commercially available “joint diets” that contain the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), green-lipped mussel extract and glucosamine/chondroitin sulphate are beneficial.

In recent years, the popularity of a more “holistic” approach to medicine for both humans and pets has increased. Physical rehabilitation is the most rapidly growing specialty in veterinary medicine and several clinical centers now specialize in these modes of therapy. Treatment modalities include laser therapy, electrical stimulation, manual techniques including joint mobilization, massage and trigger point therapy and therapeutic exercise. Although there is a need for well controlled clinical studies using these techniques there is no doubt that many animals greatly benefit from them. Acupuncture is now a respected component of treatment in human pain clinics and many veterinarians are pursuing formal training in this discipline and reporting beneficial results in cats with chronic pain.

#### **The future**

There has been a huge growth in the use of monoclonal antibodies to treat numerous diseases in humans and this has spilled over into veterinary medicine. Neutralizing antibodies to nerve growth factor (NGF) provide pain relief in humans, rodent models and dogs with degenerative joint disease. A pilot study using fully felinized anti-NGF antibody has shown promising results in cats with DJD. Injection is by the subcutaneous route and benefits are reported to last 4-6 weeks.

A new class of drugs called the piprants are being widely studied and one such drug is now available for the treatment of osteoarthritis associated pain in dogs (Grapiprant). Grapiprant is a selective antagonist of the EP4 receptor, one of the four prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) receptor subtypes. There are likely to be fewer unwanted side-effects with this class of drug because the COX-1 and COX-2 pathways are not affected. There may be future development of this drug for in cats.

#### **Suggested reading**

- Benito J, Depuy V, Hardie E, Zamprogno H, Thomson A, Simpson W, et al. Reliability and discriminatory testing of a client-based metrology instrument, feline musculoskeletal pain index (FMPI) for the evaluation of degenerative joint disease-associated pain in cats. *Vet J.* 2013;196(3):368-73.
- Benito J, Gruen ME, Thomson A, Simpson W, Lascelles BD. Owner-assessed indices of quality of life in cats and the relationship to the presence of degenerative joint disease. *J Feline Med Surg.* 2012;14(12):863-70.
- Bennett D, Morton C. A study of owner observed behavioural and lifestyle changes in cats with musculoskeletal disease before and after analgesic therapy. *J Feline Med Surg.* 2009;11(12):997-1004.
- Bennett D, Zainal Ariffin SM, Johnston P. Osteoarthritis in the cat: 1. how common is it and how easy to recognise? *J Feline Med Surg.* 2012;14(1):65-75.
- Bennett D, Zainal Ariffin SM, Johnston P. Osteoarthritis in the cat: 2. how should it be managed and treated? *J Feline Med Surg.* 2012;14(1):76-84.
- Gowan RA, Baral RM, Lingard AE, Catt MJ, Stansen W, Johnston L, et al. A retrospective analysis of the effects of meloxicam on the longevity of aged cats with and without overt chronic kidney disease. *J Feline Med Surg.* 2012.
- Gowan RA, Lingard AE, Johnston L, Stansen W, Brown SA, Malik R. Retrospective case-control study of the effects of long-term dosing with meloxicam on renal function in aged cats with degenerative joint disease. *J Feline Med Surg.* 2011;13(10):752-61.
- Gruen ME, Thomson AE, Griffith EH, Paradise H, Gearing DP, Lascelles BD. A feline-specific anti-nerve growth factor antibody improves mobility in cats with degenerative joint disease-associated pain: a pilot proof of concept study. *J Vet Intern Med.* 2016; 30(4):1138-1148.
- King JN, King S, Budsberg SC, Lascelles BDX, Beinhoff SE, Roycroft LM, Roberts ES. Clinical safety of robenacoxib in feline osteoarthritis: results of a randomized, blinded, placebo controlled clinical trial. *J Feline Med Surg.* 2016; 18(8):632-642.
- Lascelles BD, DePuy V, Thomson A, Hansen B, Marcellin-Little DJ, Biourge V, et al. Evaluation of a therapeutic diet for feline degenerative joint disease. *J Vet Intern Med.* 2010;24(3):487-95.

Sparkes AH, Heiene R, Lascelles BD, Malik R, Sampietro LR, Robertson S, et al. ISFM and AAFP consensus guidelines: long-term use of NSAIDs in cats. *J Feline Med Surg.* 2010;12(7):521-38.

# Perioperative Anesthesia and Analgesia Planning

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In their Global Year Against Acute Pain in 2010, the International Association for the Study of Pain (IASP) introduced the motto “Anticipate, Assess, Alleviate”. This emphasizes three key approaches to acute pain management. They also emphasized that management of acute pain is not a specialist’s job and is a condition that medical professionals encounter on a regular basis every day. It is important to prevent or alleviate acute pain to decrease the distress it causes but also to enhance nursing care, enhance sleep and rest, decrease the stress response, catabolism and poor wound healing. Finally, poorly managed acute pain is a major predictor for developing long-term pain following surgery or trauma.

Clinically, there are two phases associated with surgery; the first is the sensory input arising directly from the surgery itself and the second is from the resultant, more prolonged inflammatory response. Acute pain begins with thermal, chemical or mechanical stimulation of the peripheral nervous system which is amplified by inflammation (transduction). Signaling from peripheral sites (transmission) causes central sensitization which can occur very quickly as a result of changes in N-methyl-D-aspartate (NMDA) receptors in the dorsal horn of the spinal cord.

It is now understood that an effective and appropriate level of analgesia must be maintained throughout the duration of the inflammatory response. If analgesic therapy is withdrawn too early, “re-initiation” of pain is possible. To prevent prolonged or persistent post-operative pain, analgesic therapy should be started prior to surgery (or as soon as possible after trauma), maintained during surgery, be robust in the immediate post-operative period and not withdrawn until the inflammatory response has subsided. Duration of treatment will depend on the degree of surgical trauma and resultant inflammation. The exact duration of the inflammatory response after different types of surgical procedures is not well documented but is obviously longer after orthopedic surgery than after a simple elective ovariohysterectomy performed through a small incision.

The major classes of analgesics employed for acute pain management are:

1. Opioids
2. Non-steroidal anti-inflammatory drugs (NSAIDs)
3. Local anesthetics
4. Alpha<sub>2</sub>-adrenergic agonists
5. NMDA antagonists

## Opioids

Opioids are the “backbone” of most acute pain management protocols and they are much more effective when given before surgery (preventive strategy). An additional benefit of opioids is their anesthetic sparing effect which is not seen with NSAIDs. Opioids lower the amount of induction and maintenance agents required which often results in less cardiorespiratory depression. In cats, it is common to see euphoria, with purring, rolling, rubbing and kneading. In contrast to dogs, opioids cause marked mydriasis in cats so they should be approached slowly, while being spoken to, so they are not startled; they should also be kept away from bright light. Some opioids cause nausea, vomiting and salivation in cats; this is more common after morphine and hydromorphone but is rare after buprenorphine, fentanyl, methadone or butorphanol.

Methadone is unique within this class of analgesics because in addition to having mu-opioid effects it also acts at the NMDA receptor which is important in the process of central sensitization. Unlike European countries there is no veterinary formulation of methadone in the United States and the human formulation (used off label) is expensive.

Buprenorphine is popular in feline pain management. Transmucosal absorption through oral mucous membranes (OTM) has been demonstrated in cats which can be utilized after cats are discharged from the hospital; most owners find it simple to administer. A sustained release preparation of buprenorphine for subcutaneous administration has been evaluated in cats undergoing ovariohysterectomy. A single sustained release dose of 120µg/kg was as effective as 20µg/kg buprenorphine by the OTM route given every 12 hours until 60 hours after surgery. The sustained release formulation is not FDA approved for cats and there are reports of injection site reactions in cats. Simbado<sup>TM</sup>; Buprenorphine Injection for cats (1.8 mg/ml), is the first FDA approved buprenorphine for use in cats and is approved for 3 days of treatment. This product is intended for subcutaneous administration and may provide analgesia for up to 24 hours which simplifies treatment. It is not however for dispensing for use in the home setting.

Epidural injection of morphine is a technique well worth considering for hind-limb surgery or trauma and abdominal surgery. Prior to surgery this is often combined with a local anesthetic to decrease sensory input to the central nervous system. Preservative free morphine may be effective for up to 18-20 hours with few side-effects.

## **Non-steroidal Anti-Inflammatory Drugs (NSAIDs)**

NSAIDs are excellent analgesics for acute pain, can provide up to 24 hours of analgesia after a single dose, and are not subject to the legal regulations of opioids. In the United States the only approved NSAIDs for perioperative use in cats are meloxicam and robenacoxib. Meloxicam is approved only for one single injection and repeated use is “off label” as is the oral formulation. Robenacoxib is approved by the FDA for use in cats 4 months and older for the control of post-operative pain associated with inflammation related to orthopedic surgery, ovariohysterectomy and castration, and can be given for a maximum of three days. It is available in a tablet and injectable formulation which simplifies perioperative administration. At clinical doses COX-1 inhibition is minimal and short lasting. Robenacoxib has a unique pharmacokinetic profile, with a short half-life but long residence time in target (inflamed) tissues. NSAIDs should not be used in patients that are hypovolemic or hypotensive and never concurrently with corticosteroids.

## **Local anesthetics**

Local anesthetics can provide complete analgesia with minimal side effects and can be used for many different surgical procedures including castration and ovariohysterectomy. Loco-regional blocks are valuable to learn, for example a sciatic and femoral nerve block desensitizes the hind limb sufficiently for many hind limb surgical procedures. A wound or “soaker” catheter can be placed into a surgical site to provide a method for maintaining continuous analgesia. After fibrosarcoma removal in cats the use of a wound infusion catheter significantly reduced the time the cat was hospitalized. Another method for delivery of local anesthesia is a lidocaine patch. When applied to shaved skin, high concentrations of lidocaine are detected at the site of application with minimal systemic absorption.

## **Alpha<sub>2</sub>-adrenergic agonists**

It is important to note that the dose of an alpha<sub>2</sub>-adrenoceptor agonists (medetomidine and dexmedetomidine) required to provide sedation is lower than that needed for analgesia; for example, in cats dose dependent sedation was seen with doses of dexmedetomidine between 2 and 40 µg/kg (intramuscular) but analgesia was only associated with the highest dose. Sedation may mislead the observer to think that the animal is comfortable; however interactive assessment (palpation of the wound) will usually reveal the difference between pain and sedation. For this reason, this group of drugs are not “first line” analgesics.

## **NMDA antagonists**

Ketamine acts at the NMDA receptor and there is great interest in using ketamine to prevent central sensitization and “wind up”. Low (sub-anesthetic) infusions of ketamine given as part of a multimodal analgesic protocol in dogs undergoing major surgery suggests that it has beneficial effects on post-operative pain and appetite. Ketamine also has anti-proinflammatory actions, which may provide additional benefits. In a clinical study dogs diagnosed with pyometra and undergoing surgery were sequentially allocated to receive a standard anesthetic and analgesic protocol, with or without low-dose ketamine infusion (not blinded). Serum C-reactive protein (CRP) was measured before, 24 and 48 hours after surgery. Low dose ketamine attenuated the post-operative concentration of serum CRP. Although there are fewer published studies on the use of low-dose ketamine infusions in cats, clinical experience suggests it is a very useful analgesic. At the recommended doses (< 10 microg/kg/minute) you do not see the dissociative effects that are common with anesthetic doses. Dilution of ketamine and use of a syringe pump are essential for accurate dosing.

## **Gabapentin**

There is little information on the use of gabapentin for acute pain in cats, however, there are several encouraging case reports in cats suggest it should be investigated further.

## **Multimodal analgesia**

Nociception and pain involves many steps and pathways so it seems unlikely that one analgesic agent could completely prevent or alleviate pain. Multimodal analgesia describes the combined use of drugs that have different modes of action, work at different receptors and at different places in the “pain pathway” with the assumption this will provide superior analgesia or allow lower doses of each drug to be used thereby lessening any adverse side effects. The most commonly used combination of drugs is an opioid plus a NSAID; in cats undergoing ovariohysterectomy using an NSAID plus buprenorphine was superior to using either drug alone.

Preventing and relieving pain is not all about drug therapy. Small incisions and careful tissue handling produce less inflammation and therefore less pain. Good nursing care (warm, dry, comfortable bedding) and low stress handling can have a very positive effect on a patient’s recovery. Icing incisions post-operatively is also a “low tech” and easily implemented technique to add to the multimodal approach.

ANTICIPATE any situation which will cause acute pain – do not overlook seemingly small but additive events; for example, placing an IV catheter, taking a “small” biopsy or passing a urinary catheter. Plan for the procedure before, during and afterwards; the latter includes in the hospital and when the pet goes home.

ASSESS the patient regularly; “one size does not fit all” and therefore your plan may not be enough for an individual patient. The sooner pain is recognized and treated, the less harm it can do.

ALLEVIATE - this is the ultimate goal and is achievable in our patients if we educate ourselves and use the drugs and tools available to us.

#### **Suggested reading**

AAHA/AAFP Pain Management Guidelines: [www.catvets.com/guidelines/practice-guidelines/pain-management-guidelines](http://www.catvets.com/guidelines/practice-guidelines/pain-management-guidelines)

Benito J, Monteiro B, Lavoie AM, Beauchamp G, Lascelles BD, Steagall PV. Analgesic efficacy of intraperitoneal administration of bupivacaine in cats. *J Feline Med Surg*. 2015.

Davis KM, Hardie EM, Lascelles BD, Hansen B. Feline fibrosarcoma: perioperative management. *Compend Contin Educ Vet*. 2007;29(12):712-4, 6-20, 22-9 passim.

Kissin I, Lee SS, Bradley EL, Jr. Effect of prolonged nerve block on inflammatory hyperalgesia in rats: prevention of late hyperalgesia. *Anesthesiology*. 1998;88(1):224-32.

Liao PY, Chang SC, Chen KS, Wang HC. Decreased postoperative C-reactive protein production in dogs with pyometra through the use of low-dose ketamine. *J Vet Emerg Crit Care (San Antonio)*. 2014;24(3):286-90.

Robertson SA, Lascelles BD, Taylor PM, Sear JW. PK-PD modeling of buprenorphine in cats: intravenous and oral transmucosal administration. *J Vet Pharmacol Ther*. 2005;28(5):453-60.

Slingsby LS, Taylor PM. Thermal antinociception after dexmedetomidine administration in cats: a dose-finding study. *J Vet Pharmacol Ther*. 2008;31(2):135-42.

Wagner AE, Walton JA, Hellyer PW, Gaynor JS, Mama KR. Use of low doses of ketamine administered by constant rate infusion as an adjunct for postoperative analgesia in dogs. *J Am Vet Med Assoc*. 2002;221(1):72-5.

# The Five Freedoms: Are We Meeting Our Hospitalized Feline Patients' Needs?

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The “Five Freedoms” are not a new concept, having been introduced in the 1960’s and 70’s in response to the public’s concerns for farm animal welfare in the United Kingdom. They were part of the Brambell report and have been adopted by numerous veterinary and welfare organizations throughout the world. Although the freedoms are the same for all animals in our care, how we provide these will differ between species. They offer a simple check list for assessing our care of patients, for example when a cat is hospitalized. They are:

1. **Freedom from hunger and thirst** – by providing appropriate food and water
2. **Freedom from discomfort** - by providing an appropriate environment, for example a resting area
3. **Freedom from pain, injury and disease** – by providing a rapid diagnosis and treatment
4. **Freedom to express normal behavior** – by providing sufficient and appropriate space and social interactions
5. **Freedom from fear and distress** - by ensuring conditions and treatment which avoid mental suffering

Clearly there will be exceptions at times which will be medically justified, for example briefly withholding food and water before anesthesia or immediately after gastrointestinal surgery.

For most cats, and owners, the stress of a veterinary visit begins at home. Many cats do not like being put in a carrier nor do they enjoy the car journey required for transport. This can be ameliorated by having owners leaving carriers accessible at all times in the home and feeding the cat treats in them and rewarding them if they enter voluntarily. Administration of gabapentin 2-3 hours prior to a journey is an extremely useful strategy. Suggested doses are 50-100 mg for most cats. It can be sprinkled on a small (1 tablespoon) of wet food – adding a “dash” of Fortiflora or some sardine or tuna oil will persuade most cats to consume it. Cats will be sedate and some may be ataxic (for up to 12 hours) so discuss this with the owners so they are not surprised or worried. If a cat is known to get car-sick, maropitant can also be prescribed for trips to the hospital.

Cats may become extremely fearful and stressed when confined to a small cage especially if there is no place to hide. Veterinary clinics tend to be chaotic and the stimuli and smells present may be overwhelming to a cat. If a cat has never encountered a dog before, the noise and smell can be extremely distressing. Inappropriate restraint and the stress of an unfamiliar environment can have a detrimental effect on cats for example distressed cats will have increased heart and respiratory rates, elevated blood pressure, elevated cortisol levels, may become anorexic and resent handling that is required for treatment purposes resulting in suboptimal care. In addition, under these circumstances cats are more likely to retaliate and cat bites and scratches are potentially serious injuries in humans – remember that fear is the number one cause of aggression in this setting. Try to avoid having cats wait in a busy waiting room with other animals – as soon as the cat arrives at the clinic it is best to take it directly to a quiet and secluded area to wait, or place the carrier in an elevated spot and cover it with a Feliway® treated towel (see later). Calming an injured, distressed, fearful or aggressive cat so that it can be examined or treated may require one or a combination of the following:

- Physical restraint
- Sedation
- Chemical immobilization / general anesthesia

Most cats can be gently examined by removing the top off their carrier (always recommend this type of carrier to owners). Scruffing should no longer be a restraint method in cats. Wrapping them in towels (tips on towel wraps can be found under suggested reading and resources), usually calms most cats and allows a full examination including blood draws.

## **Feline facial pheromones**

The use of a synthetic fraction of feline facial pheromones in a spray formulation has been assessed in several clinical settings. Prior to intravenous catheterization the cage was sprayed with Feliway® (CEVA Sante Animale) or placebo and the cat was placed in the cage for 30 minutes. Cats were videotaped and their behavior assessed by a blinded observer. The facial pheromone had additional calming effects in cats given acepromazine and, to a lesser degree, helped to calm cats that were not given acepromazine and the authors concluded that Feliway® helps to calm cats in unfamiliar surroundings. In another study, significant increases in grooming and interest in food were found in cats exposed to facial pheromones compared with a placebo. A recent study reported decreased stress scores during a consultation when the examination table was sprayed with Feliway®, however there was no difference in the handling score between treatment and placebo. The spray can be used in cages, on tables and blankets and a diffuser can be used in the cat area of a clinic. Owners should also be given a Feliway® wipe to use in the cat’s carrier prior to hospital visits. It is important to plan ahead as it takes 15 minutes for the alcohol base to evaporate after spraying or wiping an area.

Where physical examinations and treatments occur should also be considered. A study has shown that when cats watch another cat being examined their stress level increases. Therefore, try to remove the cat from sight of other cats during treatment – this could be achieved by placing a screen around the treatment table if it is situated in the ward.

All cats should be provided a hiding place and if possible an elevated perch while hospitalized. A hiding place can be as simple as a large paper grocery bag with duct tape around the edges, or a towel placed over part of the cage. Published data shows that this reduces stress scores, makes cats more likely to voluntarily approach and increases “relaxed” behaviors. A cat also needs sufficient space to fully stretch and there should be a minimum of 2 feet between their resting area, the litterbox and where they eat and drink.

The correct thermal environment is also important. The thermoneutral temperature for cats is 29-38°C (85-100°F). This can be provided with warm recovery areas and wards, preventing drafts in animal areas, heated cages, and a microclimate will be created in hiding places. Electric heating pads should never be used as many serious burns have resulted from them.

Auditory enrichment is good, but must be chosen carefully. Minimizing sudden loud noises prevents cats from being startled. If your practice has stainless steel cages the latches can be sprayed with “rubber glue” to decrease the noise every time they are opened and closed. The music the staff may want to listen too may not be suitable for cats! Snowden et al (see suggested reading), tested music composed for cats with that for humans. Cats showed more interest in the “cat” music which included specific frequency ranges involved in feline affiliative interactions.

Soft comfortable bedding is easy to provide, with cat beds, pillows, fleece and towels. Examination tables can be covered non-slip (e.g. yoga) mats and baby changing pads are ideal as the covers can be changed between cats.

Prescribing non-medical treatments can enhance a cat’s hospital experience. If the only time they have human contact a medical procedure occurs, for example having a rectal temperature taken, they become anticipatory. Time should be made to spend time with the cat to groom it, play with toys or simply speak to it or offer it a treat. Social interaction with humans in a shelter setting facilitated sustained contentment, decreased the incidence of upper respiratory tract disease and enhanced secretion of S-IgA, an immune mucosal antibody.

With some very simple techniques we can enhance the experience for cats during a veterinary visit or period of hospitalization.

#### **Suggested reading and resources**

Gourkow N, Phillips CJ. Effect of interactions with humans on behaviour, mucosal immunity and upper respiratory disease of shelter cats rated as contented on arrival. *Prev Vet Med.* 2015;121(3-4):288-96.

Griffith CA, Steigerwald ES, Buffington CA. Effects of a synthetic facial pheromone on behavior of cats. *J Am Vet Med Assoc.* 2000;217(8):1154-6.

Kronen PW, Ludders JW, Erb HN, Moon PF, Gleed RD, Koski S. A synthetic fraction of feline facial pheromones calms but does not reduce struggling in cats before venous catheterization. *Vet Anaesth Analg.* 2006;33(4):258-65.

Kry K, Casey R. The effects of hiding enrichment on stress levels and behavior of domestic cats (*Felis sylvestris catus*) in a shelter setting and the implications for adoption potential. *Animal Welfare.* 2007; 16:375-383.

Pereira JS, Fragoso S, Beck A, Lavigne S, Varejao AS, da Graca Pereira G. Improving the feline veterinary consultation: the usefulness of Feliway spray in reducing cats' stress. *J Feline Med Surg.* 2016;18(12):959-64.

Snowdon CT, Teie D, Savage M. Cats prefer species-appropriate music. *Applied Animal Behavior Science* 2015; 166:106-111.

The Five Freedoms (with posters for download) at: [www.aspcapro.org/resource/shelter-health-animal-care/five-freedoms](http://www.aspcapro.org/resource/shelter-health-animal-care/five-freedoms)

The AAFP’s Feline Handling Guidelines and the Feline Friendly Nursing guidelines which can be accessed at:

<http://www.catvets.com/guidelines/practice-guide-lines>

AAFP Feline Friendly Practices: [www.catvets.com/cfp/cfp](http://www.catvets.com/cfp/cfp)

CATalyst Council's Cat-Friendly Practice: [www.catalystcouncil.org](http://www.catalystcouncil.org)

Sophia Yin: <https://drsophiayin.com/> This is an excellent source for watching short videos, purchasing videos, books and information on low-stress training and certification. This is an excellent resource for learning towel wrap techniques for cats.

# Those Feline Problem Cases

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Cats can pose many problems when it comes to anesthesia and analgesia. A nice friendly cat can turn into a patient you don't recognize. In addition cats may have underlying disease which is not apparent by taking a history or performing a physical examination (e.g. hypertrophic cardiomyopathy). We are also required to anesthetize them for many medical or surgical reasons and some will have additional comorbidities (e.g. hyperthyroidism, diabetes mellitus). Based on my own experience and the most popular questions I get the following cases will be open for discussion – in addition participants are encouraged to bring their challenging cases for discussion.

1. The untouchable /scared/ fearful cat
2. Geriatric cats that require prolonged anesthesia; for example, complex dental procedures
3. Young (pediatric) kittens for elective procedures (neutering) but also major surgery such as a fracture or removal of a gastrointestinal foreign body.
4. A dyspneic cat for a chest tube placement
5. A cat with a ruptured diaphragm
6. A debilitated cat for an E-tube placement (e.g. a cat with hepatic lipidosis)
7. A cat with known hypertrophic cardiomyopathy for a tooth extraction
8. Sedation for a cat with urethral obstruction

These cases can have successful outcomes when you have a good understanding of feline behavior, how different anesthetic and analgesic drugs are metabolized, which ones are reversible and if you invest in some feline-specific equipment.

Controversial topics including “mask” “box” or “chamber” inductions will be discussed in addition to the intramuscular use of alfaxalone and the use of alpha<sub>2</sub>-adrenergic agonists in the face of heart disease.

# Updates in Feline Anesthesia and Analgesia

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Cats are the most popular pet in many countries and due to their unique behavior and physiology they can pose anesthetic and pain management challenges. They may have underlying but subclinical disease, their unique metabolism requires us to choose anesthetic and analgesic drugs carefully and because of their small size they are prone to hypothermia which can lead to anesthetic complications. In addition, cats are easily stressed by a journey to and a stay in a veterinary clinic. Stress, fear and anxiety may also contribute to anesthetic complications, impede good nursing care and worsen pain.

## Feline anesthetic related mortality rates

The Confidential Enquiry into Post-anesthetic Small Animal Fatalities (CEPSAF) study included 98,036 dogs and 79,178 cats and has provided valuable information on the risks associated with anesthesia in small animals. The overall risk of death was 0.17%, and 0.24% in dogs and cats respectively. In healthy dogs and cats the risks were 0.054% and 0.112% respectively and in sick dogs and cats the risks were 1.33% and 1.40% respectively. "Healthy" [ASA 1 and 2] and "sick" [ASA 3-5] classifications were based on the American Society of Anesthesiologist's classification. Analysis of the results reveals that most deaths occur post-operatively with the most critical time being the first three hours after the end of anesthesia. An independent panel of experts reviewed details of each anesthetic death and tried to ascertain a cause. Cardiovascular and / or respiratory causes accounted for 72% of deaths in cats.

Respiratory problems were common in the post-operative period suggesting airway trauma and swelling may be involved. For short procedures (< 30 minutes) intubation increased the risk and this suggests that great care should be taken when placing an endotracheal tube in a cat. Alternatives to intubation include use of a face mask or a supraglottic airway device (V-gel®).

Another reason for the higher risk in healthy cats may be the presence of sub-clinical cardiac disease. In "overtly" or "apparently" healthy cats, the incidence of cardiomyopathy may be as high as 15-18%. Cats with cardiac disease can appear to be clinically healthy, murmurs can be significant or insignificant and can be absent in cats with cardiac disease so it is difficult to know which of our feline patients has cardiac disease without echocardiography.

The use of fluids was also revealed as a risk factor and not necessarily related to the health status of the cat. The blood volume of cats (40-60 ml/kg) is significantly lower than in dogs (80-90 ml/kg) so this and underlying heart disease may lead to fluid overload. The American Animal Hospital Association (AAHA) and American Association of Feline Practitioner's (AAFP) fluid therapy guidelines suggest 3 ml/kg/hour as an anesthesia maintenance rate for crystalloid fluids in cats.

## Hypothermia

Hypothermia occurs commonly in cats undergoing anesthesia and is linked to mortality. Hypothermia leads to delayed recovery, impaired cardiac function, increased oxygen requirements during recovery and can increase blood loss and contribute to post-operative infections. Every attempt should be made to prevent heat loss in cats during anesthesia by using circulating warm water blankets, forced warm air devices and blankets made of conductive fabric in addition to avoiding cold work areas and using warm prep solutions for preparing patients for surgery and avoiding excessive soaking.

## Post-anesthetic blindness

There are reports of cats being temporarily or permanently blind with or without other neurological abnormalities following anesthesia. The purpose of anesthesia in most of these cases was for dental or oral endoscopy procedures. Most cats undergoing these procedures had spring loaded mouth gags inserted, often to full extension, for variable periods of time (45 minutes to 5.5 hours) although there was no association between length of anesthesia and severity of clinical signs. In one report, 3 out of 20 cats were blind (cortical in origin) only and the other 17 also had abnormal neurological signs including ataxia, head tilt, proprioceptive deficits and abnormal mentation. A few cats were lost to follow up but of those that had a known outcome, seventy percent regained sufficient vision to adequately navigate their surroundings, three cats that remained blind were reported to adapt well, fifty nine percent of cats with neurologic deficits made a full recovery and one cat was euthanized. Based on cadaver dissection and evaluation of maxillary blood flow the cause of these post-anesthetic deficits in cats that underwent endoscopy or dental procedures is presumed to be cerebral ischemia secondary to impaired blood flow in the maxillary artery (the primary cerebral blood supply in cats) when the mouth is held open. Additional studies using magnetic resonance angiography, computer tomography, electroretinography and brainstem auditory evoked potentials demonstrate that cerebral blood flow can be diminished in some cats when their mouth is open. To prevent these adverse events spring loaded mouth gags should not be used; the mouth can be manually held open, just wide enough for the purpose, or small mouth gags can be made by cutting a tuberculin syringe (20-30 mm length) and inserting the canine teeth into either end, again opening the mouth only as wide as needed.

## **Metabolism – Feline specific issues**

To avoid unwanted side effects in cats, their unique and limited metabolic capacity must be understood. The distribution of drugs is influenced by several key factors including:

- Physiologic variables such as age
- Pharmacologic interactions, for example the simultaneous use of more than one drug
- Pathologic factors such as chronic renal failure

The main disparity in disposition of drugs between cats and other species can be explained by differences in drug metabolism. Metabolism is of particular importance when highly lipid-soluble drugs are used because they must be transformed into a water-soluble form before they can be excreted. Slow metabolism of lipid soluble drugs may lead to accumulation and potentially toxic effects if dosing intervals are not adjusted. In contrast, if a metabolite has an important role to play in the overall action of the drug, (e.g. morphine's active metabolite M-6-G) failure to produce metabolites may make the drug relatively ineffective. The liver is the major site of drug metabolism and involves 2 distinct phases, each requiring specific enzymes

- Phase 1 involves oxidation, reduction and hydrolyzation
- Phase 2 involves conjugation of the original drug, or its metabolites with glucuronide (most common), glutathione, acetyl and amino acid groups. Conjugation usually renders the compound inactive and water-soluble so it can be excreted via urine or bile.

The domestic cat seems especially sensitive to the adverse effects of some drugs that require glucuronidation before elimination. This metabolic deficiency has a molecular genetic basis with pseudogenes and gene mutations linked to the glucuronidation enzymes being identified. It has been proposed that cats have not developed this metabolic pathway in their liver because they have always been true "obligate" carnivores and not exposed themselves to plants containing phytoalexins, which must undergo glucuronidation to be eliminated.

## **Anesthetic agents**

Propofol (2,6-diisopropylphenol) is widely used in cats. The attractive features of propofol anesthesia include its rapid onset and offset of action. Compared to some other injectable protocols, recoveries are usually smooth and complete with no "grogginess" or "hang over". Propofol is completely metabolized with no active metabolites. Cats require a higher induction dose compared to dogs when no premedicant agent is used and although the total dose is decreased after sedation, the dose in cats is still higher. In cats, recovery times after infusions that last > 30 minutes are longer than expected and this may be due to decreased capacity for glucuronidation as outlined above. Propofol would appear to be ideal for repeated administration, for example in cats that require daily wound care or radiation therapy. Based on the knowledge that feline hemoglobin is susceptible to oxidative injury and that phenolic compounds are linked to this injury, Andress et al studied the safety of consecutive day propofol administration in cats. Anesthesia was induced with a bolus of propofol and maintained for 30 minutes by infusion. The authors planned to do this daily for 10 days, but by day 3, there was a significant increase in Heinz bodies, and recovery times were longer. By day 5 many cats stopped eating, had diarrhea and were "unwell", and the study was terminated on day 7. Cats recovered without treatment within 2 days. Based on this study, propofol was not recommended for repeated use at short intervals. However, Bley and colleagues have revisited the use of repetitive propofol administration in cats that required radiation therapy. In their study one group of cats received propofol with or without midazolam on 5 consecutive days and another group was anesthetized 12 times over a 19-day period, again using propofol or midazolam/propofol; if "top up" anesthesia was needed this was achieved with additional propofol boluses. The mean duration of each anesthetic episode was 8 minutes (range 5-20mins). In this study, there were no clinically apparent adverse effects and although hematocrit and hemoglobin concentration decreased this was not significant. The use of midazolam decreased the total amount of propofol needed for induction and maintenance by 26% and these authors concluded that propofol can be used daily for short periods and the dose should be minimized as much as possible.

Propofol (PropoFlo™ 28) is a formulation of propofol that contains 2% benzyl alcohol as a preservative which means it can be kept at room temperature for up to 28 days. It is only approved for use in dogs, however studies have been conducted in cats using normal to high clinical doses given 3 times at 48 hour intervals with no clinically relevant adverse effects.

### **Alfaxalone**

Alfaxalone is a neurosteroid anesthetic which is now available in the USA. The alfaxalone molecule is similar to progesterone but has no hormonal activity. The drug has a high safety index and can be given as a single induction bolus and used as an infusion. It has been used intramuscularly in cats but this is not an approved route of administration.

### **Assessing pain in cats**

New validated assessment tools are now available for acute pain assessment. One is the UNESP-Botucatu Multidimensional Composite Pain Scale (UNESP-Botucatu MCPS) which is available along with examples (videos) and explanations of behaviors via a dedicated website ([www.animalpain.com.br/en-us/](http://www.animalpain.com.br/en-us/)). Another is the Glasgow Composite Measures Pain Scale-Feline (rCMPS-Feline) which has been updated to include facial expressions. It can be downloaded at: [www.newmetrica.com/acute-pain-measurement/](http://www.newmetrica.com/acute-pain-measurement/)

## **Analgesic agents**

Opioids are an essential component of most anesthetic protocols and for a long time there has been a reluctance to use opioids in cats due to fear of adverse behavioral effects. However, at appropriate clinical doses euphoria and sedation usually occur and numerous research and clinical studies demonstrate that they can provide excellent analgesia in cats. An FDA approved formulation of buprenorphine (Simbadol™) is now available for subcutaneous administration. The high concentration and dose result in analgesia for up to 24 hours and it is approved for use on three consecutive days.

Robenacoxib is an FDA approved non-steroidal anti-inflammatory drug for use in cats 16 weeks and older. It is approved for the control of post-operative pain associated with inflammation related to orthopedic surgery, ovariohysterectomy and castration, and can be given for a maximum of three days. It is available as an oral tablet and more recently in an injectable formulation. This is the first coxib class of drug approved for cats. At clinical doses COX-1 inhibition is minimal and short lasting. Robenacoxib has a unique pharmacokinetic profile, with a short half-life but long residence time in target (inflamed) tissues.

Gabapentin is an antiepileptic drug that is also used to treat neuropathic pain in humans. Although not a lot is known about the efficacy of this drug in cats, there are several case reports which support its use as an adjunctive drug for pain management. The popularity of cats and their unique needs has led to the development of feline specific drugs and drug formulations and development of specialized equipment to improve their analgesic and anesthetic management.

## **Suggested reading**

- AAFP fluid therapy guidelines can be downloaded at: [www.catvets.com/guidelines/practice-guide-lines/fluid-therapy-guide-lines](http://www.catvets.com/guidelines/practice-guide-lines/fluid-therapy-guide-lines)
- Address JL, Day TK, Day D. The effects of consecutive day propofol anesthesia on feline red blood cells. *Vet Surg.* 1995;24(3):277-82.
- Barton-Lamb AL, Martin-Flores M, Scrivani PV, Bezuidenhout AJ, Loew E, Erb HN, et al. Evaluation of maxillary arterial blood flow in anesthetized cats with the mouth closed and open. *Vet J.* 2013;196(3):325-31.
- Bley CR, Roos M, Price J, Ruess-Melzer K, Buchholz J, Poirier V, et al. Clinical assessment of repeated propofol-associated anesthesia in cats. *J Am Vet Med Assoc.* 2007;231(9):1347-53.
- Boothe DM. Drug therapy in cats: mechanisms and avoidance of adverse drug reactions. *J Am Vet Med Assoc.* 1990;196(8):1297-305.
- Brodbelt DC, Pfeiffer DU, Young LE, Wood JL. Risk factors for anaesthetic-related death in cats: results from the confidential enquiry into perioperative small animal fatalities (CEPSAF). *British journal of anaesthesia.* 2007;99(5):617-23.
- Cote E, Manning AM, Emerson D, Laste NJ, Malakoff RL, Harpster NK. Assessment of the prevalence of heart murmurs in overtly healthy cats. *J Am Vet Med Assoc.* 2004;225(3):384-8.
- Court M, Greenblatt D. Molecular genetic basis for deficient acetaminophen glucuronidation by cats: UGT1A6 is a pseudogene, and evidence for reduced diversity of expressed hepatic UGT1A isoforms. *Pharmacogenetics.* 2000;10(4):355-69.
- Giraudel JM, Toutain PL, King JN, Lees P. Differential inhibition of cyclooxygenase isoenzymes in the cat by the NSAID robenacoxib. *J Vet Pharmacol Ther.* 2009;32(1):31-40.
- Lorenz ND, Comerford EJ, Iff I. Long-term use of gabapentin for musculoskeletal disease and trauma in three cats. *J Feline Med Surg.* 2012;15(6):507-12.
- Paige CF, Abbott JA, Elvinger F, Pyle RL. Prevalence of cardiomyopathy in apparently healthy cats. *J Am Vet Med Assoc.* 2009;234(11):1398-403.
- Pascoe PJ, Ilkiw JE, Frischmeyer KJ. The effect of the duration of propofol administration on recovery from anesthesia in cats. *Vet Anaesth Analg.* 2006;33(1):2-7.
- Redondo JI, Suesta P, Gil L, Soler G, Serra I, Soler C. Retrospective study of the prevalence of postanesthetic hypothermia in cats. *Vet Rec.* 2012;170(8):206.
- Steagall PV, Monteiro-Steagall BP. Multimodal analgesia for perioperative pain in three cats. *J Feline Med Surg.* 2013.
- Stiles J, Weil AB, Packer RA, Lantz GC. Post-anesthetic cortical blindness in cats: twenty cases. *Vet J.* 2012;193(2):367-73.
- Taylor PM, Chengelis CP, Miller WR, Parker GA, Gleason TR, Cozzi E. Evaluation of propofol containing 2% benzyl alcohol preservative in cats. *J Feline Med Surg.* 2012;14(8):516-26.
- van Oostrom H, Krauss MW, Sap R. A comparison between the v-gel supraglottic airway device and the cuffed endotracheal tube for airway management in spontaneously breathing cats during isoflurane anaesthesia. *Vet Anaesth Analg.* 2013;40(3):265-71.

# Diagnosing Feline GI Diseases: Setting Yourself Up for Success

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If our patients read textbooks our job would be much easier. If our patients came to us with Presenting Complaints such as “eosinophilic syndrome”, or “low-grade alimentary lymphoma” our job would be much easier. If our patients restricted themselves to one disease at a time, our job would be much easier. If our patients segregated themselves such that the positive predictive value of our diagnostic tests were through the roof, our job would be much easier. And if our prescribed therapy never failed, our job would be much easier. Our job is not very easy.

## Clinicians first and foremost

When a client pays for an appointment they are paying for the clinical expertise of the veterinarian (well, that and the electricity, the receptionist’s salary, the mortgage on the building, etc.). The clinical expertise of the veterinarian has a profound impact on how much more the client will pay on diagnostic testing, how effectively and efficiently a diagnosis is identified, and the likelihood the patient leaves the appointment with the correct diagnosis and the appropriate treatment.

## Definitions

- Sensitivity – the proportion of true positives that are correctly identified by the test.
- Specificity – the proportion of true negatives that are correctly identified by the test.
- True positive: Sick pets correctly diagnosed as sick
- False positive: Healthy pets wrongly identified as sick
- True negative: Healthy pets correctly identified as healthy
- False negative: Sick pets wrongly identified as healthy

Positive Predictive Value (PPV) - The ratio of true positives to combined true & false positives; the proportion of pets with positive test results who are correctly diagnosed. It is the most important measure of a diagnostic method as it is a measure of the probability that a positive test result reflects the underlying condition being tested for. Its value depends on the prevalence of the disease.

## Technology

- ELISA – Enzyme-linked immunosorbent assay: uses specific antibodies directed at particular antigens, these antibodies are linked to an enzyme that catalyzes a substrate reaction that results in a quantifiable color change
- IFA – Immunofluorescence antibody assay: uses specific antibodies directed at particular antigens, these antibodies are linked to a fluorophore (primary) whose emission can be visualized with a fluorescence microscope or plate reader.
- IHC – Immunohistochemistry: antibodies directed at specific antigens within tissues (ex. cell surface markers), these antibodies can be conjugated to an enzyme that catalyzes a color producing reaction or they can be attached to a fluorophore.
- Flow Cytometry: fluorophores attached to antibodies directed at specific cell surface markers are used to label cells, which are then passed by lasers single-file, the resulting emission is captured and quantified
- PCR - Polymerase chain reaction: the amplification (using specific primers, a DNA polymerase, and thermal cycling) of a specific DNA sequence within a sample, allows detection, identification and quantification of target sequences.

Ironically, the advent of these incredible advances in diagnostic technology (and list is the condensed version) have significantly magnified, not diminished, the importance of the basic clinical skills of the veterinarian. With these diagnostic tools and the client’s money we have reached the point where we can find almost anything, almost anywhere, in almost every patient – if we are willing to spend the time, effort, and money. But a positive test result is only as meaningful as the quality of the question it addressed – once again highlighting the importance of our ability to ask the right questions.

## *Giardia*, *Tritrichomonas*, and fecal technology

Both *Giardia* and *Tritrichomonas* can cause diarrhea in cats. Young cats, and those from crowded environments such as kennels, catteries, and cat shows are at higher risk. Although *Tritrichomonas* is thought to cause predominantly large bowel diarrhea and *Giardia* appears more likely to cause small bowel diarrhea, there is certainly overlap in the target patient population and the presenting clinical signs. In addition, a number of studies have identified both organisms in a significant percentage of young cats with diarrhea from cat shows and kennels around the world. Because both organisms can be therapeutically challenging, and *Giardia* is potentially zoonotic, it is important to attempt to confirm a clinical diagnosis prior to trial treating with a best-guess dewormer. This is also an important step on the off-chance the initial trial treatment should fail or similar clinical signs reappear down the road.

Having arrived at a clinical diagnosis of *Giardia* in a cat with diarrhea, the subsequent diagnostic algorithm starts with feces and a microscope. Identification of *Giardia* cysts is challenging because the organism is shed intermittently (sample fresh diarrhea), are very fragile, and are mimicked by pollens, brewer's yeast and other artifacts from the diet or environment. *Giardia* trophozoites must also be differentiated from numerous artifacts as well as *Tritrichomonas* trophozoites on a fecal wet mount (again, the fresher the better).

The next technological step in the attempt to diagnose *Giardia* involves the use of an ELISA assay. The following table was developed by Dr. Stan Marks (used with permission), comparing the performance of different ELISA assays and fecal flotation for diagnosing *Giardia* in 344 cats. Not only does this technology remove the microscopy and the eye sight necessary for cyst identification, it also removes the need for fresh fecal samples.

	Sensitivity (%)	Specificity (%)	False negatives	False positives
Flotation	85.3	99.7	5	1
Immunocard STAT!	72.7	99	9	3
XpectT Giardia/Crypto	79.4	99	7	3
SNAP Giardia ELISA	85.3	100	5	0
ProSpecT Giardia Microplate ELISA	91.2	99.4	3	2

The SNAP® *Giardia* Test Kit (IDEXX Laboratories, Inc.) featured in this table is an in-house assay that can be performed on fresh, previously frozen, or refrigerated fecal samples stored for up to one week. The assay is easily performed, takes a matter of minutes, and is both sensitive and specific. Dr. Marks emphasizes that parallel testing, using both floatation with centrifugation and the SNAP ELISA increases the sensitivity (97.8%) of the diagnostic effort. At the Colorado State Diagnostic laboratory we frequently employ the Merifluor® IFA combination *Cryptosporidium/Giardia* assay as a gold standard, but the requirement for a fluorescent microscope precludes the use of this assay in-house in private practice.

The diagnosis of *Tritrichomonas foetus* can be equally challenging. As with *Giardia*, the effort starts with attempted microscopic identification of trophozoites from a fecal wet mount preparation. A reminder that *T. foetus* are spindle-shaped with an undulating membrane and move in a jerky manner while *Giardia* trophozoites have a concave ventral disc and move as if imitating a “falling leaf”. Unlike *Giardia*, *Tritrichomonas foetus* does not have a cyst stage. This diagnostic effort successfully identifies the offending organism approximately 14% of the time it is used in cats with diarrhea due to *T. foetus*.

The InPouch TF (Biomed Diagnostics) is a fecal culture system that is significantly more sensitive for the detection of *T. foetus* in cats with diarrhea. This assay requires a very small amount of fresh feces (0.05 grams), acquired either through the cooperation of the patient or with a moist cotton swab up the bum. The InPouch is incubated at 37° for 24 hours, then stored at room temperature in the dark during which time the culture media is examined daily (40X) for 10 days for evidence of the organism. At CSU we frequently employ PCR technology to look for evidence of *T. foetus* in a fecal sample, the detection limit for this technique is only 10 organisms per 50 mg of feces, compared to the greater than 1000 organisms per 0.05 grams of feces reported for the InPouch assay.

## Prevalence

Remember that the Positive Predictive Value of a diagnostic test is dependent upon the prevalence of the disease in the population being tested. The prevalence of various “common” causes of feline diarrhea are published for many locations throughout the United States, and even the world. If you find yourself diagnosing *Giardia* in 50% of the cats that present to your clinic in Northern Colorado with diarrhea, something is amiss, EVEN if 90% of those cats seem to respond to your prescription for metronidazole!

## Summary

- Diagnostic tests are only as good (Positive Predictive Value) as you are
- Clinical decisions impact the Prevalence of the Disease in the population being tested
- Cats do not read veterinary textbooks
- Exceptions, incongruities, subtle signs, and things that don't make sense are important
- Therapeutic failure is not failure, but opportunity

## References

Gookin JL, Foster DM, Poore MF, et al. Use of a commercially available culture system for diagnosis of *Tritrichomonas foetus* infection in cats. J Am Vet Med Assoc 222:1376-1379, 2003.

Mekaru S, Marks SL, et al. Comparison of direct immunofluorescence, immunoassays, and fecal flotation for detection of *Cryptosporidium* spp. and *Giardia* spp. in naturally exposed cats in 4 Northern California animal shelters. J Vet Intern Med 21:959-65, 2007.

Additional *Tritrichomonas* information found at [http://www.cvm.ncsu.edu/docs/personnel/gookin\\_jody.html](http://www.cvm.ncsu.edu/docs/personnel/gookin_jody.html)

Additional references available upon request.

# Feline Constipation: Getting Crap Out of a Cat

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Constipation is not usually thought of as a terminal disease...unless you are a cat. In that case, constipation, and its potential progression to obstipation and megacolon, can eventually result in euthanasia in an tragic number of cases. The list of causes of feline constipation is far longer than the list of cures, or even effective treatments. Gastrointestinal motility is impacted (no pun intended) by a myriad of conditions external to the GI tract as well as within the GI tract itself. To make matters even more complicated – we are, after all, talking about cats – the clinical manifestation of feline constipation can show itself far away from the source, with vomiting be a common clinical presentation.

## Clinical presentation

### History and physical examination

A bit of constipation, acute in onset and short in duration, can afflict any cat, may not be recognized by the owner, or may not progress to the point where clinical signs motivate the owner to seek out veterinary care. Although diarrhea usually makes itself relatively obvious, whether in the litter box or on the living room floor, the dry, hard feces that makes its way out of a constipated cat may appear quite normal, or at least potentially normal, having likely dried out after-the-fact, especially when coated with litter. The other clinical manifestations of constipation are the ones that more often prompt an owner to seek veterinary care: vomiting, decreased appetite and/or water intake, decreased social interactions, and vocalization when attempting to defecate would all be consistent with feline constipation.

Evaluation of the cat begins with signalment and presenting complaint – which as mentioned, may or may not involve the area, or even the “end” of interest. As our profession is becoming more and more aware of the subtleties and complexities of our feline patients, our history-taking is becoming more sophisticated and complete. Onset, duration, progression, other associated clinical signs, history of disease or surgery, medication use and response, a complete dietary history including supplements, probiotics, nutraceuticals, water intake, potential stressors or changes, perceived or known changes in weight or body condition, activity level, normal ambulation and activity/interactions, indoor/outdoor and environmental conditions are all important aspects of the case. Also of particular interest will be a historical assessment of the litter box arrangement (number and actual structure of the box, location, type of litter), litter box behavior if witnessed (ease of entry, any vocalization, straining, number of unproductive attempts) and the character of the stool (a sample would help, keeping in mind that there may be some degree of desiccation with storage). It will be important to try and discern between descriptions of unproductive attempts at defecation and straining to urinate, the two problems may look quite similar to many owners. Again, this is not meant to be an exhaustive list of historical questions as the client’s answers may well lead the clinician down important and productive tangents or expansions.

A complete physical examination should be a given for any cat presented for veterinary care. Avoid the temptation to focus on the presumed source of the problem, but instead, examine the patient for every normal aspect of any feline physical exam, and the abnormalities should then make themselves obvious. As with the history taking for feline patients, the appropriate physical examination has become more thorough and complex, including a fundic exam (ex. evidence of granulomatous lesions in FIP cats), hydration status and blood pressure, hair coat and cervical palpation, body weight, body condition score, and muscle condition, and of course assessment of both neurologic status and orthopedic condition are no longer the realm of the canine. Obviously a careful examination of the peri-anal area, anal sacs, hip joints, and colonic palpation is critical. It is rare that we perform a rectal examination on an awake cat, although some tolerate a lubricated and gentle pinky-finger for assessment of anal tone. With sedation or anesthesia a more complete rectal examination can reveal masses, strictures, or other causes of mechanical obstruction, as well as more complete evaluation of anal sacs.

Manx cats appear over-represented for megacolon, due in large part to a condition of sacrocaudal dysgenesis. These cats may demonstrate a number of neurologic or neuromuscular abnormalities, with colonic dysfunction being just one manifestation. Similar circumstances are present in cats with dysautonomia, where the GI tract is just one of many systems impacted by a generalized dysfunction of a portion of the nervous system.

## Differentials

A common cause of constipation in the cat is dehydration: secondary to a disease process (CKD, DM, hyperthyroidism); a result of vomiting and/or diarrhea; diuretic drug use; restricted access to water; voluntarily decreased intake (stress, behavioral, environmental); pain (inflammation, trauma, disease within the oral cavity, abdominal disease, colitis, anal sac or rectal disease); decreased mobility or painful ambulation (musculoskeletal); dysfunctional thirst mechanism (CNS disease). Any physical obstruction (tumor or mass, stricture, foreign body, fracture, intussusception, herniation) or functional obstruction (motility disorder, either

secondary to GI inflammation, spinal cord disease, electrolyte imbalance, or primary, such as with megacolon or dysautonomia) will result in constipation. Colonic motility is also negatively impacted by a variety of drugs and medications. Obese cats appear at risk for constipation, probably for multiple reasons.

### **Pathophysiology and diagnostics**

The progression from constipation to megacolon occurs as normal colonic function is lost. The loss may be secondary to a persistent inability to move stool (obstruction) and includes secondary colonic hypertrophy, but in many cases an actual cause cannot be identified, hence the term, idiopathic megacolon. If there is an identifiable inciting cause for a cat's constipation, such as a pelvic fracture, or metabolic electrolyte abnormality, it appears that time is of the essence and early intervention/correction gives the cat the best prognosis for resolution.

Because the list of differentials for a constipated cat is extensive, the appropriate diagnostic work-up could be equally lengthy and involved. After a complete history and physical examination the obvious starting point is a biochemical profile, CBC, urinalysis, total T4, and abdominal radiographs. Follow-up diagnostic steps will depend largely on the clinical and diagnostic picture that is formed up to this point: colonic contrast with barium or air for suspected stricture; colonoscopy for infiltrative mucosal disease; CT or MRI for suspected neurologic disease; skeletal radiographs for fractures or arthritic conditions, abdominal ultrasound for extra-luminal masses, enlarged lymph nodes, or other systemic diseases, etc.

### **Non-specific therapy**

Since dehydration is almost always a component of the presentation with a constipated cat it is one of the most important aspects of non-specific therapy to be addressed. Depending on how the fluid therapy is going to be administered (IV, Subcutaneous, orally, feeding tube) it also represents an opportunity to address electrolyte balance, with potassium being critical for normal neuromuscular function. Various physical exam parameters are used to estimate percent dehydration, and then a variety of formulas exist to calculate the necessary volume of fluid administration to both correct dehydration and meet maintenance requirements. Different types of fluids are appropriate for rehydration, maintenance, and the make-up and degree of electrolyte balance. Clinicians are referred to the recent Davis et al. publication (JAAHA 2013) for a complete discussion of these various parameters. One of the simplest ways to increase fluid intake by cats is to encourage the feeding of canned foods, which are composed of 70% or more of water.

### **Specific therapy**

Rehydration is the first priority. Once the cat is well on the way to a normal hydration status, with correction of electrolytes and acid-base status, steps can be taken to remove the feces from the colon – remembering that early intervention is an important step towards avoiding significant long-term consequences. At Colorado State University many cases of mild to moderate constipation have been addressed with warm-water retention enemas (2-3 over the course of 12=24 hours, 5-10 ml/kg) followed by gentle manual extraction. In some cases this can be accomplished with gentle "milking" of the initial fecal ball followed by successful voluntary defecation. If not successful, brief general anesthesia and more persistent effort, combined with rectal lubrication and assistance is needed. In the worst cases, sponge forceps have been required.

More recently, manual de-obstipation is avoided if at all possible, and a variety of other interventions should be considered.

Laxatives are a potentially useful tool, and classified as lubricating (mineral oil), emollient (Colace <sup>TM</sup>, Surfax <sup>TM</sup>), stimulating (Dulcolax <sup>TM</sup>) or bulk-forming (cellulose), although most are considered only mildly efficacious, stimulating fluid transport and thereby improving the hydration and passage of feces. At CSU we administer most of these as part of an enema, frequently pre-treating with Cerenia <sup>TM</sup>, instead of attempting to get them into the cat orally.

Cathartics are used to increase colonic motility and generally believed to be more effective than laxatives. Lactulose is the most frequently used cathartic at CSU, and frequently is administered orally. The reader is referred to Scherk et al. Vet Focus 2013 p.36-37 for an excellent summary table of the available products and dosing instructions, briefly summarized below (adapted from Dr. Susan Little, Atlantic Coast Veterinary Conference 2012).

- Pediatric rectal suppositories and Enema solutions [10-12 Fr red rubber]
- DSS (dioctyl sodium sulfosuccinate, Colace <sup>TM</sup>), Bisacodyl (Dulcolax <sup>TM</sup>) 5-10 ml/kg
- Warm tap water (5-10 ml/kg)
- Mineral oil (5-10 ml/cat, do not administer with DSS)
- Lactulose (5-10 ml/cat); Kristlose (lactulose crystals mixed with food or water)
- Fleet (sodium phosphate) is **CONTRAINDICATED!**
- GoLYTELY <sup>TM</sup>, Colyte <sup>TM</sup> Miralax PG3350 (polyethylene glycol); NE tube, 6-10 ml/kg/hr

Most recently, thanks to the efforts of Dr. Anthony Carr, we employ polyethylene glycol (Miralax, PG3350), trickled through an NE tube (6-10 ml/kg/hr). Although it may take up to 12-18 hours, the success rate with this minimally invasive protocol makes it well worth the attempt and the patience.

Once the immediate problem has been resolved, follow-up care may include dietary intervention, oral lactulose to effect, and pharmaceutical manipulation.

Dietary fiber is characterized as soluble-easily fermentable and insoluble-poorly fermentable, although sources of fiber are rarely only one or the other, but a combination of both properties. Insoluble fiber adds bulk, distends the colon, and in that way, increases colonic water content and stimulates colonic motility. Soluble fiber is metabolized (fermentable) by colonic bacteria into short-chain fatty acids, a preferred nutrient for gastrointestinal mucosal cells. Psyllium (unflavored Metamucil; 1-4 tsp mixed with food q12-24hr) is used for soluble fiber while wheat bran (1-2 tbsp mixed with food q12-24hr) is used as an insoluble fiber. Canned pumpkin is a popular choice for insoluble fiber and it is not unusual for cats to ingest it voluntarily, but it does not actually provide as much fiber content as other choices. Royal Canin Fiber Response is a psyllium-enriched dry extruded diet that has shown promise as a dietary therapy for constipation in cats (Freiche V et al. JFMS 2011).

Pharmacologic intervention is best achieved with Cisapride (Propulsid™; 5 mg/cat PO q8-12hr). In a number of cats we have had anecdotal success with ranitidine.

Acupuncture can be considered if an experienced clinician is available to administer the treatment. Surgical management of megacolon is beyond the scope of these proceedings.

### **Summary**

- Hydration is first and foremost for the clinical presentation of constipation in cats
- Early and aggressive diagnostic effort to identify underlying causes is essential
- Dietary intervention may play a critical role in decreasing or preventing future episodes
- Cisapride remains the drug of choice for moving a cat's colon.

### **References**

- Freiche V, et al. Uncontrolled study assessing the impact of a psyllium-enriched extruded dry diet on faecal consistency in cats with constipation. JFMS 2011 13:903-911.
- Scherk M, et al. Constipation in the cat: Thinking outside the gut. Vet Focus 2013 Royal Canin.
- Davis H, et al. 2013 AAHA/AAFP fluid therapy guidelines for dogs and cats. JAAHA 2013 49:149-159.

# Feline GI Disease: Diagnostic Dilemmas and Failed Therapy

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I have learned (or been forced) to embrace the importance of diagnostic dilemmas and to develop some form of organized approach to evaluating my therapeutic failures. If nothing else, I have gained a deep appreciation for the complexity of the cat and the shortcomings of the clinician. But I press on.

## Basic principles

- Know your drugs before you use them
- Diagnostic tests; Only as good as you are
- Define the Problem: Verify

## Failed therapy

- Wrong diagnosis
- Right diagnosis, wrong treatment
- Right diagnosis & treatment, owner?
  - Concurrent disease, new disease, progression
  - Effective therapy unknown
  - Failed therapy a clue to Diagnostic Dilemma

## Reminder: Diagnostic testing

Positive Predictive Value (PPV) - The ratio of true positives to combined true & false positives; the proportion of pets with positive test results who are correctly diagnosed. It is the most important measure of a diagnostic method as it reflects the probability that a positive test reflects the underlying condition being tested for. Its value depends on the prevalence of the disease, and it serves as a reminder that your diagnostic test results are only as good as you are!

## Case examples

### FIP

A viral disease of high mortality in kittens, FIP, a mutated coronavirus, does most of its damage through an immune-mediated process where one of the body's defenses, macrophages, actually help spread and perpetuate the disease, which is classically pyogranulomatous in nature. Anorexia, weight-loss, and diarrhea are clinical signs associated with GI involvement, but usually the other effected tissues result in the clinical signs that are most suggestive of the diagnosis. Panleukopenia is actually another differential to consider in these kittens as they may have neurological and ocular signs, but FIP kittens also often have swollen bellies full of fluid and granulomatous masses, and are frequently icteric. Elevated globulins and a viscous, straw-colored abdominal fluid are highly suggestive of the disease, although histopathology (intestines, liver, kidney) is the gold standard. Treatment is supportive, but FIP is almost invariably a terminal disease. Vaccination is not generally recommended by the American Association of Feline Practitioners, and prevention is best done through the reduction of possible exposure.

### Feline hypereosinophilic syndrome

A syndrome that appears to be unique to the Feline, eosinophilic infiltrates are found in the intestinal tract, and the diagnosis may stop there, being deemed Eosinophilic Gastroenteritis. But in this syndrome the GI tract is just part of the pathologic picture, and eosinophils are found to be invading a number of other parenchymal organs, particularly the spleen. Cats with this syndrome are usually > 7 years old and most frequently present with diarrhea (often bloody) and weight-loss. Physical examination reveals thickened small intestines, again leading the clinician to conclude that this is only a disease of the tube itself, not the rest of the animal. Peripheral eosinophilia can be seen, sometimes to a minor degree (2,000 cells/ $\mu$ l) and sometimes to an astonishing degree (60,000 cells/ $\mu$ l). The biggest dilemma is the difference in prognosis: garden-variety eosinophilic gastroenteritis should usually respond quite favorably to standard IBD treatment, while Hypereosinophilic Syndrome responds poorly to a similar protocol, and in fact, to most any protocols attempted, ie. the prognosis is quite poor for these patients.

### Motility disorders

Motility disorders may be famous enough to warrant their own name, as in Feline Megacolon, but otherwise are often a secondary complication of the more standard enteropathies, or even non-GI systemic disease. Barium and BIPS are messy and variable, leaving us with few diagnostic options when trying to identify motility disorders. Our therapeutic options are also limited, often non-specific, and all too frequently, quite non-satisfactory. It is important to remember that likely the ideal way to induce normal gastric motility in an abnormal animal (diseased or recovering) is eating!

Drug	Dose	Comment
Metoclopramide	0.2-0.2 mg/kg TID-QID	Efficacy in Question
Cisapride	1.25 – 5.0 mg/cat TID	Compounding Pharmacy
Ranitidine	1-2 mg/kg PO BID-TID	Stim feline colonic activity
Lactulose	2-3 ml PO TID	

Psyllium	1-4 tsp q12-24hr	
Canned Pumpkin	1 tbsp BID	Not Pumpkin Pie filling
Kristalose	¼ to 1 tsp BID	Powdered lactulose
Miralax granules	¼ tsp BID	GoLyteLy minus electrolytes
Misoprostol	25-50 µg/day	PGE1 stim intestinal motility

### IBD or lymphoma

1. Identify the patient as having a Chronic (3 weeks) Enteropathy (diarrhea, vomiting, weight-loss, change in appetite, etc.); signs attributable to a dysfunction of the enteric system because non-enteric causes have been ruled-out (**Diagnostic Step One**, often referred to as the Minimum Data Base, with a number of tests thrown in for good measure; PLI, TLI, cobalamin, abdominal ultrasound, etc.). With a stable patient:
2. Fecal examination and prophylactic deworming (**Step Two**) (more likely in dogs than cats)
3. Diet trial (**Step Three** – ruling out a Food Responsive Condition [Allergy or Intolerance])
4. Antibiotics? (Caution: Consider the Microbiome and consider the consequences in a cat)
5. The Chronic Enteropathy persists – Tissue Diagnosis (**Step Four**) to rule out Neoplasia.

Histopathology is/was/maybe considered the “gold standard” for diagnosis of Inflammatory Bowel Disease, although ironically, many studies show very little correlation between histopathologic severity and clinical reality. Encourage your pathologist to look into the guidelines produced by the WSAVA, [www.wsava.org](http://www.wsava.org)). Perhaps the single most critical function of our pathologist is to distinguish between IBD and Neoplasia for us, our patient, and their owners. But even that distinction has clearly been shown to be a difficult one for the naked eye looking through a microscope – and it can be very difficult to get two eyeballs to agree (especially if they belong to two different pathologists). To make matters worse, the two may not be as separate and distinct as we would like. An overlap between IBD and alimentary lymphoma in cats has been suggested with some cases of IBD suspected of progressing to alimentary lymphoma (as has been demonstrated in humans). Fortunately, the information that can be derived from a piece of tissue is rapidly extending beyond a classical histopathologic description. Particularly relevant technological advances include immunohistochemistry, flow cytometry, and PCR, designed to characterize the cells that are present in the tissue specimen.

The major players in the etiopathogenesis of inflammatory bowel disease have seemingly been identified: Antigenic Stimulation, the Microbiota, the Enteric Architecture and Protective Functions, and the Immune System. New players are joining the ranks as research continues – particular enteropathic bacterial species, specific toll-like receptors, an array of cytokines and chemical messengers, breed-specific genetic mutations, etc. It makes for a fascinating quagmire of literature that renders us “idiopathic”. To top off that quagmire, it is believed that chronic inflammatory conditions may progress to neoplastic disease.

6. **Diagnosis** = Inflammatory Bowel Disease, GI Lymphoma, or a histopathologic surprise.

### IBD treatment – now that you’ve got it diagnosed, sort of, how to treat?

*Diet* (a crucial component of IBD therapy): novel protein, hydrolyzed, highly digestible diet, with dietary fiber, polyunsaturated fatty acids (n-3 FA), and prebiotic/probiotic supplements. There, did I leave anybody out? At various ends of the spectrum, an inappropriate immune response to dietary antigens may constitute an Adverse Reaction to Food, a Food Allergy, or simply an antigenic component of IBD. The only real way to tell is to re-challenge the cured cat with the previously offending diet and see if the diarrhea returns to the new carpet...good luck with that business plan.

*Rx*: Corticosteroids (prednisolone 2 mg/kg/day, taper over 6-12 weeks; budesonide 1-2 mg/day). As an additional immune-modulator in cases that persist in the face of glucocorticoids, chlorambucil (2 mg every 4 days in cats > 2 kg) is gaining in popularity, and appears particularly important if the IBD is actually low-grade lymphoma – the two look disturbingly similar.

*Cobalamin (vitamin B12 supplementation)*: Because a healthy, functional GI tract is important in the processing and absorption of cobalamin, patients with chronic GI disease frequently have low levels of cobalamin. The concentration of cobalamin can be particularly low in cases of GI lymphoma and so I would encourage clinicians to measure cobalamin levels prior to beginning supplementation, as another piece of the diagnostic puzzle. Few if any side-effects are seen with B12 supplementation, and the dose ranges from 250 µg to 500 µg per week for 6 weeks, then tapered to once a month over the next several months, pending improvement in clinical signs or repeat measure of the patient’s level. There is now an oral form of cobalamin available (Nutramax Laboratories).

*Vomiting*: Vomiting may be the only sign or a concurrent condition in cats with IBD. At CSU we frequently reach for the NK-1 receptor antagonist, maropitant at 1.0 mg/kg q24 h intravenously, subcutaneously, or orally. Alpha-2 adrenergic antagonists (chlorpromazine 0.2-0.4 mg/kg subQ or IM TID) and 5-HT<sub>3</sub> antagonists (ondansetron 0.1-1.0 mg/kg or dolasetron 0.5-1.0 mg/kg, orally or IV q12-24 h) act as effective anti-emetics in cats, while metoclopramide (dopaminergic antagonist, 1-2 mg/kg CRI) is less effective as an anti-emetic (although still a prokinetic, in theory at least).

## Treatment considerations: IBD vs. lymphoma

Signalment, History, Physical Examination
An Effective Diagnostic Pathway is Dictated by a Sound Clinical Diagnosis
The Use and Timing of Therapeutic Trials is Guided by the Severity of the Clinical Condition (dose recommendations can be highly variable; check current formulary prior to administration)
<b>Idiopathic Inflammatory Bowel Disease</b>
Dietary Intervention: Hypoallergenic or Hydrolyzed
Antibiotics: Tylosin <sup>#</sup> 10 mg/kg q24hr Metronidazole* 10 mg/kg q12hr
Prednisolone 1-2mg/kg BID, taper per clinical signs & side-effects
Budesonide 1 mg (most cats) total dose q24hr, then taper
Cobalamin (vit B12) Supplementation (see dose recommendations above)
Chlorambucil 2mg total/cat q4d If cat < 2kg, 2mg total/cat q1wk
<b>GI Lymphoma</b>
Chlorambucil (various schedules) 15 mg/m <sup>2</sup> PO q24hr for 4 days q3wks
Prednisolone 3 mg/kg PO q24hr, then taper
Cobalamin (vit B12) Supplementation (see dose recommendations above)
Additional Therapies to Consider as Warranted
E-tube placement, Probiotics
Mirtazapine 15mg tab, ¼ tab q24hr (decrease with CKD)
Cerenia 1.0 mg/kg/day IV, SQ; 2.0 mg/kg/day PO (reduce dose 50% with liver failure)

<sup>#</sup>Tylan@Soluble = 100gms per bottle; 1 tsp (5ml) = 2.5-2.7gms; 1/8<sup>th</sup> tsp = 325mg; bitter, rec'd capsules

\*1mg of metronidazole base = 1.6mg of metronidazole benzoate

## Summary

- Diagnostic tests are only as good (Positive Predictive Value) as you are (clinical decisions impacting Prevalence of the Disease in the population being tested)
- Cats do not read veterinary textbooks
- Exceptions, incongruities, subtle signs, and things that don't make sense are important
- Therapeutic failure is not failure, but opportunity

## References

- Richards JR, Elston TH, Ford RB, et al. The 2006 American Association of Feline Practitioners Feline Vaccine Advisory Panel Report. JAVMA 229:1405-1441, 2006.
- Pederson MC. A review of feline infectious peritonitis virus infection: 1963-2008. J Feline Med Surg 11:225-258, 2009.
- Marks SL, Willard MD. Diarrhea in kittens. In, August, JR (Ed), Consultations in Feline Internal Medicine, vol 5. Elsevier, St. Louis, MO., p 133, 2006.
- Washabau et al. ACVIM Consensus Statement. JVIM 24:10-26, 2010; [www.acvim.org](http://www.acvim.org)
- Ragainini et al. Inflammatory bowel disease mimicking alimentary lymphosarcoma in a cat. Vet Res Comm, 2003
- Waly et al. IHC diagnosis of alimentary lymphomas and severe intestinal inflammation in cats. J Comp Path, 2005
- Evans et al. Comparison of endoscopic and full-thickness biopsy specimens for diagnosis of inflammatory bowel disease and alimentary lymphosarcoma in cats. JAVMA, 2006
- Trepanier L. Idiopathic IBD in Cats: rational treatment selection. JFMS, 2009
- Simpson KW & Jergens AE. Pitfalls and progress in the diagnosis and management of canine inflammatory bowel disease. Vet Clin North Am Small Anim Pract 41:381-398, 2011.
- Kiupel M et al. Diagnostic algorithm to differentiate lymphoma from inflammation in feline small intestinal biopsy samples. Vet Pathol 48:212-222, 2011

# Feline Nutrition: Getting Nutrition into a Cat

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Our understanding of feline nutrition has advanced significantly from the day when we simply considered them small dogs, and the number of options we now have for dietary intervention in this species has expanded exponentially. But neither the knowledge of feline metabolism nor the number of available diets helps us, or the cat, one bit, if we can't get the stuff into them. When a Labrador retriever refuses to eat we know the prognosis is grave: when a cat refuses to eat it may well be that they have decided that the presentation of their latest meal was not up to standards. Unlike Labrador retrievers, cats are one-trial learners, so make the mistake of trying sneak a medication into the one particular flavor of food the cat will tolerate, and that may well be the last time you get anything into that cat's mouth. Try to switch diets on a Labrador and you might get a brief pause as the dog considers the phrase "fool me once, please!". Try to switch diets on a cat, for its own good mind you, and suffer an expression of disdain and an attitude of incredulous indignation. So of course, what is perhaps the single most common clinical expression of almost anything wrong with a cat? A decreased-to-absent appetite. And what are the consequences of anorexia in a cat compared to a Labrador? Well cats have their own specific condition for just that – hepatic lipidosis. This presentation should be considered a "group effort" as collectively the veterinary profession aspires to be more clever than a single cat and we explore a plethora of possible strategies for getting nutrition into a cat.

## Terminology and differentials

Hyporexia is the term for a reduced appetite and Anorexia is complete inappetence. Large category differentials for Anorexia are: Primary anorexia, Secondary Anorexia, and Pseudo-Anorexia. Primary anorexia is most often associated with brain disease, trauma, or tumor, including "anosmia" or the inability to perceive odor – a particularly important sensation for cats. Pseudo-anorexia is any condition where the cat actually wants to eat but is extremely reluctant to do so because of other pressing problems. Examples of pseudo-anorexia would include dental disease, musculoskeletal disorders, pain (of the some component of the oral cavity and GI tract, or an unrelated but uncomfortable condition), stress, anxiety, depression, even environmental ques. Secondary anorexia is everything else, and the category that is most commonly the reason for presentation of a cat that's not eating.

## Consequences

Anorexia leads to malnutrition, and malnutrition has significant consequences for cats. The cat's unique metabolic make-up is not particularly well suited for adapting to different nutritional planes, their metabolic rate and preferential metabolic pathways do not alter their activity level to a great extent in response to changes in nutrient content. When their diet or lack of dietary intake fails to provide their preferred nutrients they may turn to their endogenous supply (muscle protein leading to cachexia) or over-produce harmful metabolic by-products (ketoacidosis). A poor nutritional plane leads to immunosuppression, proteolysis, hepatic lipidosis, and an increase in mortality. Importantly, Reynolds et al. (2010) showed that for cat owners the quality of life is more important than longevity, and appetite ranked as one of the key components in a cat owner's perception of their cat's quality of life. Cats are also particularly prone to stress, whether obvious to us or only perceived by the cat, and Stella et al. (2011) demonstrated that one of the consequences of stress in cats is anorexia.

## Veterinary clinics and hospitalized cats

The advent of Feline Friendly Practice standards ([www.catvets.com](http://www.catvets.com)) from the American Association of Feline Practitioners goes a long way towards helping clinicians design environments and interactions that can reduce stress and decrease the incidence of hospital acquired anorexia in our feline patients. Unfortunately there are still too many scenarios where cats who are already feeling ill are stuffed into a carrier and exposed to a room full of predators just before being introduced to the healing hands of the veterinary staff, potentially for restraint, target practice, and indignity before being transferred to a metal box with none of the comforts of home. But an active appreciation and the motivation to change can go a long way towards relatively simple (a hiding box, an elevated perch, the appropriate temperature, the line-of-sight) or complex (feline-only reception area, cat-only exam rooms, specially trained and qualified "crazy cat" nurses) measures to reduce the stress of your feline patients and the anxiety of their owners. While hospitalized it should be routine for cats to be weighed daily and assessed in terms of body condition score, muscle score, amount of food and water consumed, evidence of urination and defecation, including fecal characteristics. Consideration of who is feeding the cat, what and in what, when and where, texture (it is often mistakenly assumed that every cat would prefer wet food to dry...not so) and social setting (some will only eat when witnessed, others only when alone). Remember that cats are "neophobic", they are very suspicious of new things and most everything in a veterinary clinic is new to a cat. Ironically, the veterinary hospital is probably the worst place (and

time) to attempt to introduce a cat to a new “prescription diet”, and as mentioned, hiding medication in what a cat will eat is, unfortunately, often a quick way to add that to the list of what a cat will not eat. Consider a “sacrificial” diet first.

#### **Guideline for how much to feed a cat**

Resting Energy Requirement (RER) =  $30 \times \text{weight (kg)} + 70 \text{ Kcal for cats } < 5 \text{ kg}$   
=  $70 \times \text{weight (kg)}^{0.75} \text{ Kcal for cats } > 5 \text{ kg}$

5 kg cat: 220 kcal/day, with  $> 5 \text{ gm protein/kg/day}$

KEY = Monitoring!

#### **Non-pharmaceutical intervention in anorectic cats**

Dr. Google, the Popular Press, Cat Fancy magazine, YouTube, and the Crazy Cat Lady next door, the number of reliable sources for ideas on how to convince a cat to eat are almost boundless! Much of it common sense, some of it is cat sense, some of it is Oscar Myer Bologna. At first do no harm, but as long as you observe that Golden Rule, Kitty-bar-the-door because it is open to most whatever your imagination can come up with. From obvious (palatability, smell, temperature, texture, freshness, presentation) to open-mindedness (acupuncture, slippery elm, B vitamin complex) to absurd (wafting wonderful odors under their noses while blowing CatNip bubbles into their faces...), all are worthy of consideration.

#### **Pharmacology**

Several recent pharmaceutical advances are of tremendous benefit to the cat with some form of gastrointestinal disease as a reason for anorexia, and the clinician attempting to care for that patient. Metoclopramide still may have a place as a pro-motility agent in the cat, but it has largely been replaced by cisapride (5mg per cat, two to three times daily) for that function. The pharmacology of the cat's emetic center is simply not amenable to metoclopramide as an effective feline anti-emetic. Fortunately, ondansetron (0.5 mg/kg IV or PO once daily) and maropitant (1mg/kg daily, subcutaneously or orally – 1/4<sup>th</sup> of a 16mg tablet) appear to be very effective anti-emetics in the cat. So if needed, we can stop the cat with acute gastritis from vomiting. What about getting them to eat?

Cyproheptadine (2-4mg per cat, once or twice daily) has long been used as an appetite stimulant in cats, with variable success. More recently, mirtazapine (1/8<sup>th</sup> of a 15mg tablet once daily, reduce the dose to every other day in cats with chronic kidney disease to ) has been shown to be an effective appetite stimulant in many cats, and may have some anti-emetic properties as well. Contrary to the original dosing information (every 3 days), research by Dr. Quimby at Colorado State University has shown that the pharmacokinetics of mirtazapine in cats would require daily administration of the drug for full effect. It appears safe to mix and match the various anti-emetics and appetite stimulants, and the most effective combination will likely differ for different patients.

Finally, if a feline patient at CSU is approaching 48 hours without having been convinced to take on nutrition voluntarily (or with the help of pharmaceutical intervention), we will move relatively quickly towards “assisted feeding” through either a nasoesophageal feeding tube (liquid diet such as CliniCare at 1 kcal/ml, or the human product Ensure, also 1 kcal/ml), or quite frequently, an esophageal feeding tube (E-tube) with a blenderized diet, particularly if we are trying to get the cat out of the hospital.

E-tube placement: (a number of excellent demonstrations available as YouTube videos)

- 20-24 French Argyle Catheter
- Surgical scrub & alcohol; sterile gloves; 3cc syringe; 2-0 or 3-0 Nylon suture
- Clippers & blades, Sterile instrument pack (towels, drape, clamps, scalpel #10 blade, 4x4s)
- Curved blunt-tipped forceps
- General anesthesia, right lateral recumbency for left-sided placement
- Aseptic prep of lateral mid-cervical area, extend neck, place mouth speculum
- Premeasure feeding tube from mid-cervical to 7<sup>th</sup>-8<sup>th</sup> intercostal space (place mark on tube)
- Cut end of feeding tube at an angle to enlarge diameter of delivery
- Large curved forceps through oral cavity, into esophagus, push outward to id entry point
- 1-2 cm incision over Forceps bulge in neck, avoid vessels
- Blunt dissection of subQ, esophagus & esophageal mucosa to visualize forceps
- Forceps grasp end of E tube and pull that portion out of the mouth to pre-marked length
- Reinsert tip of tube through mouth, into esophagus, and feed distally
- Outer portion of E-tube will “flip”, showing that inner portion is running in aboral direction
- Chinese finger trap and bandage

#### **Summary**

- Anorexia leads to malnutrition relatively quickly in the feline and should be addressed
- Abundant numbers of unproven strategies exist for encouraging cats to eat, use common sense.
- Pharmacological intervention should be temporary while underlying conditions are addressed
- The Esophageal Feeding Tube is an excellent way to empower an owner to help their cat.

**References**

- Reynolds CA et al. Perceptions of quality of life and priorities of owners of cats with heart disease. *J Vet Intern Med* 2010; 24:1421-1426.
- Stella J, et al. Effects of stressors on the behavior and physiology of domestic cats. *Appl Anim Behav Sci* 2013; 143:157-163.

# Feline Triaditis: Fact or Philosophy

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Occam's Razor has been at the foundation of medical education since the dawn of time. Dr. Hickam first challenged Occam's Razor while on staff at Indiana University Medical School. Although at one level this debate is one of philosophy, for those of us working with cats, the distinction between these two philosophies has a potentially major impact on the clinic floor. Feline "triaditis" serves as an excellent example.

## Definitions

Occam's Razor, expressed in Latin as the *lex parsimoniae* (law of parsimony), is a principle that generally recommends selecting the competing hypothesis that makes the fewest new assumptions, when the hypotheses are equal in other respects. When discussing Occam's razor in contemporary medicine, physicians speak of diagnostic parsimony. Diagnostic parsimony advocates that when diagnosing a given injury, ailment, illness, or disease a doctor should strive to look for the fewest possible causes that will account for all the symptoms. Hickam's dictum states that it is often statistically more likely that a patient has several common diseases, rather than having a single rarer disease which explains their myriad symptoms. Also, independently of statistical likelihood, some patients do in fact turn out to have multiple diseases, which by common sense nullifies the approach of trying to explain any given collection of symptoms with one disease. The classic examples in Feline Medicine are Chronic Kidney Disease (Occam's Razor) and Diabetic Ketoacidosis (Hickam's Dictum).

## Feline triaditis – Hicam's Dictum or Occam's Razor applied to the cat

The origin of the term "triaditis" in feline medicine appears to have been the publication by Weiss DJ et al. (JAVMA 1996) "Relationship between inflammatory hepatic disease and inflammatory bowel disease, pancreatitis, and nephritis in cats." In that report we find the following statement:

"The prevalence of IBD (83%) and pancreatitis (50%) was greater for cats with cholangiohepatitis, compared with cats without inflammatory hepatic disease. Thirty-nine percent of cats with cholangiohepatitis had IBD and pancreatitis. Evidence of IBD in association with cholangiohepatitis was characterized by infiltration of lymphocytes and plasma cells into the lamina propria; however, neutrophilic infiltrates also were found in 40% of cats with cholangiohepatitis." For the authors the clinical implication of this finding was that cats with a diagnosis of cholangiohepatitis should be evaluated for IBD and pancreatitis.

Unfortunately, our understanding of the term 15 years later remains rudimentary and speculative, as highlighted in the publication by Clark JEC et al. (JFMS 2011) "Feline cholangitis: a necropsy study of 44 cats (1986-2008)."

"... it is clear that concurrent pancreatitis and IBD occurs in cats with all forms of cholangitis (30%) and that some cats with cholangitis do not have pancreatitis or IBD. It is unknown whether a single pathogenesis relating inflammatory disease of these three organs occurs in cats with all forms of cholangitis. Bacterial and immune-mediated etiologies have been proposed for the various forms of cholangitis. Information regarding etiology of, and predisposing factors for, concurrent cholangitis, pancreatitis and IBD could not be determined in this study. Further investigation is required to better understand the etiopathogenesis of this condition."

Triaditis can be broken down into the component parts; in the original research it was felt that the predominant signs of triaditis were the result of the cholangitis, with pancreatitis and IBD being secondary complications. More recently, with an increased awareness of pancreatitis in cats, and the long-standing popularity of the diagnosis of IBD, rank-ordering the importance of the individual diseases or determining the actual prevalence of the various possible combinations has become problematic.

## Feline cholangitis

Cholangitis is the most common primary hepatic disease of cats (hepatic lipidosis is more common, but secondary to another concurrent condition and anorexia in the vast majority of cases). There are 3 distinct forms of cholangitis in cats: Neutrophilic (bacterial), Lymphocytic, and Chronic cholangitis associated with liver fluke infection.

Although clinical signs can be non-specific (anorexia, weight loss, lethargy, vomiting, diarrhea, fever), variable, and overlap extensively, Table 1 attempts to summarize the nomenclature and clinical characteristics of Neutrophilic and Lymphocytic cholangitis.

<b>Neutrophilic (N) acute and chronic</b>	<b>Lymphocytic (L)</b>
Younger males	Older, chronic, progressive (European breeds)
Acute, febrile, icteric, lethargic, abd pain	Variable appetite, vomiting, weight loss
+/- Vomiting or Diarrhea	Icteric, ascites
Extra-hepatic biliary obstruction, lipidosis	↑Globulins
↑ALT (although can be normal)	Total bilirubin, ALT, ALP, GGT are all variable

total bilirubin, ALP, GGT are all variable	Bile duct distention, hepatomegaly, mixed echogenicity
CBC shows left shift w/toxic neutrophils	Bile cytology (toxoplasmosis, <i>Helicobacter</i> )*
US reveals thickened GB wall	Bile culture (E.coli, other enterics)
Bile cytology (toxoplasmosis, <i>Helicobacter</i> )*	Liver touch-prep cytology for bacteria
Bile culture (E.coli, other enterics)	Histopathology for definitive diagnosis

Abd = abdominal; GB = gallbladder; CBC = complete blood count; US = ultrasound

\* 22 gauge 1.5 inch spinal needle in a trans-hepatic approach (decreased leakage)

**Table 2 summarizes the treatment options for feline cholangitis.**

Treatment	Information	Dose
Fluids & Electrolytes	Oral (voluntary), IV, subQ	40-60 Kcal/kg/day
Nutrition	Oral (voluntary), E-tube	40-60 Kcal/kg/day
Cobalamin (vit B <sub>12</sub> )	Taper after 6 weeks	250-500 µg SC once per week
Pain management	As covered under Pancreatitis	
(N) Antibiotics	Ampicillin, Cephalexin, Clavimox*	3-6 months
(L&N) Metronidazole	Immunomodulatory & Antibiotic	7.5 mg/kg BID
(L) Prednisolone	Immunomodulation	1-4 mg/kg/day, taper q2wks
(L) Chlorambucil		
Ursodiol	Choleretic, "silver bullet"	10-15 mg/kg q24hr, long term
SAME	Liver protectant, antioxidant	200 mg q24hr
vit K <sub>1</sub>	Dose prior to E-tube placement	5 mg/cat q1-2 days SQ
Lactulose	HE, ptyalism	0.5-1.0 ml/kg PO TID
Neomycin	HE, act within GI tract	20 mg/kg q8-12hr PO
Methotrexate	Confirmed cases of bringing fibrosis	0.4 mg/day divided, q7-10 days

E-tube = esophagostomy feeding tube; cobalamin = DOSE; BID = twice daily; TID = 3 times daily; HE = hepatic encephalopathy

\*May combine with baytril; Avoid chloramphenicol, clindamycin, erythromycin, lincomycin, streptomycin, sulfonamides, trimethoprim- sulfas, tetracyclines

### Pancreatitis

Feline pancreatitis may occur as one of two forms, or an overlap of the two: Acute Necrotizing (ANP) is the more rare presentation, with acute or chronic Lymphoplasmacytic appearing to be more common. There is no age, sex, or breed predisposition, although some reports find Siamese to be over-represented. The clinical signs can be indistinguishable and include lethargy, anorexia, and dehydration, with icterus, abdominal pain, and hypothermia appearing in the more severe ANP form. Abnormalities on the biochemical profile can include elevations in liver enzyme activity, total bilirubin, and blood glucose. The cats are often azotemic with electrolyte abnormalities, including hypokalemia. Low ionized calcium is a poor prognostic indicator. CBC can reveal a nonregenerative anemia and a leukocytosis is more common than leukopenia. The feline PLI (Texas AM GI Lab) or the SpecfPL (IDEXX), run on a serum sample from a fasted cat, are excellent blood tests for the ANP form (100% sensitivity), while they perform with a bit less sensitivity in cases of mild or chronic feline pancreatitis (60-85% sensitivity). At CSU we have removed amylase and lipase from our biochemical profiles entirely. Abdominal radiographs could be normal or show a loss of serosal detail, a mass effect, or dilated fluid or gas-filled duodenum. Abdominal ultrasound could also be normal, or reveal a hypoechoic pancreas, hyperechoic surrounding mesentery, a mass effect, or dilated common bile duct. Definitive diagnosis is histopathology, obtained either through laparotomy or laparoscopy, but with the caveat that pancreatic disease can be focal and non-uniform.

The cause of either form of pancreatitis in cats is unknown or undetermined in the majority of cases. Differentials to consider include parasites (*Toxoplasmosis*, *Amphimerus pseudofelineus*), viruses (Herpes and FIP), trauma, hypoperfusion and ischemia, and concurrent disease. It seems unlikely that glucocorticoids, obesity, or high fat intake are causes of pancreatitis in cats.

**Table 3 summarizes treatment options for the various forms of pancreatitis seen in the cat.**

Acute Necrotizing Pancreatitis (ANP)		
Fluids	Crystalloids & Colloids	Consider Hetastarch, Dextran
Nutrition	NE-tube, E-tube	Crucial for the Cat
Antiemetics	Maropitant	1.0 mg/kg q24 hours
	Ondansetron	0.1-1.0 mg/kg q12-24 hours
Pain management	Buprenorphine	0.005-0.01 mg/kg lingual q 4-8 hours
	Meperidine	1-2 mg/kg IM q 2-4 hours
	Butorphanol	0.2-0.4 mg/kg IM q2-4 hours
	Ketamine or Lidocaine	CRI
Acidity	H2 Blockers, Pantoprazole	0.5-1 mg/kg IV over 15 minutes q24h

Antibiotics	Controversial, Cefotaxime	50 mg/kg IM q8 hours
Plasma	Controversial	20 ml/kg IV
<b>Chronic Pancreatitis</b>		
Fluid support	Oral, subQ, E-tube	Hydration
Nutrition	Highly digestible	Feed the Beast
Cobalamin (vit B <sub>12</sub> )	Taper after 6 weeks	250–500 µg SC once per week
Pain management	Buprenorphine	0.005–0.01 mg/kg lingual q4–8 hours
Antiemetic	Maropitant	1.0 mg/kg q24 hours
Choloretic	Ursodiol	10 - 15 mg/kg q24hours
Antioxidant	SAMe	200 mg/day
Probiotic	Provable, FortiFlora	As directed by the package insert
Omega-3 FA	Various formulas	2000 mg/day
Steroids	Human Autoimmune disease	5 mg/cat/day
Antibiotics	Broad spectrum	Cover <i>E. coli</i>

### Feline inflammatory bowel disease

Feline Inflammatory Bowel disease (IBD) is a histopathologic diagnosis for a chronic enteropathy that occurs most commonly in middle-age to older cats. Clinical signs include chronic diarrhea, vomiting, variable appetite, and weight-loss. These signs may be intermittent or persistent, and of variable severity. In addition to histopathology of the small intestine and colon, additional information can be obtained from more recently available advanced diagnostics, such as immunohistochemistry, flow cytometry, and PCR. Although it is suspected that the luminal bacteria (normal microbiota and/or pathogens) play an important role our lack of understanding of the pathogenesis of IBD often renders current treatments non-specific and unsatisfactory. It is especially important to rule-out as many clinically plausible differentials as possible before settling for a diagnosis of IBD, which, after all, is more correctly termed *idiopathic* IBD. Research has repeatedly demonstrated that a number of cats with chronic enteropathies respond very well, in not completely, to dietary intervention alone, an option which may not be considered if the initial diagnosis is IBD.

**Table 4 summarizes the treatments used most frequently in cats with IBD.**

<b>Treatment</b>	<b>Information</b>	<b>Dose</b>
Dietary – decrease antigens	Hypoallergenic, hydrolyzed	Various Brands available
Dietary – increase fiber	Large bowel, Fiber-responsive	
Dietary – avoid high fat	Osmotic diarrhea	
Prednisolone	Anti-inflammatory, immunomodulation	1-2mg/kg BID, taper
Budesonide	Local activity, High first-pass metabolism	1 mg/cat/day, taper
Chlorambucil	Low grade lymphoma	Various schedules
Probiotics	Intestinal microbiota	Beware of “false” advertising

### Summary

- Feline patients frequently carry more than one significant disease
- Concurrent diseases may be distinct entities or share a common etiology
- Failure to recognize and address concurrent disease often precludes therapeutic success
- Feline cholangitis, pancreatitis, and IBD may be housed within the same cat
- Histopathology remains the gold standard for diagnosis; gallbladder aspiration is an important adjunct