

# FELINE health topics

for veterinarians

FELINE PANCREATITIS:  
CHALLENGES IN DIAGNOSIS  
AND THERAPY\*

Page 1

FELINE INFLAMMATORY  
BOWEL DISEASE\*

Page 5

21ST ANNUAL FRED SCOTT  
FELINE SYMPOSIUM

Page 16

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## Feline Pancreatitis: Challenges in Diagnosis and Therapy

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### Risk Factors

In most cases of pancreatitis in cats, an underlying cause or instigating event cannot be determined, leading to classification as idiopathic. Abdominal trauma, infectious diseases (toxoplasmosis, liver flukes, FIP and FIV), lipodystrophy, and organophosphate administration have been associated with feline pancreatitis, but appear to account for a very small percentage of cases. Hypercalcemia precipitated pancreatitis in one experimental study in cats and aspirin induced pancreatic cell damage in another. Most surveys associate underweight body condition, not obesity, with the development of feline acute necrotizing pancreatitis. Evidence for glucocorticoid administration as a cause of acute pancreatic inflammation remains anecdotal in cats. The causal role of intercurrent inflammation in the biliary tract and intestine in the pathogenesis of pancreatitis remains the subject of speculation. Cholangitis is the most important type of biliary tract disease for which an association has been made, but other forms of pathology (e.g., stricture, neoplasia, and calculus) also have known associations.

### Clinical Signs

No significant age or gender predisposition has been recognized in cats with pancreatitis and no relationship has been established with body condition score. A wide age range (5 weeks to 20 years) has been reported, but some authors suggest

that cats older than 7 years are more likely to be affected. Most cases are seen in domestic short hair cats. Lethargy (86-100 percent) and partial to complete anorexia (95-97 percent) are the most common clinical signs in cats diagnosed with acute necrotizing pancreatitis. All other clinical signs occur only sporadically. In particular, "textbook" signs of pancreatitis in dogs are usually absent in cats - vomiting occurring in 35-52 percent of cats vs. 90 percent of dogs, abdominal pain in 25 percent vs. 58 percent, diarrhea in 15 percent vs. 33 percent, and fever in 7 percent vs. 32 percent. Other reported clinical findings in affected cats include dehydration (92 percent), tachypnea (74 percent), hypothermia (68 percent), tachycardia (48 percent), and dyspnea (20 percent). Almost one quarter of cats with pancreatitis (23 percent) have a palpable abdominal mass that may not appear painful and can be easily misdiagnosed as a lesion of other intra-abdominal structures such as intestinal tract or mesenteric lymph nodes. Tachypnea/dyspnea may be due to pain, but pleural effusion and pulmonary thrombosis are other potential causes. Some cases of acute pancreatitis are associated with severe clinical syndromes including shock, disseminated intravascular coagulation and multi-organ failure, and both acute and chronic pancreatitis may be involved in the development of transient or permanent diabetes mellitus.



continued on page 2

## Laboratory Evaluation

Hematologic abnormalities in cats with pancreatitis are non-specific. In cats with acute necrotizing pancreatitis, findings included non-regenerative anemia (26 percent), hemoconcentration (13 percent), leukocytosis (30 percent), and leukopenia (15 percent). Biochemical abnormalities in affected cats often reflect concurrent disease. High serum bilirubin concentrations and increases in serum alkaline phosphatase and alanine amino-



**Vomiting occurs in up to one half of cats with pancreatitis but is less common than non-specific signs, such as lethargy, anorexia, dehydration, and hypothermia**

transferase activities are common in cats with pancreatitis. Serum glucose and cholesterol concentrations may be high, and azotemia and decreases in serum potassium and calcium concentrations are common. Low plasma ionized calcium concentration has been correlated with a poorer outcome in cats with acute pancreatitis.

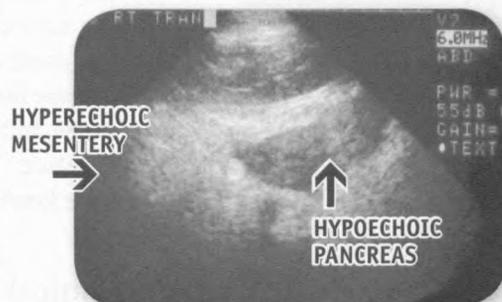
Serum lipase activity is modestly increased very early in experimental feline pancreatitis and serum amylase actually decreases. Serum activities of both enzymes are frequently normal in cats with spontaneous pancreatitis. Note also that increased amylase and lipase are both associated with chronic malabsorption in cats with chronic intestinal disease (and both may increase whenever the glomerular filtration rate is reduced). Therefore, neither serum lipase nor amylase activities are of clinical value in the clinical diagnosis of pancreatitis in cats. In contrast, measurement of serum amylase and/or lipase activities in dogs remains meaningful in the diagnosis of pancreatitis, even though the sensitivity of these tests is relatively low, meaning that some affected dogs have normal values of one or both enzymes. The lack of usefulness of serum amylase and lipase in cats has prompted the development of other serum tests for pancreatitis. The use of serum pancreas-specific lipase (spec fPL) is now recommended instead of

the previously validated serum fTLI (feline trypsin-like immunoreactivity) as a serum test for pancreatitis in cats exhibiting clinical signs compatible with this diagnosis. Although initial data look encouraging, the specificity and sensitivity of the Spec fPL still need to be established in a large population of sick cats.

## Imaging

Abdominal radiographs in cats with pancreatitis may show a loss of detail in the cranial abdomen, and, in some cases, there may be a suggestion of a mass in the cranial abdomen. A diagnosis of pancreatitis is not possible by abdominal radiography alone. Exclusion of some of the other causes of vague gastrointestinal signs, however, is still a major diagnostic rationale for survey abdominal radiographs in cats with the clinical signs described above.

Abdominal ultrasonography is a key diagnostic test in cats with suspected pancreatitis. Findings may include peritoneal effusion, a hypoechoic pancreas with hyperechoic peripancreatic fat and mesentery, cavitory lesions, a mass effect in the cranial abdomen, and/or biliary duct dilation. In some cases, however, there will be no detectable abnormalities. One feline study showed abdominal ultrasound had a sensitivity of 24 percent for detecting pancreatitis. Abnormal sonographic findings,



**Ultrasonographic appearance of pancreatitis in a 6-year-old cat. The edematous (enlarged, hypoechoic) pancreas and inflamed (hyperechoic) peripancreatic fat may result in a mass that can be palpated on physical examination.**



The ultimate purpose of the Cornell Feline Health Center is to improve the health of

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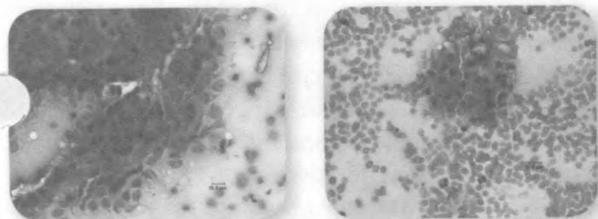
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Examples of pancreatic samples obtained by ultrasound-guided fine needle aspiration. Normal feline pancreas (left) and acute pancreatic inflammation (right). Both photomicrographs at 50x. Images courtesy of Drs. Amy Cordner and Sara Hill, University of Minnesota.

however, are highly specific for pancreatitis, meaning that a cat with compatible clinical signs and changes in the pancreas on sonography is very likely to be correctly diagnosed with pancreatitis. Ultrasound-guided fine needle aspirates of the pancreas and peri-pancreatic tissue and/or fluid may assist in the diagnosis of pancreatitis.

## Biopsy

If clinically indicated, pancreatic biopsy may be obtained by laparoscopy or exploratory laparotomy. Severe pancreatitis patients are poor anesthetic risks, however. Gross observation at the time of laparoscopy or exploratory laparotomy may confirm the diagnosis of acute necrotizing pancreatitis and inspection of other viscera (e.g., intestine, biliary tract, liver) is of paramount importance because of the high rate of concurrent disease in this species. In equivocal cases, biopsy may be safely performed as long as blood flow is preserved at the site of the biopsy. A single biopsy may be insufficient to exclude pancreatitis as inflammation has been shown to occur in discrete areas within the pancreas.

## Treatment

Supportive care continues to be the mainstay of therapy for feline acute pancreatitis. Efforts should be made to identify and eliminate any inciting agents, sustain blood and plasma volume, correct acid/base, electrolyte, and fluid deficits, control vomiting, provide pain relief and

nutritional support, and treat any complications that might develop. Hypocalcemia is a complication of severe cases of feline acute necrotizing pancreatitis and is associated with a worse prognosis. Calcium gluconate should be given at doses of 50-150 mg/kg intravenously over 12-24 hours and serum total or ionized calcium concentra-

tions should be monitored during therapy. Nausea and vomiting may be pronounced in affected cats. The  $\alpha_2$  adrenergic antagonists and 5-HT<sub>3</sub> antagonists appear to be the most effective anti-emetics in cats; Dopaminergic antagonists (metoclopramide) are less effective. Cats may be treated with chlorpromazine ( $\alpha_2$  adrenergic antagonist) at a dose of 0.2-0.4 mg/kg subcutaneously or intramuscularly every 8 hours, or with one of the 5-HT<sub>3</sub> antagonists (ondansetron 0.1-1.0 mg/kg or dolasetron 0.5-1.0 mg/kg, orally or intravenously q12-24 h), or the NK-1 receptor antagonist, maropitant, at 1 mg/kg intravenously, subcutaneously or orally q24 h.

Analgesia is an important component of therapy for pancreatitis and other painful intraabdominal disorders that can be easily overlooked as cats may not exhibit easily-recognized signs of pain. Acute pain control can be accomplished through the use of intramuscular hydromorphone or buprenorphine. The latter drug can also be administered sublingually (0.02-0.03 mg/kg q6-8h) as transmucosal absorption is excellent. Meperidine (1-2 mg/kg intramuscularly or subcutaneously q2-4 h) or butorphanol (0.2-0.4 mg/kg subcutaneously q6 h) have also been recommended. Tramadol is usually avoided in cats as it can cause severe dysphoria. A fentanyl patch provides good analgesia in cats within 12 hours of placement.

Enteral nutritional support is not considered contraindicated in the absence of vomiting in affected cats, a departure from the standard NPO component of treatment in dogs with pancreatitis designed to minimize the cephalic, gastric, and duodenal sources of pancreatic stimulation. Moreover, recent studies suggest that it may be appropriate and necessary to stimulate pancreatic secretion (via feeding) in affected animals. A short period of withdrawal of food and water is recommended only in those cats in which there is severe vomiting and risk for aspiration pneumonia. A nasoesophageal tube is usually placed in cats for short-term, in hospital feeding. It can be replaced by a gastrostomy or esophagostomy tube for longer-term feeding in severe cases or in cats with concurrent diseases, such as hepatic lipidosis, that prolong their return to unassisted feeding. Parenteral nutrition is indicated in feline patients only when vomiting precludes enteral support. The standard diet of choice for canine pancreatitis patients, a low-fat diet, has not been shown to be of benefit in cats. The author's choice is to feed affected cats a diet high in antioxidants, and to provide SAME (see below) as a supplement, based on preliminary human and canine



Analgesia is a very important component of therapy in cats with pancreatitis. Cats often fail to demonstrate "classic" evidence of abdominal pain but may have tachycardia, tachypnea or other more subtle signs. Buprenorphine is a good choice for providing immediate analgesia. Effective blood levels can reliably be reached within 6-12 hours of application of a transdermal fentanyl patch. Use of a 25 µg/hr patch is shown here.

evidence that antioxidant therapy (selenium) is beneficial.

Antibiotic therapy has not been routinely recommended because cats with pancreatitis, unlike humans, rarely have infectious complications (abscessation). Experimental data in acute necrotizing pancreatitis, however, indicates that it may begin as a sterile process, but necrosis and inflammation predispose to colonic bacterial translocation and colonization of the pancreas. High colonization rates suggest that bacteria may spread to the inflamed pancreas more frequently than is currently thought. Coliforms are the principal pathogens, as they are in bile cultures from cats with cholangitis. Broad spectrum antibiotics may, therefore, be appropriate in cases of feline acute pancreatitis. It has been shown in people and dogs with experimental pancreatitis that circulating macroglobulins are depleted in severe pancreatitis. This forms the rationale for administering plasma to cats with severe pancreatitis.

Two drugs are of interest based on experimental data but they have not yet been investigated in clinical pancreatitis. Low-dose dopamine infusion (5 µg/kg/min) improves pancreatic blood flow and reduces microvascular permeability in

experimentally induced acute feline pancreatitis, even when it is given up to 12 hours after induction of the disease. Histamine and bradykinin-induced increases in microvascular permeability are associated with the development of hemorrhagic necrosis in experimental feline pancreatitis. Treatment with H<sub>1</sub> or H<sub>2</sub> histamine receptor antagonists protects against the development of hemorrhagic pancreatitis in these models. For this reason, and to mitigate the esophageal effects of vomiting acidic gastric contents, an H<sub>2</sub>-receptor antagonist such as famotidine (0.5-1.0 mg/kg every 12-24 hrs) is usually administered.

Coexisting conditions, such as inflammatory liver disease, inflammatory bowel disease, hepatic lipidosis, or diabetes mellitus are common in cats with pancreatitis and must be managed concurrently. There is no evidence that steroid use is contraindicated when necessary for controlling some of these problems and a single dose of steroids has been anecdotally advocated in severe clinical cases of pancreatitis. Surgery may be indicated in occasional cases, such as for biliary obstruction or pancreatic abscess.

## Summary

In spite of advances in diagnostic capabilities, especially ultrasonog-

raphy and fPLI of the Spec fPL test, the diagnosis of feline pancreatitis remains challenging in many cases. The use of pancreatic biopsy as the 'gold standard' for ante-mortem diagnosis will be facilitated by more routinely obtaining pancreatic biopsies during exploratory laparotomy, and by the increased availability of laparoscopic biopsy through referral centers. Better understanding will be gained of the range of pancreatic pathology in an older cat population. Undoubtedly, as the index of suspicion for this disease rises, the apparent prevalence of this disease in the feline population will rise. Once the diagnostic hurdles are surmounted, further work on risk factors (to guide prevention strategies) and on treatment will be possible.

In studies on feline liver disease at the University of Minnesota, we reported that 83 percent of cats with cholangitis also had inflammatory changes in the bowel and 50 percent had evidence of concurrent chronic pancreatitis. Concurrent inflammation in these three organs has been termed "triaditis". This association has been documented histologically, but further clinical investigation is warranted. Awareness of the association of these three disorders, however, may affect the diagnostic evaluation of individual patients. 🐱

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# Client Information Brochure: Feline Inflammatory Bowel Disease

## What is inflammatory bowel disease?

Feline inflammatory bowel disease (IBD) is not a single disease, but rather a group of chronic gastrointestinal disorders caused by an infiltration of inflammatory cells into the walls of a cat's gastrointestinal tract. The infiltration of cells thickens the wall of the gastrointestinal tract and disrupts the intestine's ability to function properly. Cats of any age can be affected by IBD; however, the disease occurs most often in middle-aged and older cats.

Chronic inflammation of the gastrointestinal tract can occur as a result of a specific disease, such as a parasitic or bacterial infection or a specific food allergy. However, the cause of IBD in many cases is considered to be "idiopathic", or unknown. Current theories suggest that these cases of IBD may be due to a breakdown in the relationship between the normal bacteria that reside in the gastrointestinal tract and the immune system of the gastrointestinal wall.

IBD can present in different forms depending on the type of inflammatory cells and the region of the gastrointestinal tract involved. The most common form of IBD involves an inflammatory infiltrate consisting of lymphocytes (small white blood cells) and plasma cells (cells that produce antibodies) and is called *lymphocytic-plasmacytic enteritis*. *Enteritis* refers to the small intestine. If the stomach is involved the inflammation is described as *gastritis*, and if the colon (large intestine) is involved, the term *colitis* is used. Eosinophils are

another cell type commonly present in feline IBD. Eosinophils may be present as the predominant cell (for example, in *eosinophilic gastroenteritis*), but are more commonly seen as part of a mixed population of other inflammatory cells. Two less common forms of IBD are called neutrophilic and granulomatous.

## What are the symptoms of IBD?

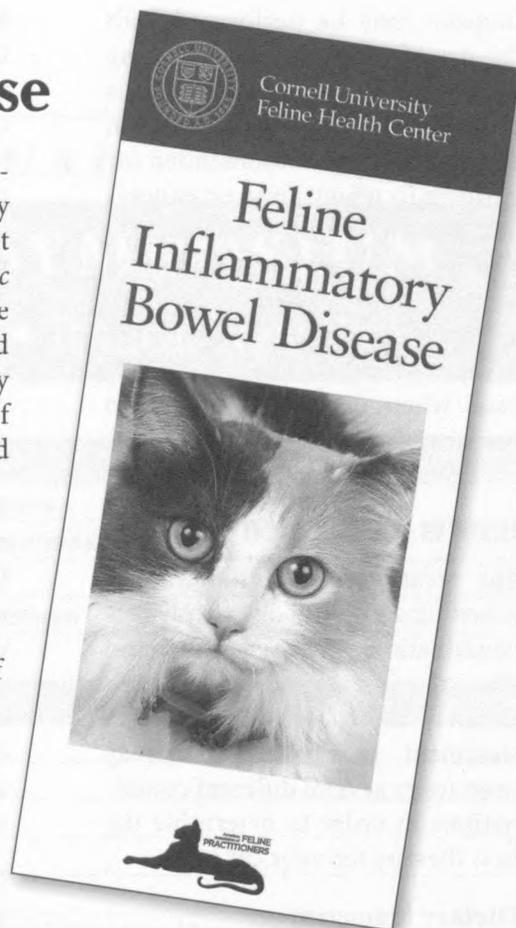
Some common symptoms of feline IBD include vomiting, weight loss, diarrhea and lethargy. Appetite can be variable, ranging from ravenous to anorexic. While some cats will show obvious symptoms of disease, such as vomiting after every meal, other cats may exhibit symptoms much less frequently, such as vomiting or producing hairballs once or twice a month. The symptoms of IBD can also vary depending on the area of the digestive tract affected by the disease. For example, if the inflammatory cells are affecting the stomach or higher areas of the small intestine, then the cat may exhibit symptoms of chronic vomiting. If the inflammatory cells are in the colon, then the cat may have diarrhea or blood in the stool. The symptoms may not always correspond to the area affected, especially if the entire digestive tract is involved.

## How is feline IBD diagnosed?

Making a diagnosis of feline IBD requires an extensive work up because many of the common symptoms of IBD, such as vomit-

ing and diarrhea, are also common symptoms of other diseases. First, specific causes of gastrointestinal inflammation must be ruled out. Your veterinarian will likely recommend bloodwork, fecal examinations, radiographs and/or ultrasound check for metabolic disease, feline leukemia, parasitic or bacterial infections and certain types of cancer. A hypoallergenic food trial may also be conducted to rule out food allergy.

A definitive diagnosis of feline IBD can only be made based on microscopical evaluation of tissue collected by means of an intestinal (or gastric) biopsy. In a patient with IBD, the tissue sample will show increased numbers of inflammatory cells in the intestinal wall. The types of cells found will indicate what type of IBD is present and help to guide treatment. Gastrointestinal



biopsies may be performed with the use of an endoscope or during abdominal surgery. Endoscopy is a less invasive procedure; however, surgery may be recommended for patients in whom liver or pancreatic disease is also suspected, so that those organs can be biopsied as well. Both procedures require general anesthesia, and the associated risks must be considered when deciding whether to perform these tests.

### How is IBD treated?

The treatment of inflammatory bowel disease usually involves a combination of change in diet and the use of various medications. Because there is no single best treatment, your veterinarian may need to try several different combinations in order to determine the best therapy for your cat.

### Dietary Management

Because dietary allergens may play a role in inflammatory bowel disease, a food trial using hypoallergenic diets may be recommended by your veterinarian. In using a hypoallergenic diet, the key is to use a protein and carbohydrate source that the cat has never eaten before. Rabbit, duck or venison-based diets are often tried initially.

If the symptoms of IBD are not improved with a hypoallergenic diet, other diets may be tried. Diets high in fiber, low in fat and easily digestible can be beneficial and are generally better tolerated in cats with IBD. It is important to note that it may take several weeks or longer for cats to improve after a diet change, and during a food trial, all other food sources (including table food, flavored medications, and treats) must be eliminated from the diet.

### Medical Treatment

Cats that have been diagnosed with IBD may be put on a course of corticosteroids, usually prednisolone. Corticosteroids have potent anti-inflammatory and immunosuppressive properties. Diabetes and excessive immunosuppression are among the serious side effects these drugs can produce. Cats should be monitored closely while they are on corticosteroids, although they tend to tolerate these drugs well as long as they are given at an appropriate dose and schedule. Corticosteroids are usually given orally, and are started at a higher dose, with a gradual reduction in dose over several weeks. In cats that are difficult to mediate orally or in cases where the vomiting is severe, your veterinarian can give the medication as an injection.

If combinations of dietary management and corticosteroid therapy have failed to adequately control feline IBD, then antibiotics may also be added to the treatment regimen. Metronidazole is a common medication that is used by itself or in conjunction with corticosteroids to control IBD. Metronidazole has antibacterial, anti-protozoal and immunomodulatory properties. Although side effects are uncommon, some cats may experience loss of appetite and vomiting when given metronidazole. This is likely a response to the unpleasant taste of the medication.

If none of these medications successfully controls the symptoms of IBD, more potent immunosuppressive drugs, such as chlorambucil or azathioprine, may be necessary. These drugs can suppress the bone marrow, so cats must be carefully monitored by a veterinarian when taking these drugs. Because the gastroin-

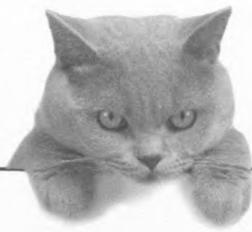
testinal microflora (bacteria) may play a role in the development of IBD, newer therapy considerations include using prebiotics (substances that promote certain bacterial populations) and probiotics (bacterial strains that promote gastrointestinal health) to help maintain beneficial bacterial populations in the gastrointestinal tract.

### What is the prognosis for cats with inflammatory bowel disease?

Inflammatory bowel disease can often be controlled so that affected cats are healthy and comfortable. However, even with proper management, the disease may wax and wane; and animals may have periods during which they are symptomatic. Optimal control is dependent upon the proper selection of diet and medications. Vigilant monitoring by the veterinarian and owner are critical so that relapses can be assessed and managed and appropriate adjustments in the dosing of long term medications can be made. 🐾

*The Cornell Feline Health Center's client education brochures address the most commonly asked questions on feline disorders and are a valuable resource to help you in educating clients on feline health issues. To place an order for Feline Respiratory Infections or any of the other brochures in this series, please call Pam Sackett at 607-253-3443. To download an order form from our website, please visit:*

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## Schedule

### Friday, July 24th

Update on the Management of Feline Infectious Gastrointestinal Diseases

James R. Richards, Jr. Memorial Feline Lecture: Feline Vaccine Controversies

Pet Ownership for Immune Suppressed Individuals

Diagnostic Medicine: Use of Molecular Assays in Feline Infectious Diseases

Annual Picnic Six Mile Creek Winery

### Saturday, July 25th

Feline Obesity

Feline Diabetes Mellitus:

- Pathogenesis & Principles of Therapy
- Which Insulin Do I Choose and How Do I Adjust the Dose?
- What Diet Should I Choose and How Do I Manage Problem Cats?

The State of Feline Nutrition: Where Are We and What Do We Know about Disease Management and Prevention?

Feline Pancreatitis: Where Are We?

A New Perspective on Feline Inflammatory Liver Disease

Cayuga Lake Dinner Cruise (optional)

### Sunday, July 26

What's New in Feline Kidney Disease?

Update on Feline Anesthesia and Analgesia

### Speakers:

Sharon Center, DVM, DACVIM, Cornell University

Richard Goldstein, DVM, DACVIM, DECVIM-CA, Cornell University

Michael Lappin, DVM, PhD, Colorado State University

Andrea Looney, DVM, DACVA, Cornell University

Jacque Rand, BVSc, DVSc, DACVIM, University of Queensland, Australia

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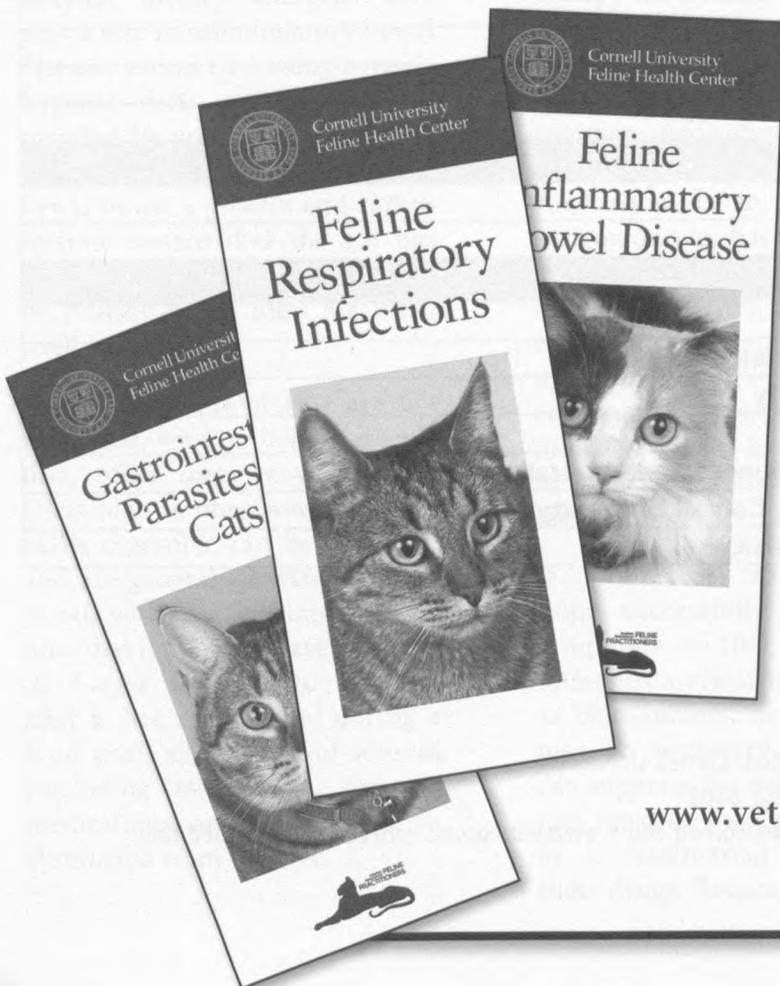
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\* featured in this issue on pages 5 and 6