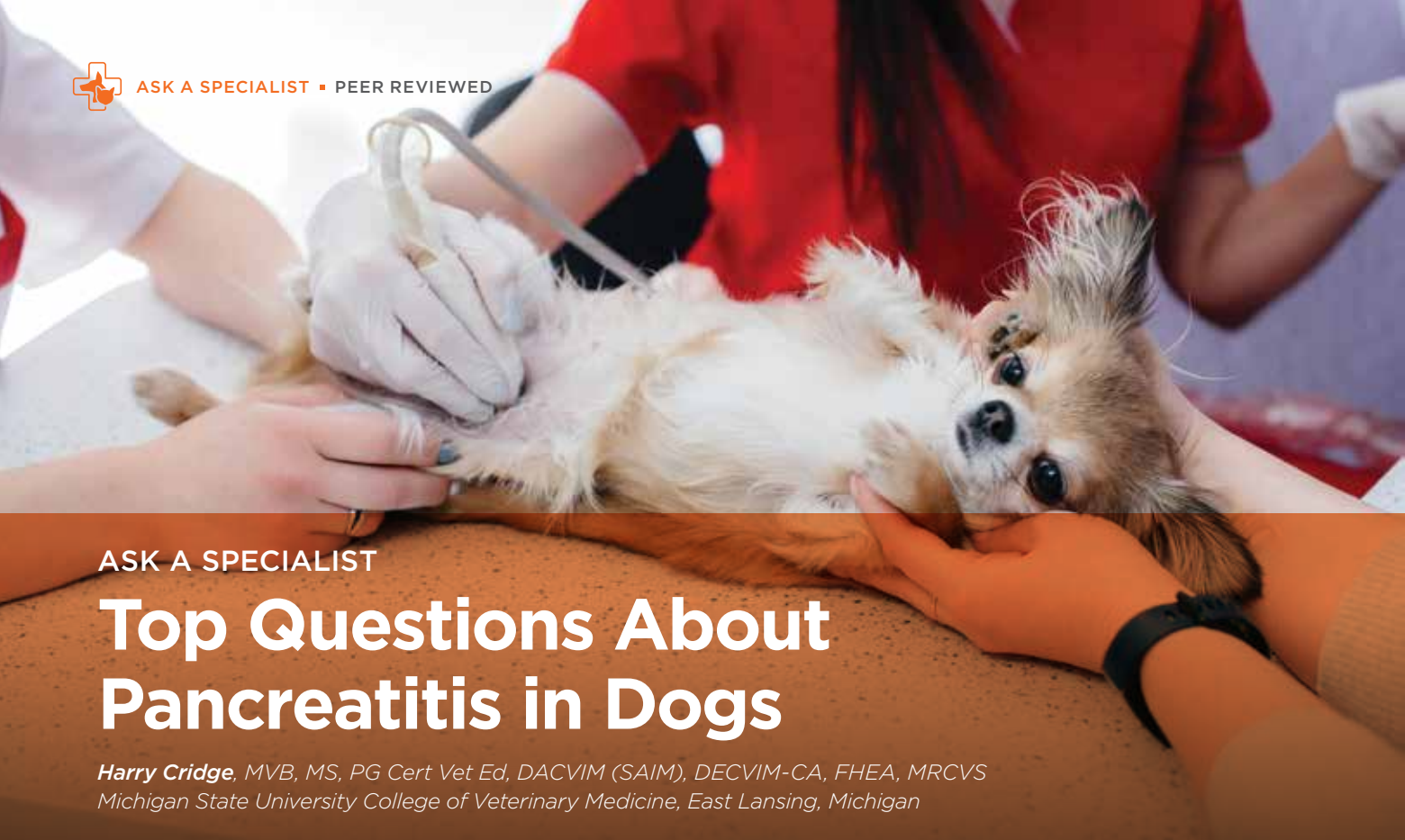




ASK A SPECIALIST

Top Questions About Pancreatitis in Dogs

Harry Cridge, MVB, MS, PG Cert Vet Ed, DACVIM (SAIM), DECVIM-CA, FHEA, MRCVS
Michigan State University College of Veterinary Medicine, East Lansing, Michigan

Pancreatitis is a common but challenging disorder in dogs, often leaving many general practitioners with questions regarding optimal diagnostic and treatment options. This article will address some of the most frequently asked questions specialists receive from general practitioners about pancreatitis in canine patients.

What is the pathogenesis of pancreatitis?

Development of pancreatitis in a dog requires an underlying risk factor, inciting cause, or a combination of both. The inciting causes or underlying risk factors then trigger a sequence of events, including colocalization of zymogens and lysosomes that occur inside the acinar cell and cause trypsinogen-dependent or trypsinogen-independent pathways of pancreatic

inflammation.^{1,2} The degree of inflammation and necrosis then determines whether clinically evident disease develops and, potentially, its severity.^{3,4} Additional specific information can be found in a recent review article.⁴

How should I approach the diagnosis of pancreatitis?

The diagnosis of pancreatitis is challenging. Historically, biopsies were recommended; however, they are costly, invasive, and challenging to interpret.⁵ Therefore, most clinicians now base a “clinical diagnosis” on integration of all available data.⁵ Doing so places the clinician at the center of the diagnosis and emphasizes their value, but it is important that the clinician understands each test and its limitations in order to provide an optimal diagnosis.

Abstract

Pancreatitis is a common yet challenging disorder. The diagnosis of pancreatitis is based on integration of data from a dog's history, physical examination, diagnostic imaging, and a pancreatic lipase assay. Treatment is based on supportive and symptomatic care in conjunction with novel therapeutics (e.g., fuzapladib sodium). Although many cases of pancreatitis are considered idiopathic, it is important to attempt to identify underlying risk factors, when possible, particularly for dogs with recurrent bouts of pancreatitis.



Take-Home Points

- Pancreatitis should be diagnosed by integrating patient data with the results of diagnostic imaging and a pancreatic lipase assay.
- The biggest pitfalls in the diagnosis of pancreatitis arise from an incomplete clinical diagnosis.
- Treatment is based on supportive and symptomatic care and novel treatments such as fuzapladib sodium.
- For dogs with recurrent bouts of pancreatitis, it is important to identify an underlying risk factor, where possible, as prevention or management of this risk factor may reduce disease relapse.

To diagnose pancreatitis, a patient's history and physical examination findings should be integrated with diagnostic imaging and the results of a pancreatic lipase assay.⁵ Although radiography is useful for ruling out foreign bodies or other diseases that may require alternate or surgical intervention, it is neither sensitive nor specific for pancreatitis. Ruling out alternate diagnoses is, however, an integral part of the diagnostic approach to pancreatitis as false-positive pancreatic lipase results (especially cage-side assays) are possible for dogs with abdominal disease.⁶

Abdominal ultrasonography is currently the imaging modality of choice for dogs with suspected pancreatitis. Ultrasonographic evidence of acute pancreatitis includes an enlarged hypoechoic (dark) pancreas with a hyperechoic (bright) surrounding mesentery (FIGURE 1).⁷ In some dogs, ultrasonographic evidence of pancreatitis lags behind clinical signs, and repeat

ultrasonography may be indicated for dogs with a high clinical suspicion for pancreatitis but “normal” ultrasonography results at hospital presentation.⁸ Conversely, ultrasonographic evidence of pancreatitis can persist well beyond the initial injury.⁹ These factors mean that the diagnostic approach to pancreatitis cannot rely on ultrasonography alone.

Are all lipase assays equal?

Each lipase assay available has its own advantages and disadvantages. It is beyond the scope of this article to discuss each commercially available assay, but assay type can provide some general information about potential advantages and disadvantages. Pancreatic lipase assays can be divided into 2 categories: catalytic and immunologic (TABLE 1).

Catalytic assays (e.g., DGGR [1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6'-methylresorufin)]) measure lipase *activity* by determining the rate at which hydrolytic products are formed, often linked to a colored reaction.¹⁰ Catalytic assays may detect extrapancreatic sources of lipase¹¹; however, optimization of catalytic lipase assay conditions can reduce the detection of nonpancreatic lipases, and using 2 to 3 times the upper reference interval cutoffs may be helpful when relying on catalytic lipase assays in practice. Catalytic assays may also be more cost-efficient. Analytical specificity of DGGR assays may depend on the manufacturer.

Immunologic assays (e.g., specific canine pancreatic lipase immunoassay [Spec cPL; IDEXX, idexx.com]) measure the *concentration* of pancreatic lipase by using specific antibodies targeted against pancreatic lipase.¹⁰ In general, immunologic assays are more analytically specific for lipase of pancreatic origin than catalytic assays and can be more heavily relied on for confirmation of pancreatic inflammation.^{10,11}

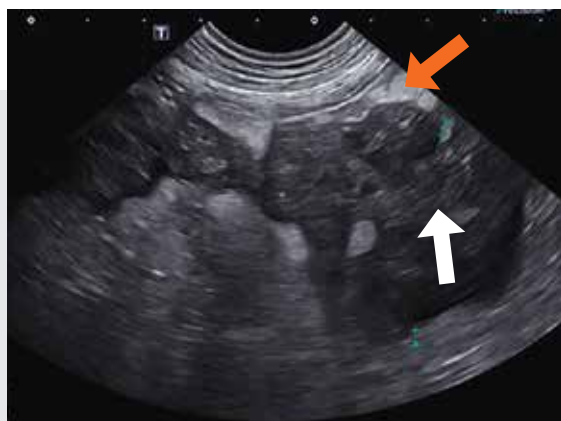


FIGURE 1. Ultrasonographic evidence of pancreatitis in a 3-year-old spayed female mixed-breed dog. The right limb of the pancreas (**white arrow**) is enlarged and hypoechoic, and the surrounding mesentery is hyperechoic (**orange arrow**). A clinical diagnosis of pancreatitis was confirmed by evaluation of the history, physical examination findings, and a specific canine pancreatic lipase immunoassay (Spec cPL; IDEXX, idexx.com) concentration of >2000 µg/L.

Analytical specificity of an assay for pancreatic lipase can be tested in 2 general ways, and these data may be reported by the manufacturers or sales representatives. One technique is to measure the concentration/activity of pancreatic lipase in a dog for which concentrations of pancreatic lipase are expected to be negligible (e.g., a dog with exocrine pancreatic insufficiency).¹² Detection of significant concentrations of lipase in these dogs suggests that the assay is detecting extrapancreatic lipases. Another technique is to measure lipase concentration/activity before and after administering a bolus of intravenous heparin.¹¹ Because heparin causes the release of extrapancreatic lipases into the circulation, increased concentration/activity after heparin administration suggests detection of newly released extrapancreatic lipases.^{10,11}

What are common pitfalls in the diagnosis of pancreatitis?

The biggest pitfalls in the diagnosis of pancreatitis arise from of an incomplete “clinical diagnosis” (i.e., failure to exclude alternate differentials such as a foreign body or relying on a single test to diagnose the disease). The author recognizes that client finances or other limitations may place the veterinarian in challenging circumstances, which may necessitate basing an educated judgment on a limited amount of data. In these cases, the author’s preference is to prioritize funds toward excluding differential diagnoses that require alternate/surgical intervention, thus prioritizing abdominal radiography where possible. Clients should be informed that a more complete clinical diagnosis may be required for dogs that have recurrent bouts of gastrointestinal upset or severe clinical presentations, so that the veterinarian can be confident in the diagnosis and treatment/prevention plan.

Elevated pancreatic lipase assay concentration/activity can also be seen in dogs with secondary pancreatic

injury, thus necessitating integration of lipase data with imaging to ensure that the veterinarian has identified and is treating the most significant disease first.

How do you treat mild, moderate, and severe pancreatitis?

The severity of pancreatitis can vary, and mild cases of pancreatitis may be managed on an outpatient basis with regular checkups, whereas more moderate to severe cases often require intensive hospitalization and aggressive medical therapy.

Supportive Care

Supportive and symptomatic care focus on fluid therapy, nutrition, pain management, and antiemetics. Introducing food early during treatment is encouraged, is well tolerated,^{13,14} and may necessitate placement of a nasogastric or nasoesophageal feeding tube. Low-fat gastrointestinal diets are frequently used in the initial management. For treatment of pain, the drugs of choice are opioids. Nonsteroidal anti-inflammatory drugs should be avoided. Full μ -opioid agonists (e.g., fentanyl, methadone) should be used for moderate to severe pain, whereas partial μ -opioid agonists may be suitable for mild pain/discomfort. Either ondansetron or maropitant citrate are suitable antiemetics and may be used together when indicated. The author prefers to use maropitant to control emesis and ondansetron to control nausea or for additional emetic control.

Anti-inflammatory corticosteroids have also been proposed as an adjunctive treatment for dogs with pancreatitis; however, data are limited and affected by study design.¹⁵ The author restricts use of anti-inflammatory corticosteroids to dogs that have been refractory to standard-of-care therapy, including fuzapladib sodium. Routine use of gastroprotectants in dogs with pancreatitis is discouraged.¹⁶

TABLE 1 Comparison of Lipase Assays

TEST TYPE	EXAMPLE TEST	MECHANISM	ADVANTAGES	DISADVANTAGES
Catalytic	DGGR lipase (many laboratories)	Measures lipase activity by determining the rate at which a hydrolytic product is formed	■ Inexpensive ■ Not species specific	■ May detect extrapancreatic lipases (likely assay/manufacturer specific)
Immunologic	Spec cPL (IDEXX, idexx.com)	Measures lipase concentration by using a specific antibody targeted against pancreatic lipase	■ Highly analytically specific (does not detect extrapancreatic lipases)	■ Cost ■ Species specific ■ Turnaround times may be higher

DGGR = 1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6'-methylresorufin); Spec cPL = specific canine pancreatic lipase

Targeted Therapeutics

Fuzapladib sodium (Panoquell-CA1; CEVA Animal Health, ceva.us) is a novel therapy that has been shown to improve the clinical signs associated with the acute onset of pancreatitis in dogs.¹⁷ The drug works by inhibiting activation of LFA-1 (leukocyte function–associated antigen 1), thereby reducing the extravasation of neutrophils into the tissues and reducing inflammation.⁴ Although additional studies are needed (and are ongoing by the manufacturer), the author uses this medication for dogs with symptomatic pancreatitis. The medication is given once daily via intravenous injection for 3 days. If clinical improvement is noted before completion of 3 doses, the remaining doses can be given on an outpatient basis. Although it may be tempting to stratify use of fuzapladib sodium based on clinical severity, dogs with pancreatitis can change quickly, and the author uses the medication when it is financially feasible. In the coming years, additional study may help provide aid for case selection.

Why do some dogs keep getting pancreatitis?

Most cases of pancreatitis are considered idiopathic, usually due to lack of diagnostic investigation into underlying causes. Underlying causes or risk factors for pancreatitis have been proposed (TABLE 2). If a potential risk factor is identified, control or avoidance of that risk factor may help prevent recurrence of disease. To try identifying a potential cause or risk factor for pancreatitis, the author recommends the following:

- Complete a drug/toxin history and a dietary history evaluating for high-fat foods (including prescription diets), table scraps, and access to trash.
- Measure ionized calcium and fasted serum triglyceride concentrations.
- Evaluate for obesity.

- Consider the potential for underlying endocrinopathies and test for them at diagnostically appropriate times (if clinically indicated).

SUMMARY

Patients with pancreatitis pose challenges for veterinarians. Diagnosis is often based on integrating data from a dog's history, physical examination, diagnostic imaging, and a pancreatic lipase assay. Some catalytic lipase assays may detect extrapancreatic lipases, and using a 2 to 3 time upper reference interval cutoff may help mitigate the consequences of the lack of analytical specificity. One of the biggest pitfalls to an accurate diagnosis is incomplete integration of all data (e.g., failure to rule out differentials). Treatment includes supportive and targeted therapies. Prognosis and prevention of recurrence depend on identifying and eliminating underlying causes. **TVP**

References

1. Saluja A, Hashimoto S, Saluja M, Powers RE, Meldolesi J, Steer ML. Subcellular redistribution of lysosomal enzymes during caerulein-induced pancreatitis. *Am J Physiol*. 1987;253(4):G508-G516. doi:10.1152/ajpgi.1987.253.4.G508
2. Dawra R, Sah RP, Dudeja V, et al. Intra-acinar trypsinogen activation mediates early stages of pancreatic injury but not inflammation in mice with acute pancreatitis. *Gastroenterology*. 2011;141(6):2210-2217. doi:10.1053/j.gastro.2011.08.033
3. Barreto SG, Saccone GTP. Alcohol-induced acute pancreatitis: the 'critical mass' concept. *Med Hypotheses*. 2010;75(1):73-76. doi:10.1016/j.mehy.2010.01.036
4. Cridge H, Lim SY, Algül H, Steiner JM. New insights into the etiology, risk factors, and pathogenesis of pancreatitis in dogs: potential impacts on clinical practice. *J Vet Intern Med*. 2022;36(3):847-864. doi:10.1111/jvim.16437
5. Cridge H, Twedt DC, Marolf AJ, Sharkey LC, Steiner JM. Advances in the diagnosis of acute pancreatitis in dogs. *J Vet Intern Med*. 2021;35(6):2572-2587. doi:10.1111/jvim.16292
6. Haworth MD, Hosgood G, Swindells KL, Mansfield CS. Diagnostic accuracy of the SNAP and Spec canine pancreatic lipase tests for pancreatitis in dogs presenting with clinical signs of acute abdominal disease. *J Vet Emerg Crit Care (San Antonio)*. 2014;24(2):135-143. doi:10.1111/vec.12158

TABLE 2 Potential Risk Factors for Pancreatitis⁴

CATEGORY	POTENTIAL RISK FACTOR(S)
Diet	High-fat diet, access to trash, unusual food items
Drugs/toxins	L-Asparaginase, phenobarbital, potassium bromide, azathioprine, potentiated sulfonamides, organophosphates, atovaquone/proguanil, N-methyl-D-glucamine, clomipramine, zinc
Endocrinopathies	Hyperadrenocorticism, hypothyroidism, diabetes mellitus
Hereditary	Miniature schnauzer, terrier breeds
Hypercalcemia	Calcium disorders
Lipid disorders	Hypertriglyceridemia
Miscellaneous	Systemic infections, obesity, chronic enteropathy

Learn more and request your invitation at compassanimal.com



April 10-11, 2025 | Washington, D.C.

Designing and delivering the future of animal health and pet care. **Together.**

1
location
2
days
40+
institutions
800+
changemakers

Compass is a catalytic immersion where industry trailblazers and allied fields will converge to ideate, innovate, and forge strategic partnerships. Through visionary keynotes, interactive think tanks, and curated networking avenues, we'll chart a transformational roadmap beyond the next decade of animal health and pet care.

By the industry, with the industry, for the animals.

The global animal health and pet care industry event presented by NAVC & Michelson Found Animals.



**Michelson
Found Animals**



ASK A SPECIALIST ■ PEER REVIEWED

- Cridge H, Sullivant AM, Wills RW, Lee AM. Association between abdominal ultrasound findings, the specific canine pancreatic lipase assay, clinical severity indices, and clinical diagnosis in dogs with pancreatitis. *J Vet Intern Med.* 2020;34(2):636-643. doi:10.1111/jvim.15693
- Gori E, Pierini A, Lippi I, Citi S, Mannucci T, Marchetti V. Evaluation of diagnostic and prognostic usefulness of abdominal ultrasonography in dogs with clinical signs of acute pancreatitis. *JAVMA.* 2021;259(6):631-636. doi:10.2460/javma.259.6.631
- Mitchell L, Wang S, Lawver J, Cridge H. Serial monitoring of pancreatic lipase immunoreactivity, C-reactive protein, abdominal ultrasonography, and clinical severity in dogs with suspected pancreatitis. *J Vet Intern Med.* 2024;38(2):987-994. doi:10.1111/jvim.17020
- Lim SY, Steiner JM, Cridge H. Understanding lipase assays in the diagnosis of pancreatitis in veterinary medicine. *JAVMA.* 2022;260(11):1249-1258. doi:10.2460/javma.22.03.0144
- Lim SY, Xenoulis PG, Stavroulaki EM, et al. The 1,2-o-dilauryl-rac-glycero-3-glutaric acid-(6'-methylresorufin) ester (DGGR) lipase assay in cats and dogs is not specific for pancreatic lipase. *Vet Clin Pathol.* 2020;49(4):607-613. doi:10.1111/vcp.12906
- Steiner J, Suchodolski J, Gomez R. DGGR is not a specific substrate for pancreatic lipase. Presented at: World Small Animal Veterinary Association World Congress; May 15-18, 2015; Bangkok, Thailand. Accessed October 8, 2024. <https://www.vin.com/doc/?id=7259064>
- Mansfield CS, James FE, Steiner JM, Suchodolski JS, Robertson ID, Hosgood G. A pilot study to assess tolerability of early enteral nutrition via esophagostomy tube feeding in dogs with severe acute pancreatitis. *J Vet Intern Med.* 2011;25(3):419-425. doi:10.1111/j.1939-1676.2011.0703.x
- Harris JP, Parnell NK, Griffith EH, Saker KE. Retrospective evaluation of the impact of early enteral nutrition on clinical outcomes in dogs with pancreatitis: 34 cases (2010-2013). *J Vet Emerg Crit Care (San Antonio).* 2017;27(4):425-433. doi:10.1111/vec.12612
- Okanishi H, Nagata T, Nakane S, Watari T. Comparison of initial treatment with and without corticosteroids for suspected acute pancreatitis in dogs. *J Small Anim Pract.* 2019;60(5):298-304. doi:10.1111/jsap.12994
- Marks SL, Kook PH, Papich MG, Tolbert MK, Willard MD. ACVIM consensus statement: support for rational administration of gastrointestinal protectants to dogs and cats. *J Vet Intern Med.* 2018;32(6):1823-1840. doi:10.1111/jvim.15337
- Steiner JM, Laines C, Noshiro Y, et al. Fuzapladib in a randomized controlled multicenter masked study in dogs with presumptive acute onset pancreatitis. *J Vet Intern Med.* 2023;37(6):2084-2092. doi:10.1111/jvim.16897

Disclosure

Dr. Cridge is a paid speaker and content developer for CEVA Animal Health, LLC, which markets and distributes fuzapladib sodium (Panoquell-CA1) within the United States.



Harry Cridge

Dr. Cridge is a dual board-certified internal medicine specialist and an RCVS-recognized specialist in small animal medicine (gastroenterology) with clinical and research interests in disorders of the exocrine pancreas. He is currently an associate professor in the department of small animal clinical sciences at Michigan State University's College of Veterinary Medicine.