

For veterinary use only

Clinical Guidelines

Vcheck cPL / fPL

Vcheck cPL / fPL

What is pancreatitis?

- **Pancreas has two parts.**
 - In endocrine parts, islets of Langerhans produce hormones (insulin, glucagon) into the bloodstream.
 - In exocrine parts, acinar cells produce enzymes that will exit the body through the digestive system.



Pancreatitis

- **Premature activation of the digestive enzymes** → Pancreatic autodigestion (Pancreatitis)
- **Causes:** Idiopathic (90%) or pancreatitis may occur secondary to a range of conditions (ischemia, hypoperfusion, dietary indiscretion, drug therapy, hyperlipidemia or endocrine diseases, etc.)
- **Clinical signs**¹: Dogs may have digestive symptoms; vomiting (90%), abdominal pain (58%)
Non-specific signs; anorexia (91%), weakness (79%), or dehydration (46%)
Cats may have less specific signs; lethargy (100%), anorexia (97%), or dehydration (92%)

Traditional diagnostic methods

- **Amylase, lipase:** Synthesized and secreted by several different tissues other than the pancreas
☞ Unreliable basis for the diagnosis of pancreatitis (low sensitivities and specificities)
- **TLI (Trypsin-Like Immunoreactivity):** Low sensitivity for the diagnosis of pancreatitis (28-64%)
- **Ultrasonography:** Provides significant additional information useful for diagnosis, but is highly operator dependent (Sensitivity 66-68%).

Recent method

- **PLI (Pancreatic Lipase Immunoreactivity):** Measures pancreatic lipase exclusively with high accuracy
☞ Can be used as a screening test to rule out pancreatitis

For accurate diagnosis of pancreatitis,

Below tests should always be performed in patients with suspected pancreatitis because they are useful for the diagnosis or exclusion of other diseases.

First, consider the history / clinical signs

- ✓ **Dogs:** Anorexia (91%), vomiting (90%), weakness (79%), abdominal pain (58%)...
- ✓ **Cats:** Lethargy (100%), anorexia (97%), dehydration (92%), hypothermia (68%)...

Second, measure the PLI testing (cPL for dogs, fPL for cats)

- ✓ Dogs (using the Vcheck cPL kit)

< 200 ng/ml	200-400 ng/ml	> 400 ng/ml
Pancreatitis very unlikely	Equivocal	Pancreatitis

- ✓ Cats (using the Vcheck fPL kit)

≤ 3.5 ng/ml	3.6-5.3 ng/ml	≥ 5.4 ng/ml
Pancreatitis very unlikely	Equivocal	Pancreatitis

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Third, perform the ultrasonography

- ✓ Low sensitivity (68%), but very high specificity ☞ Good tool to confirm or deny the presence of pancreatitis
- ✓ **US Diagnosis**
 - Pancreas (parenchyma): Hypoechoic, mottled, thickening, irregular margin
 - Peri-pancreatic fat: Hyperechoic (due to fat saponification, inflammation)
 - ± Duodenal change / biliary change / peritoneal fluid

Last, assess the blood work results^{3,4}

- ✓ **CBC:** Leukocytosis, neutrophilia with a degenerative left shift
- ✓ **Serum biochemistry:** Increased liver enzymes (ALKP 2-15 fold, ALT 2-5 fold), hyperbilirubinemia, increased BUN, creatinine or abnormal electrolytes (hypochloremia in 81.3% dogs, hypokalemia in 56% cats)

New diagnostic guidelines (4 steps)

Step 1. Rule out pancreatitis using a PLI kit

- ✓ In dogs and cats with non-specific clinical signs, cPL or fPL test can be used to rule out pancreatitis, on the premise that the results are within the reference range. **Still, consider the possibilities of false negative results in mild or chronic pancreatitis.*
- ✓ If the results are above the reference range, false positive possibilities should be considered prior to diagnosing pancreatitis.

Step 2. Investigate whether pancreatitis is primary or secondary

- ✓ Even if the PLI test results are high, pancreatic inflammation may not be the primary cause².
- ✓ **Possible factors causing pancreatic inflammation:** Diffuse abdominal inflammation (e.g. septic peritonitis) or any condition that causes hypoperfusion or ischemia

Step 3. Assess the severity and risk factors

- ✓ Severity score based upon the organ system compromise (Give scores 0~5) ☞ **Assess mortality rate⁵**
 - ① **[Renal]** UREA > 14 mmol/L or creatinine > 0.3 mmol/L
 - ② **[Hepatic]** Any of ALP, AST, or ALT > 3 x upper range
 - ③ **[Lymphoid]** Band neutrophils > 10% or WBC > 24 x 10⁹/L (Or, CRP > 40 mg/L)
 - ④ **[Endocrine pancreas]** Blood glucose > 13 mmol/L and/or β-OH butyrate > 1 mmol/L
 - ⑤ **[Acid/base buffering]** Bicarbonate < 13 or > 26 and/or anion gap < 15 or > 38 mmol/L
- ✓ **Mortality rate:** 0% in score 0 patients, 11% in score 1, 20% in score 2, 67% in score 3, 100% in score 4 and above.
- ✓ In patients with severe pancreatitis, it may lead to acute kidney injury, DIC, or acute lung injury⁶.

Step 4. Monitor the complications (Follow-up)

Chronic pancreatitis can lead to progressive destruction of the pancreas ☞ **Causing diabetes or EPI⁷**

- ✓ **Diabetes mellitus:** Hyperglycemia due to the loss of insulin production
 - 30-40% dogs and 51% cats with diabetes had pancreatitis.
- ✓ **EPI (Exocrine Pancreatic Insufficiency):** A lack of effective pancreatic exocrine secretion due to pancreatic acinar atrophy (PAA)
 - EPI in 50% dogs and 100% cats occurs from chronic pancreatitis.

Reference 1. By Jörg M. Steiner, med.vet., Dr.med.vet., PhD, DACVIM, DECVM CA, AGAF. 2. Journal of Veterinary Emergency and Critical Care 24(2) 2014, pp 135-143. 3. Journal of Small Animal Practice (2015) 56, 13-26 4. The Pharma Innovation Journal 2017; 6(12): 509-516. 5. Aust Vet J. 1998 Dec;76(12):804-808. 6. Vet Pathol. 2017 Jan;54(1):129-140. 7. Goossens MM, et al. JVIM 1998;12:1.