

For veterinary use only

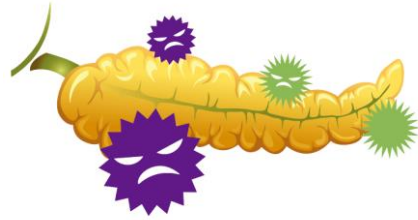
# Clinical Guidelines

## 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**<sup>1</sup>: 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

# Vcheck cPL / fPL

## 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<sup>3,4</sup>

- ✓ **CBC:** Leukocytosis, neutrophilia with a degenerative left shift
- ✓ **Serum biochemistry:** Increased liver enzymes (ALP 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 cause<sup>2</sup>.
- ✓ **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 rate<sup>5</sup>**
  - 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 10<sup>9</sup>/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 injury<sup>6</sup>.

### Step 4. Monitor the complications (Follow-up)

Chronic pancreatitis can lead to progressive destruction of the pancreas ☞ **Causing diabetes or EPI<sup>7</sup>**

- ✓ **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.