**Pancreatitis in dogs and cats: Diagnosis and Treatment**

David A. Williams

University of Illinois
GI Lab – Texas A&M University

---

**Pancreatitis - Main points to make!**

- Pancreatitis can be subclinical
- Enzyme concentration vs activity
- Amylase and lipase activities are not sensitive or specific tests
- TLI is not a sensitive test
- PLI is both sensitive and specific and there are logical reasons for this
- Spec cPL and SNAP cPL are very practical “new and improved” versions of the classic cPLI assay

---

**Pancreatitis - Treatment**

- Removal of cause
- Fluid therapy
- Control pain and vomiting
- Do not overstimulate pancreas
- Nutritional support as needed
- Monitor for complications
- Treat concurrent diseases
PANCREATITIS – EXPLORATORY LAPAROTOMY

- Hemorrhage
- Necrosis
- Fat necrosis
- Adhesions
- Ascites

*BIOPSY IS SAFE!*
Pancreatic Lesions in Dogs in the USA

- more than 200 dogs
- pancreas sectioned every 2 cm
- only 8% had no lesions in any sections

Presenting Signs

- Vomiting
- Anorexia
- Diarrhea
- Abdominal pain (?)
Pancreatitis
Remove the cause

- Nutrition
- Drugs and toxins
- Infectious agents
- Ischemia/hypoperfusion
- Hypercalcemia
- Pancreatic neoplasia

Clinical Signs

- anorexia 91%
- vomiting 90%
- weakness 79%
- abdominal pain 58%
- dehydration 46%
- diarrhea 33%
- fever 21%
⇒ non-specific findings

n = 70

Hess et al., 1998

Radiography

- abdominal radiographs
  - decreased contrast
  - dilated intestinal loops
  - transposition of abdominal organs
- thoracic radiographs
  - pleural effusion

Suter et al., 1969; Garvey et al., 1984; Hill et al., 1993

Abdominal Ultrasonography

- fluid accumulation around the pancreas
- enlargement of the pancreas
- increased echogenicity (fibrosis)
- decreased echogenicity (necrosis)
- pancreatic mass effect
⇒ if stringent criteria are applied abdominal ultrasound is highly specific
⇒ sensitivity is largely operator dependant and has been reported to be up to 68% in dogs

Saunders, 1991; Swift et al. 2000; Gerhardt et al. 2001; Saunders et al. 2002
Hematology in Dogs with Pancreatitis

- thrombocytopenia 59%
- neutrophilia and left shift 55%
- anemia 29%
- non-specific findings

n = 70

Serum Chemistry Profile in Dogs

- hypochloremia 81%
- elevation of SAP 79%
- hypophosphatemia 68%
- elevation of ALT 61%
- azotemia 59%
- hyperbilirubinemia 53%
- hypoalbuminemia 50%
- hypercholesterolemia 48%
- hypoglycemia 39%
- hyperglycemia 30%
- non-specific findings

n = 64
Enzyme Assay

- Immunologic Assay
- Catalytic Assay
  - Active Site Independent
  - Active Site Dependent
    - (Concentration)
    - (Activity)

Serum Lipase Activity in Dogs with EPI

- Only 1 of 25 dogs had serum lipase activity below the reference range

---

Serum Amylase Activity After Pancreatectomy

---

Serum amylase and lipase activities are neither sensitive nor specific for pancreatitis in dogs or cats
**Serum cTLI in 11 Dogs with Pancreatitis**

- Only 4 of 11 dogs had serum cTLI concentrations above the recommended cut-off value of 50 μg/L (sensitivity: 36.4%).

**Serum Lipase Activity in 11 Dogs with Pancreatitis**

- Only 6 of 11 dogs had serum lipase activities above the recommended cut-off value of 3 times the upper limit of the reference range (sensitivity: 54.5%).

**Serum Amylase Activity does not Increase in Cats with Pancreatitis**

- Parent et al., 1995

**Serum Lipase Activity does not Increase in Cats with Pancreatitis**

- Parent et al., 1995
Serum fTLI Concentration

- Sensitivity only 30-60%
  - Trypsinogen (TLI) is a small molecule that is quickly excreted in urine
  - Trypsinogen is activated to trypsin during pancreatitis
  - Trypsin is also quickly removed by plasma proteinase inhibitors


---

Serum canine Pancreatic Lipase Immunoreactivity (cPLI) Concentration

- 9 of 11 dogs had serum cPLI concentrations above the recommended cut-off value of 200 µg/L
- (sensitivity: 81.8%)
Serum cPLI in Dogs with Experimental Pancreatitis

Serum cPLI in Dogs with Chronic Renal Failure

- highest serum cPLI of any dog with experimentally induced chronic renal failure was 132 µg/L.

Serum cPLI in Dogs with Gastritis

- in 24/25 dogs with gastritis serum cPLI (ELISA) is less than the currently recommended cut-off value.

fTLI and fPLI in Cats with Experimental Pancreatitis

Williams et al., 2003
Test Sensitivities for Canine Pancreatitis

Collaboration
- Spec c/f PL® (Idexx Laboratories)
  - Monoclonal antibodies against PL
  - Recombinant PL standards
- Quantitative assays from labs
- SNAP cPL and fPL for in-clinic testing (10 minutes)

Serum Lipase vs. Spec cPL™

Serum Lipase and Spec cPL are NOT the same thing!

- Serum lipase activity is not specific for the pancreas and can be elevated with renal and GI disease
- Serum lipase activity helps indicate pancreatitis but can't be used as a stand alone diagnostic indicator
- Serum PLU (cPL and fPL) is only produced by the pancreas and therefore is very specific for pancreatitis

SNAP cPL

Features
- Two results: Normal or Abnormal
- Read time: 10 minutes
- Storage: Refrigeration
- Sample type: Serum
- Read: Visual, semi-quantitative
- Uses the same technology as Spec cPL™
  - Optimized to match the performance of Spec cPL with an Abnormal range that captures Spec cPL levels >200 U/l, elevated and consistent w pancreatitis (corne)
  - Correlation to Spec cPL ~95%
A Multi-Institutional Study Evaluating Diagnostic Utility of Spec cPL™ in the Diagnosis of Acute Pancreatitis in Dogs

Authors: K McCord1, J David1, F Layva1, PJ Armstrong2, K Simpson3, N Hehr1, MA Forman1, D Biller4, Comparative Gastroenterology Society Members, D Twedd1

1Colorado State University, Fort Collins, CO. 2University of Minnesota, Saint Paul, MN. 3Cornell University, Ithaca, NY. 4MedVet Center for Pets, Worthington, OH. 5Kansas State University, Manhattan, KS.

Conclusions

- The Spec PL is better able to discriminate dogs with suspect pancreatitis than amylase and lipase activities.

- Dogs with a Spec PL < 200 mcg/L are unlikely to have clinical acute pancreatitis.

Why are PLI assays so much better than TLI assays for diagnosing pancreatitis?

- PLI is a larger molecule than TLI, is not cleared by renal filtration, and probably has a much longer half life in the bloodstream

- TLI, in combination with serum cobalamin and folate, remains the test of choice for EPI & when malabsorption is suspected!!
PLI assays are good tests for pancreatitis because:

- Prompt and sustained increases occur when there is pancreatitis
- No increases in non-pancreatic diseases such as renal failure and gastritis
- No increases in response to corticosteroid therapy
- PLI is stable in serum

Questions?

"Pancreatitis"

- Canine – acute and chronic
- Feline – acute and chronic
- Histologically defined subgroups
- Etiologically defined subgroups
- Clinical and subclinical disease
- Concurrent diseases of the digestive system complicate the clinical picture even further

Pancreatitis

- Acute pancreatitis is a self-limiting benign disease in approximately 90% of human patients
- The remaining 10% present with, or progress to, severe necrotizing pancreatitis, and up to 50% die
Pancreatitis - Treatment

- Removal of cause
- Fluid therapy
- Control pain and vomiting
- Do not overstimulate pancreas
- Nutritional support as needed
- Monitor for complications
- Treat concurrent diseases

Pancreatitis
Remove the cause

- Nutrition
- Drugs and toxins
- Infectious agents
- Ischemia/hypoperfusion
- Hypercalcemia
- Pancreatic neoplasia

Pancreatic Parasites

- Feline pancreatic fluke
  - *Eurytrema procyonis*
    - Fenbendazole (30 mg/kg q24h x 6 days)
- Feline hepatic fluke
  - *Amphimerus pseudofelineus*
    - Pancreatic invasion → pancreatitis
    - Praziquantel (40mg/kg q24h x 3 days)

Pancreatitis
Control Pain and Vomiting

- Major clinical signs
  - Anorexia
  - Vomiting
  - Depression
  - Abdominal pain
  - Fever
Pancreatitis – Treatment

- Analgesia
  - Fentanyl
  - bolus injection or transdermal
  - Morphine
  - intermittent bolus or CRI
  - Intraperitoneal lidocaine

Pancreatitis – Treatment

- Analgesia
  - Intraperitoneal lidocaine
    - 2mg/kg diluted in 50mL of warm 0.9% NaCl (dogs)

Pancreatitis Monitor for complications

- Hyperlipidemia
- Hyperglycemia
- Uremia
- Hypokalemia
- Hypocalcemia
- Obstructive hepatopathy
Pancreatitis
Monitor for complications

Hepatopathy
- Toxic
  - (Enzymes)
- Obstructive
  - (Bile Duct)

Pancreatitis – Treatment

- Surgery
  - Peritoneal lavage
  - Debridement
  - Partial pancreatectomy
  - Drainage
  - Cholecystoduodenostomy

Feline Pancreatitis with Hepatic Lipidosis

- Observed in 5 of 13 cats examined
- Clinical signs not different from those in cats with lipidosis alone
- Coagulation abnormalities more common
- Peritoneal effusion common
- Poor prognosis

(Akel et al. 1993)
Pancreatitis - Treatment

Fluid therapy
- Azotemia
- Potassium
- Calcium

Pancreatitis - Treatment

- Proteinase inhibitors
  Aprotinin (Trasylol®)
  Synthetic Inhibitors
  Plasma (α-macroglobulins)

Only plasma is practical! ($$)
Pancreatitis – Treatment

Plasma contains both albumin and α-macroglobulins

Pancreatitis – Treatment

Corticosteroids?

• Acute - usually No!

• Chronic – usually OK or beneficial (especially in cats)

Pancreatitis – Treatment

• Septic complications very rare in dogs / cats

• Antibiotic therapy probably not helpful

Pancreatitis – Treatment

• Gradually reintroduce food
  – Moderate to low fat (dogs)
  – Moderate protein
  – High carbohydrate (dogs)
• Rice, pasta, potato

• Gradually return to normal diet

• Diet type not important in cats
Pancreatitis – Treatment

- Chronic Disease
  - Increasingly recognized
  - Very few studies
    - Low fat diet in dogs
    - Corticosteroids
    - Oral pancreatic enzymes?

Questions?