What’s new in pancreatic disease diagnosis and management

Presenters:

Elizabeth Schooley, DVM, MS, DACVIM

Julien Dandrieux, BSc, Dr med vet, PhD, DACVIM, GCUT, MRCVS

November 21, 2025

IDEXX

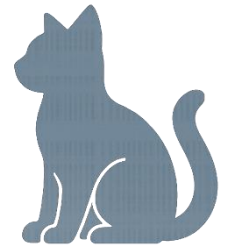
Learning objectives

1. Familiarise with pancreatic physiology and pathophysiology
2. Understand the differences between acute and chronic pancreatitis in dogs
3. Recognise the clinical picture and when to suspect pancreatitis
4. Understand how to diagnose pancreatitis
5. Familiarise with the importance of diet in pancreatitis treatment
6. Develop a treatment plan for a patient with pancreatitis

Pancreatitis in dogs and cats

More common than previously thought

True prevalence is hard to determine



Histopathologic studies show pancreatic inflammation is relatively common:

- Dogs 64%[1]
- Cats 66%[2]

Lesions ≠ Clinical disease

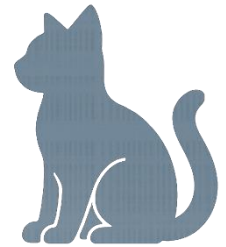
References

1. Newman S, Steiner J, Woosley K, Barton L, Ruaux C, Williams D. Localization of pancreatic inflammation and necrosis in dogs. *J Vet Intern Med*. 2004;18(4):488-493. doi:10.1892/0891-6640(2004)18<488:lopian>2.0.co;2
2. De Cock HEV, Forman MA, Farver TB, Marks SL. Prevalence and histopathologic characteristics of pancreatitis in cats. *Vet Pathol*. 2007;44(1):39-49. doi:10.1354/vp.44-1-39

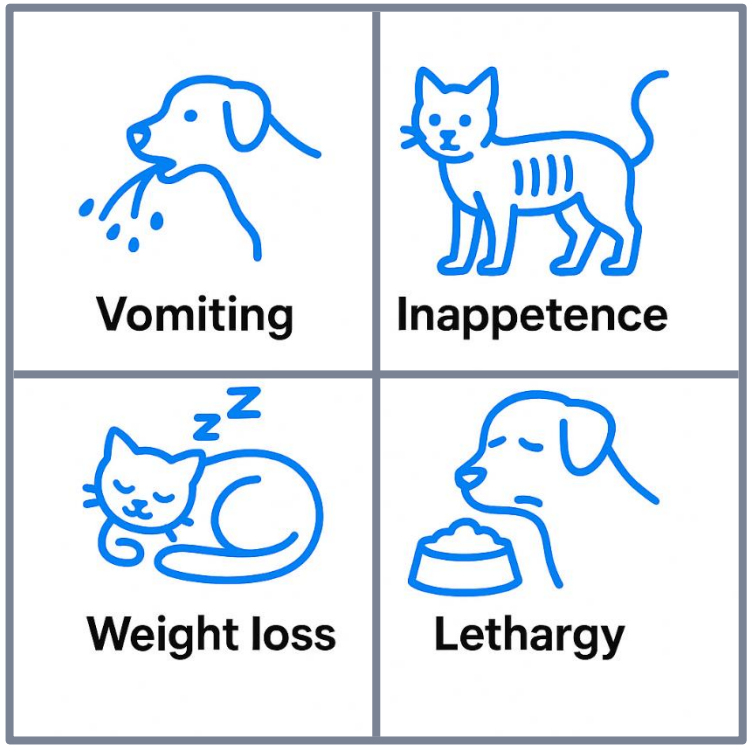
Pancreatitis in dogs and cats

More common than previously thought

True prevalence is hard to determine



2015 study examining presenting complaints at UK primary care practices found that many of the reasons pets presented could lead to the clinical suspicion of pancreatitis



Reference
1. Robinson NJ, Dean RS, Cobb M, Brennan ML. Investigating common clinical presentations in first opinion small animal consultations using direct observation. *Vet Rec*. 2015;176(18):463. doi:10.1136/vr.102751

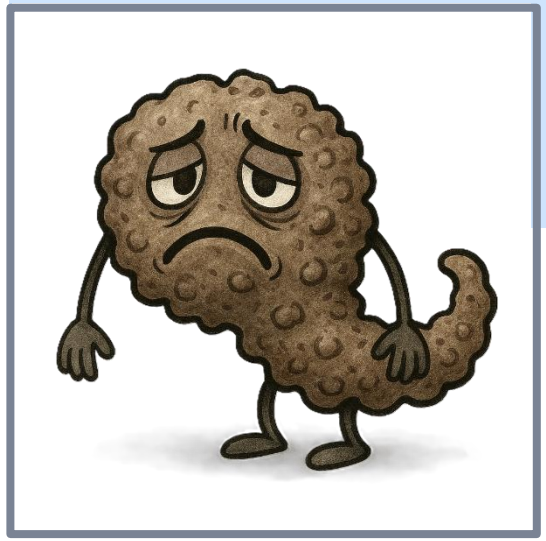
Pancreatitis: acute *and* chronic

Acute pancreatitis

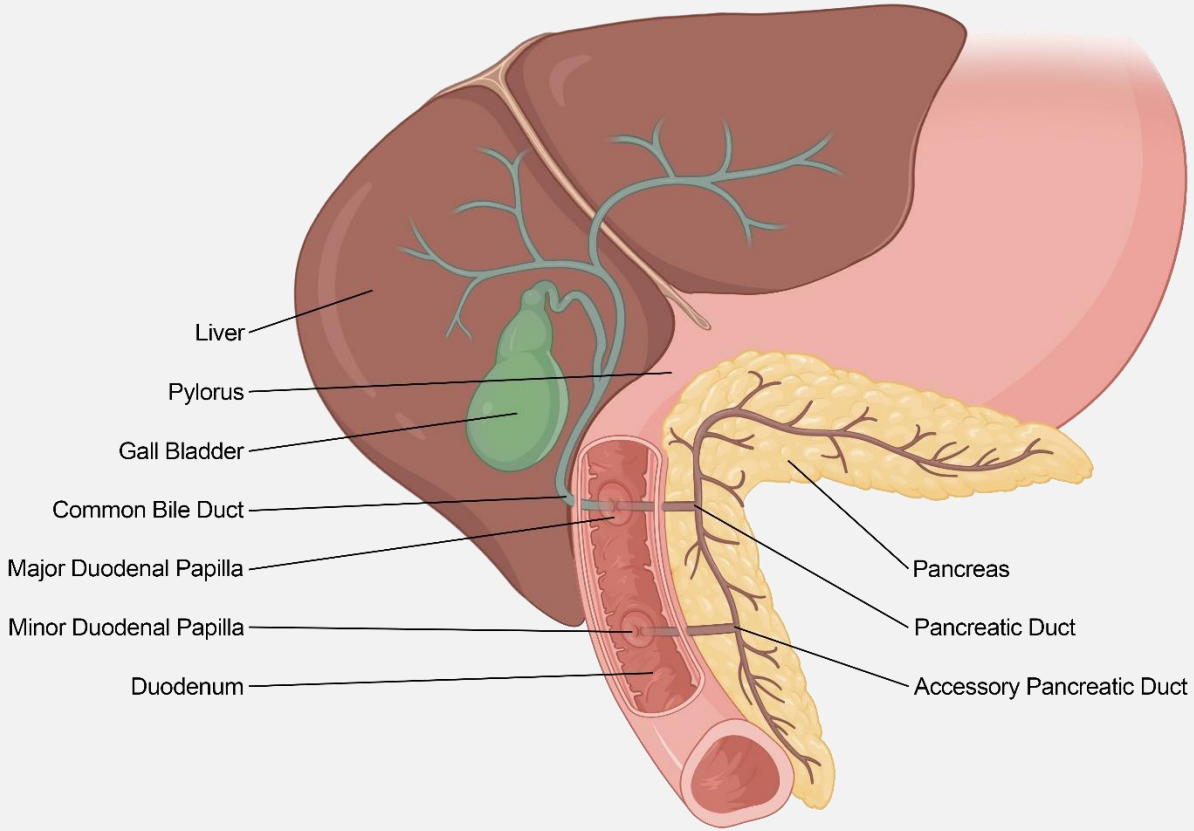
- **Reversible** inflammation
  - Neutrophilic inflammation
- Can be life-threatening

Chronic pancreatitis

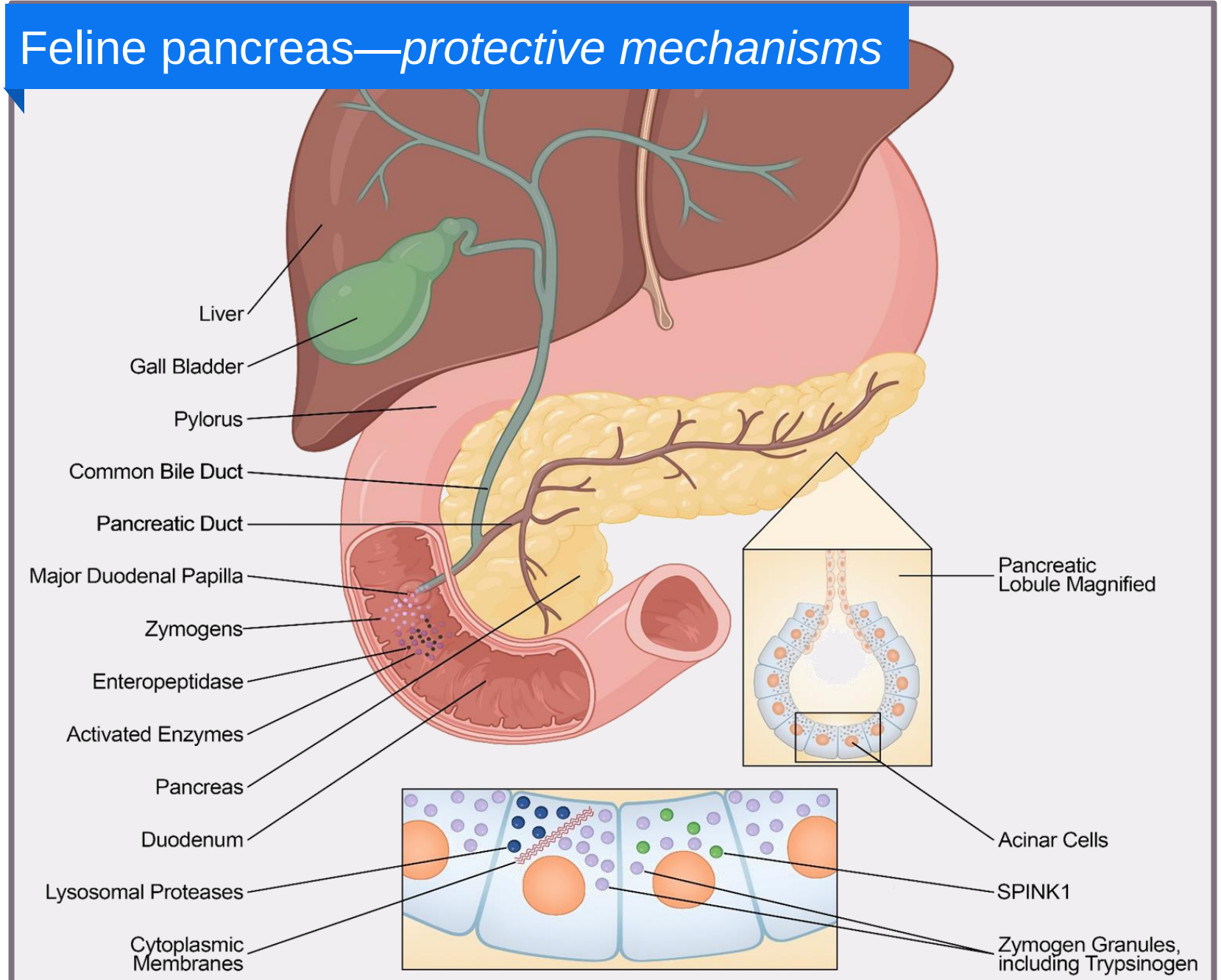
- Continuing inflammatory; **irreversible** changes to the pancreas
  - Neutrophilic and/or lymphocytic inflammation, acinar atrophy and/or fibrosis



Canine pancreas

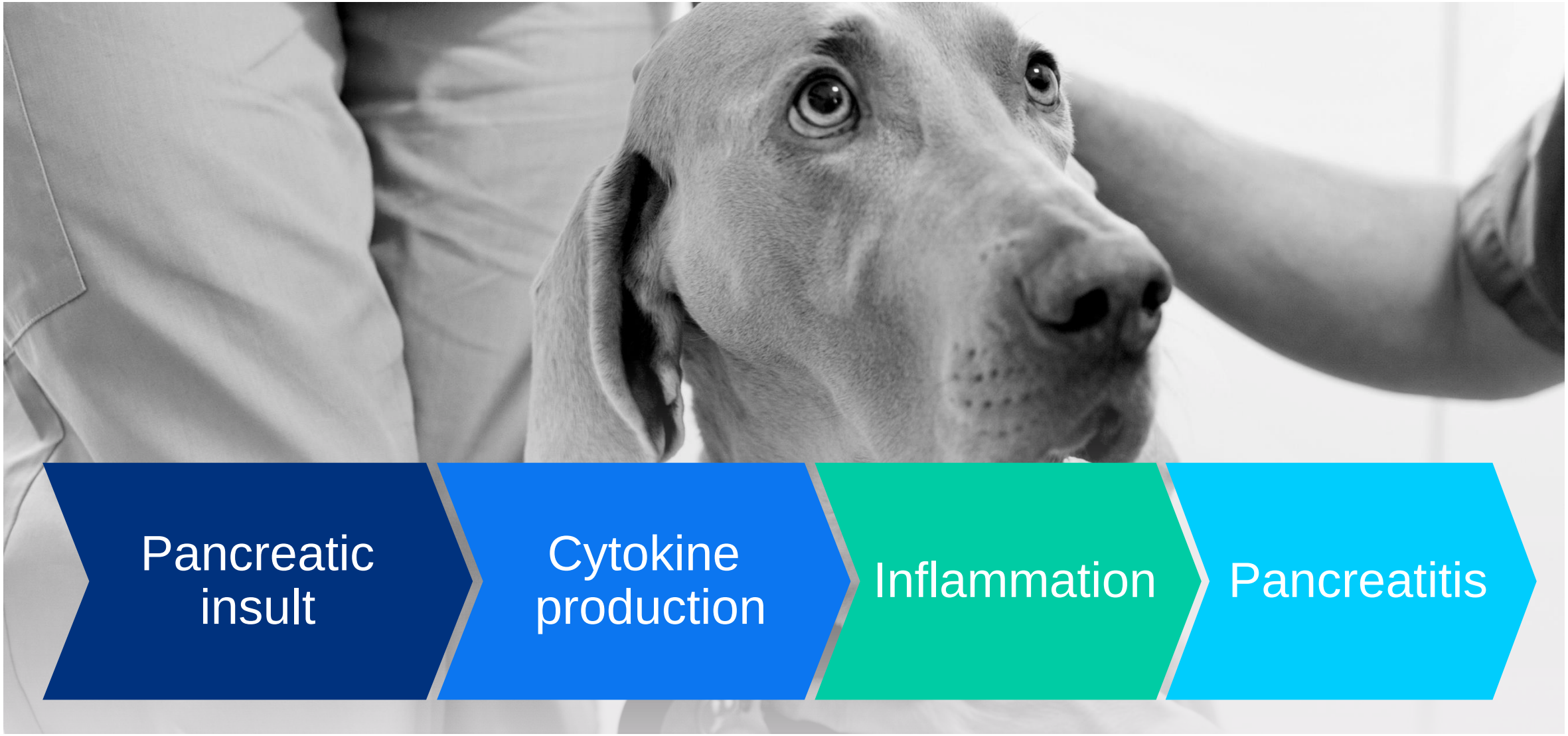


Feline pancreas—*protective mechanisms*



Recreated from Figure 1, Forman MA, Steiner JM, Armstrong PJ, Camus MS, Gaschen L, Hill SL, Mansfield CS, Steiger K. ACVIM consensus statement on pancreatitis in cats. J Vet Intern Med. 2021 Mar;35(2):703-723. doi: 10.1111/jvim.16053. Epub 2021 Feb 15. PMID: 33587762; PMCID: PMC7995362.

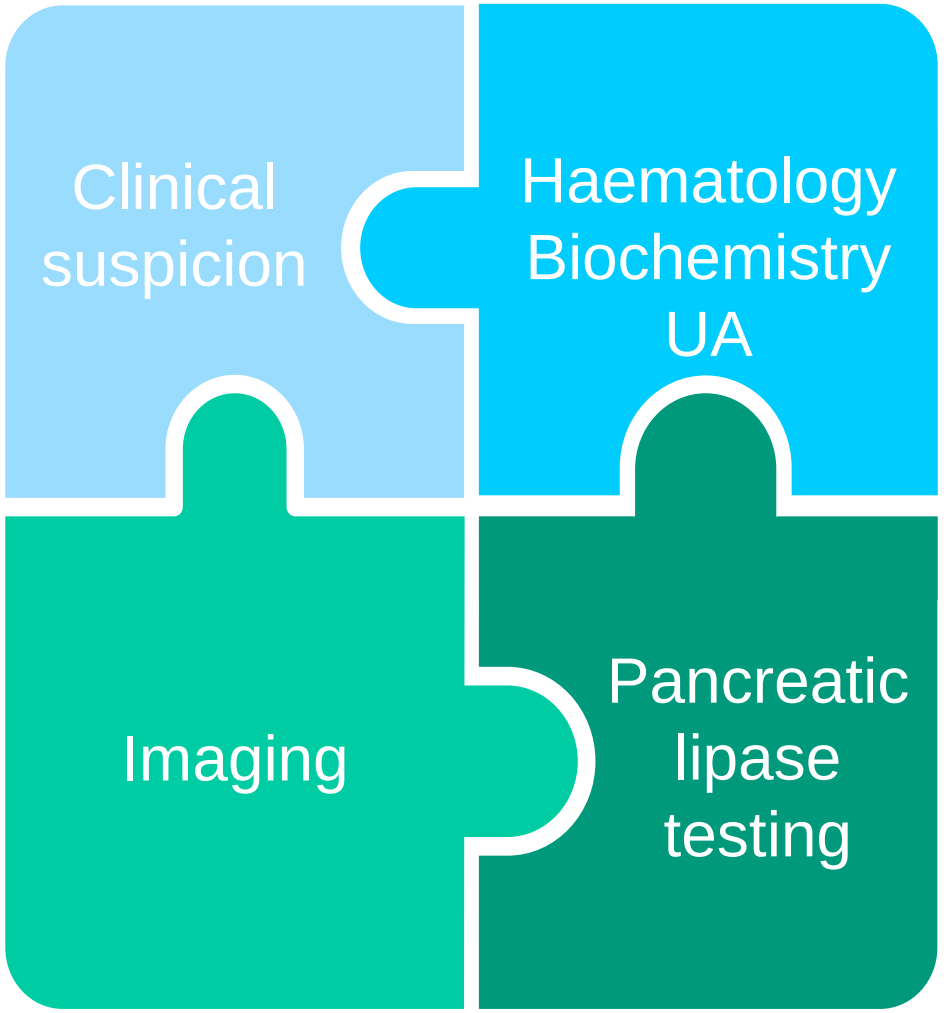
Basic pathophysiology



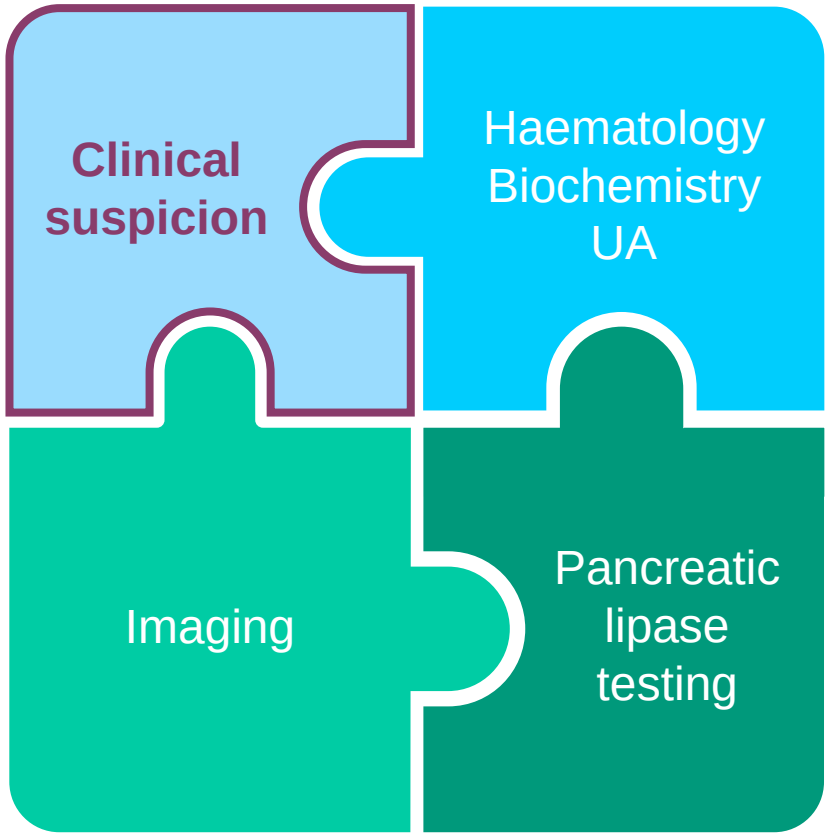
Diagnosis

Diagnosis

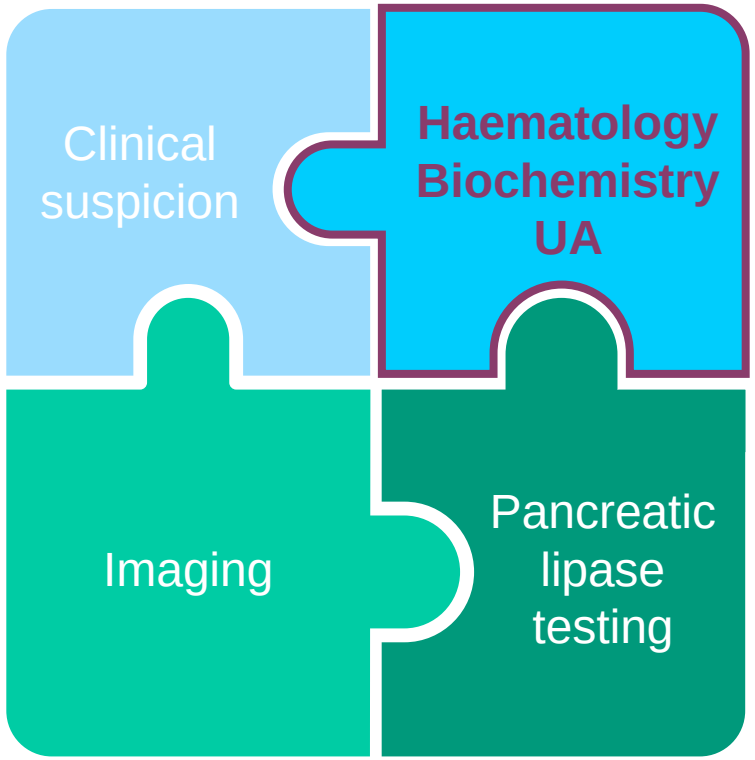
Based on a **combination** of clinical suspicion and diagnostic test results



Clinical suspicion



Minimum database



Hematology

6/22/24 **3:57 PM**

TEST	RESULT	REFERENCE VALUE
RBC	9.14	
Hematocrit	0.424	
Hemoglobin	128	
MCV	46.4	
MCH	14.0	
MCHC	302	
RDW	24.2	
% Reticulocytes	0.1	
Reticulocytes	10.1	
Reticulocyte Hemoglobin	16.3	
WBC	**27.60**	
% Neutrophils	*87.2	
% Lymphocytes	*10.7	
% Monocytes	*2.1	
% Eosinophils	0.0	
% Basophils	0.0	
Neutrophils	***24.03**	
Bands	*Suspected	
Lymphocytes	*2.96	
Monocytes	*0.59	
Eosinophils	**0.01**	
Basophils	0.01	
Platelets	324	
MPV	15.0	
Plateletcrit	0.49	

Chemistry

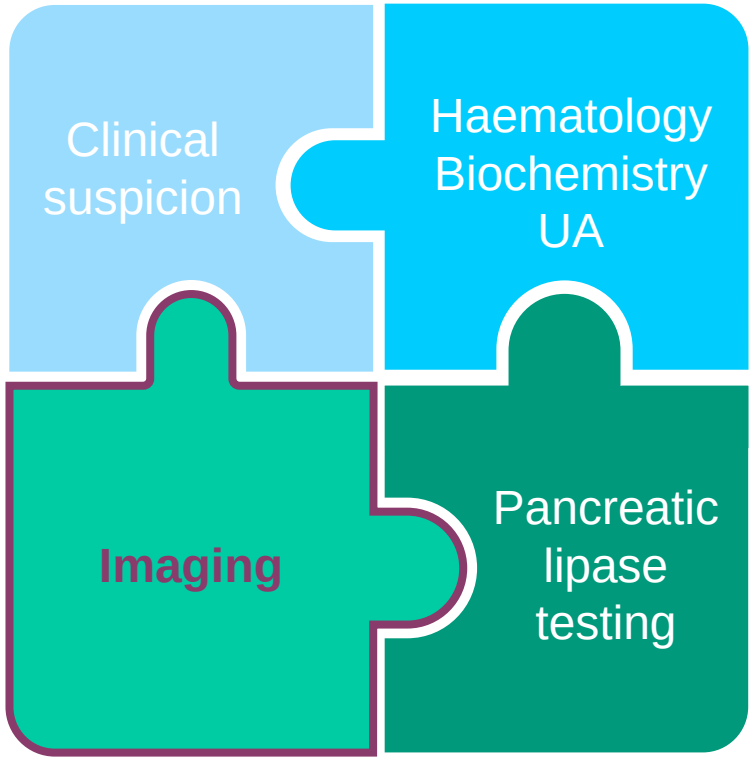
6/22/24 4:10 PM 4:06 PM

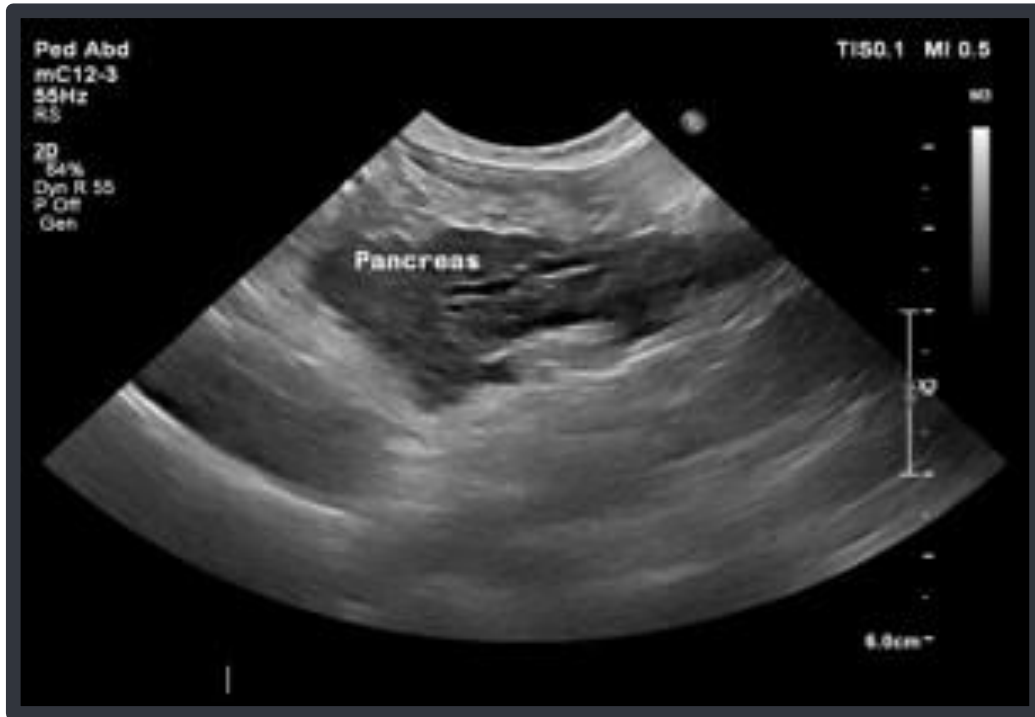
TEST	RESULT	REFERENCE VALUE
Glucose	**9.38**	**3.94 - 8.83 mmol/L** H
Creatinine	167.96	70.72 - 212.16 µmol/L
BUN	**14.64**	**5.71 - 12.85 mmol/L** H
BUN: Creatinine Ratio	22	
Phosphorus	1.49	1 - 2.42 mmol/L
Calcium	2.69	1.95 - 2.82 mmol/L
Sodium	**168.0**	**150.0 - 165.0 mmol/L** H
Potassium	4.5	3.5 - 5.8 mmol/L
Chloride	124.0	112.0 - 129.0 mmol/L
Anion Gap	28	mmol/L
Total Protein	76	57 - 89 g/L
Albumin	30	23 - 39 g/L
Globulin	46	28 - 51 g/L
Albumin: Globulin Ratio	0.7	
ALT	**181**	**12 - 130 U/L** H
ALP	16	14 - 111 U/L
GGT	0	0 - 4 U/L
Bilirubin - Total	1.71	0 - 15.39 µmol/L
Cholesterol	3.15	1.68 - 5.82 mmol/L
Amylase	1,305	500 - 1,500 U/L
Lipase	461	100 - 1,400 U/L

General lipase testing and cutoff thresholds

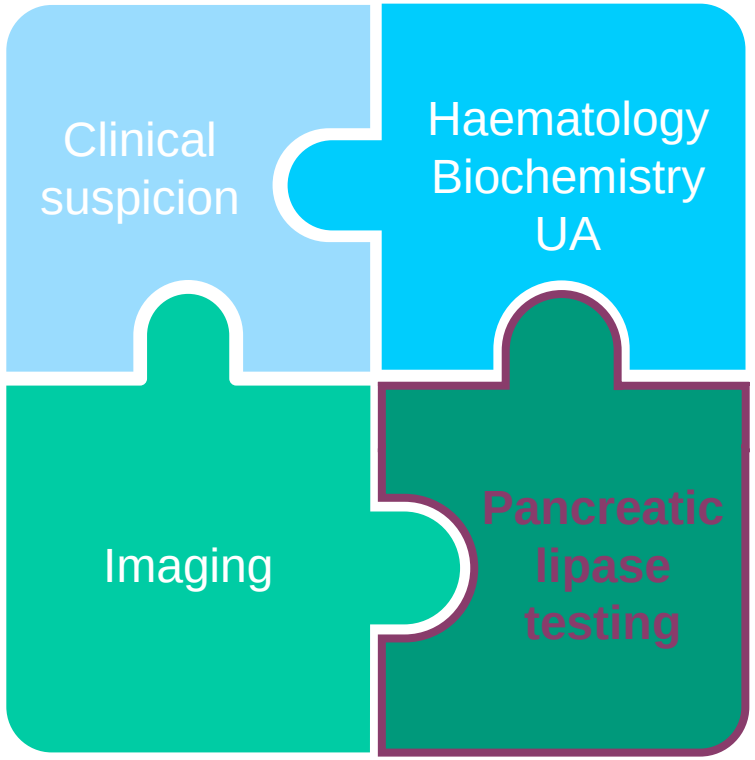
- Elevated general lipase levels
  - Raise suspicion of pancreatitis
- Catalyst® General Lipase test (part of a chem 17 clip).
  - Accessible and easy to use
- Limitations:
  - May reflect lipase from non-pancreatic sources

Imaging

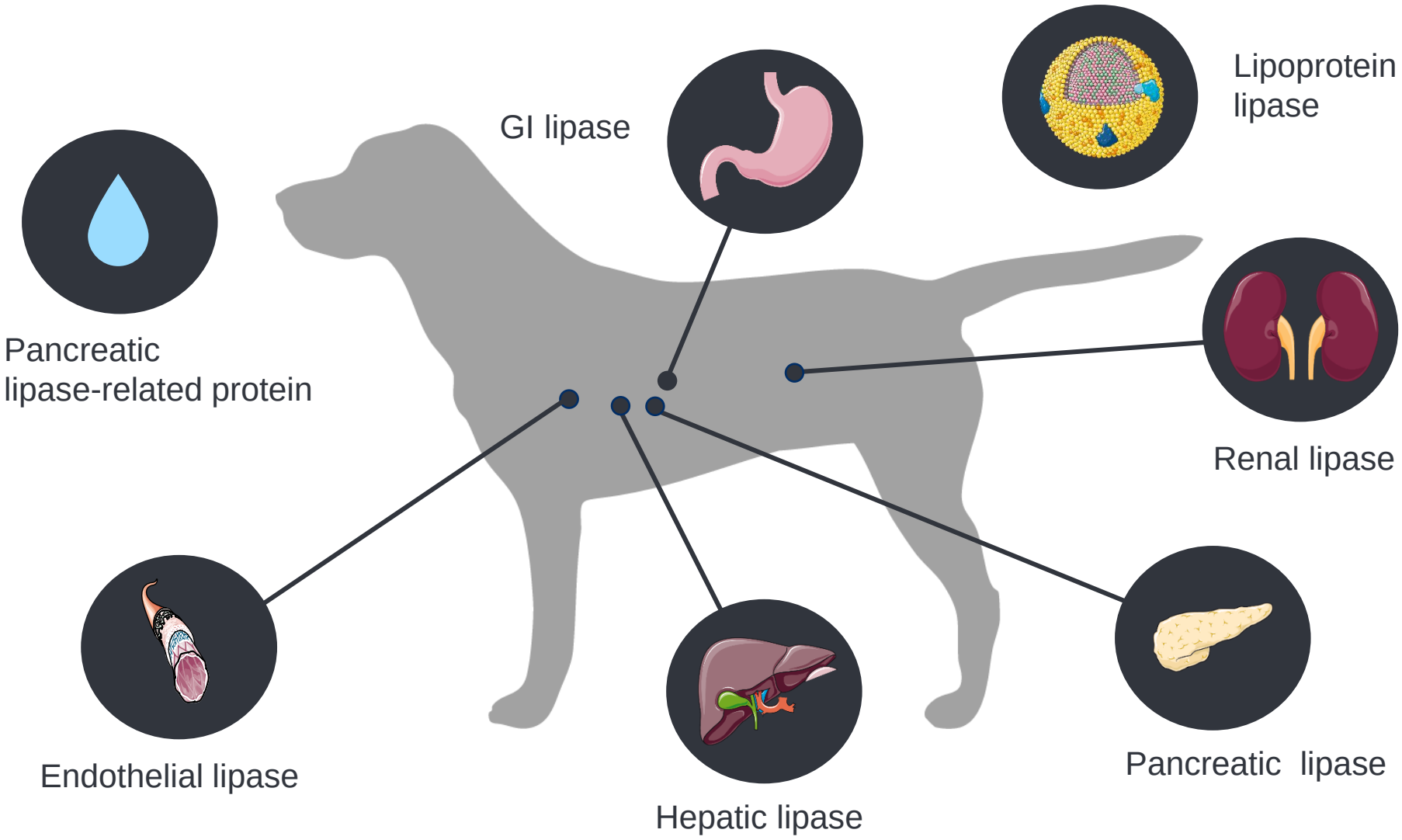




Pancreatic lipase testing



Lipase: Where does it come from?



Images courtesy of https://smart.servier.com/

Antibody based assays and their diagnostic advantages

Antibody-based assays
- Species-specific assays
- Purpose: **Minimize false positives** from non-pancreatic lipase sources

Spec cPL/fPL®
- **High specificity/sensitivity for acute/severe pancreatitis**
- Less robust performance in chronic cases

SNAP® PL Test
- Qualitative screening tool
- Higher sensitivity than specificity
  - **Effective for ruling out pancreatitis**
- Abnormal results should be confirmed with Spec cPL® or Catalyst® PL

DGGR-based assays and their clinical relevance

Lock and Key Principle

- Substrates designed to specifically fit pancreatic lipase, enhancing test specificity.

Clinical Test Correlation

- Catalyst® Pancreatic Lipase test correlates strongly with Spec cPL

Specificity

- Catalyst® Pancreatic Lipase in German Shepherd Dogs with Exocrine Pancreatic Insufficiency.

Management

Milo English Springer Spaniel
MN, 9 years and 11 months

Query pancreatitis 5 months prior

First presentation – 5 months prior

Test	RI	5 months ago
Glucose [mmol/L]	3.9 - 8.0	5.8
Creatinine [umol/L]	44 - 159	65
Urea [mmol/L]	2.5 - 9.6	3.4
Phosphate [mmol/L]	0.8 - 2.2	1.3
Calcium [mmol/L]	2.0 - 3.0	2.5
Albumin [g/L]	22 - 39	34
ALT [U/L]	10 - 125	60
ALP [U/L]	23 - 212	**508**
TBIL [umol/L]	0 - 15	6
CHOL [mmol/L]	2.8 - 8.3	6.8
Lipase [U/L]	200 - 1800	917
Pancr. lipase [U/L]	0 - 200	**232**

+ Plan
  + Supportive treatment for GE
  + Small frequent feeds
  + No improvement → re-examine

+ Treatment
  + Maropitant
  + Low fat diet for 2 weeks
  + Re-introduce normal diet, if clinically well

Second presentation

General history

- BIOP since puppy
- No travel
- Not UTD vaccination, flea, or worming (5 years?)
- No current medication
- Diet: Bakers Kibble BID
- Generally fit and healthy

Specific history

- Day 0: Owners away and kids caring for Milo
- Had a party... Milo ate 2 large chocolate muffins + multiple chocolate chip cookies
- Day 1: NQR +eating grass
- Day 2: Vomit 4X (grass and bile). Anorexic and very lethargic. No faeces passed

Second presentation

Day 3 – Visit to the vet

- PE: Mild dehydration, otherwise unremarkable. Gained 800g
- Treatment at home:
  - Maropitant
  - Probiotics
  - Small and frequent meals

Day 4

- Anorexia, on-going vomiting, very lethargic
- PE:
  - T = 39.4, MM = tacky, skin tent, CRT<2s, HR = 130bpm, RR = 60bpm
  - Painful on cranial abdominal palpation

Day 4

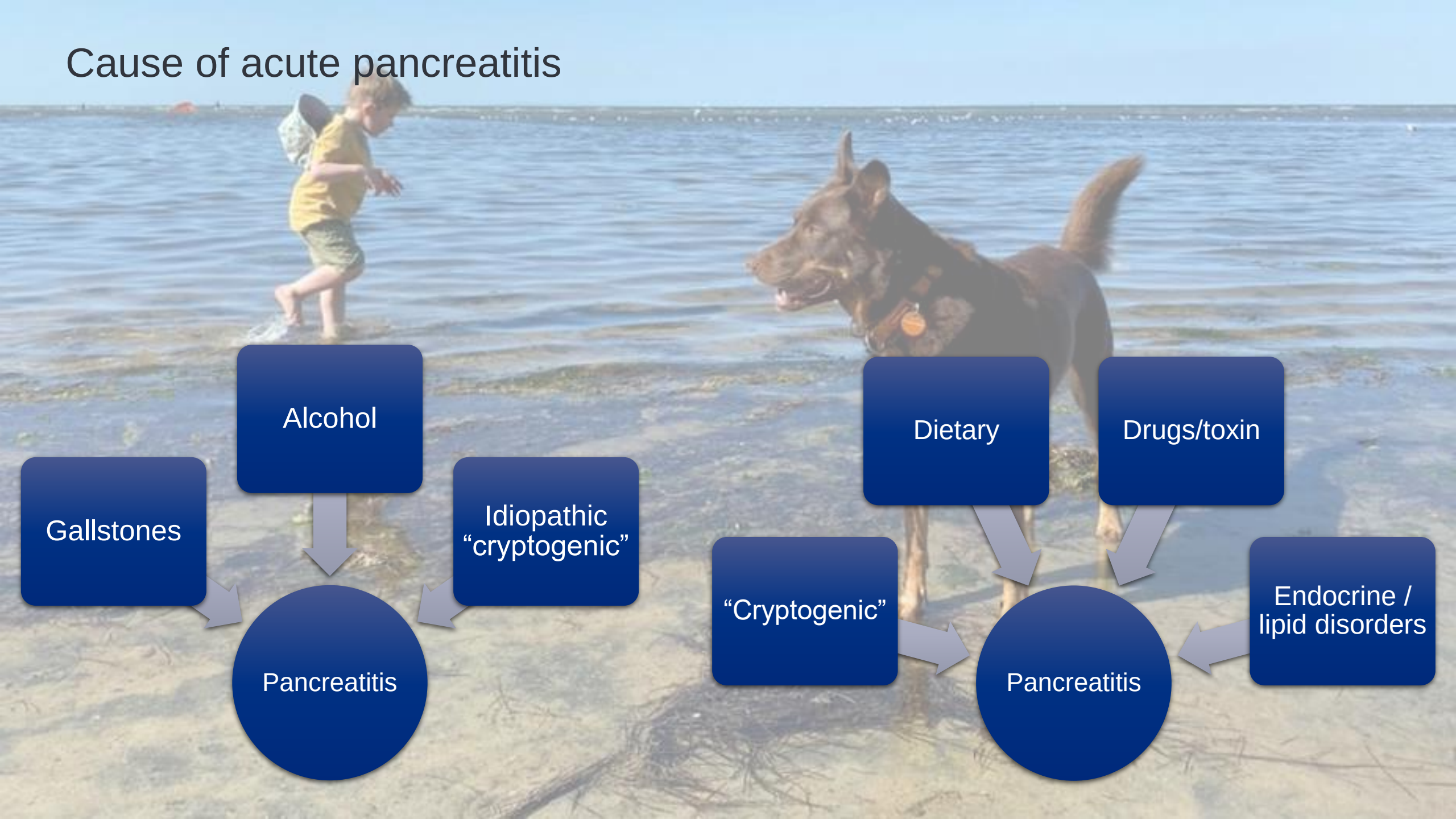
Test	RI	5 months ago	Day 4
Glucose [mmol/L]	3.9 - 8.0	5.8	6.8
Creatinine [umol/L]	44 - 159	65	**646**
Urea [mmol/L]	2.5 - 9.6	3.4	**17.4**
Phosphate [mmol/L]	0.8 - 2.2	1.3	**4.8**
Calcium [mmol/L]	2.0 - 3.0	2.5	2.7
Albumin [g/L]	22 - 39	34	35
ALT [U/L]	10 - 125	60	112
ALP [U/L]	23 - 212	**508**	**940**
TBIL [umol/L]	0 - 15	6	**22**
CHOL [mmol/L]	2.8 - 8.3	6.8	**9.85**
Lipase [U/L]	200 - 1800	917	**5811**
Pancr. lipase [U/L]	0 - 200	**232**	**1378**

Second presentation – Day 4

RBC	8.97 x10^12/L	5.65 - 8.87	HIGH
HCT	55.6 %	37.3 - 61.7	
HGB	21.5 g/dL	13.1 - 20.5	HIGH
MCV	62.0 fL	61.6 - 73.5	
MCH	24.0 pg	21.2 - 25.9	
MCHC	38.7 g/dL	32.0 - 37.9	HIGH
RDW	20.3 %	13.6 - 21.7	
%RETIC	0.5 %		
RETIC	46.6 K/µL	10.0 - 110.0	
RETIC-HGB	17.7 pg	22.3 - 29.6	LOW
WBC	14.59 x10^9/L	5.05 - 16.76	
%NEU	* 19.2 %		
%LYM	* 41.0 %		
%MONO	* 38.3 %		
%EOS	1.5 %		
%BASO	0.0 %		
NEU	* 2.80 x10^9/L	2.95 - 11.64	LOW
BAND	* Suspected		
LYM	* 5.98 x10^9/L	1.05 - 5.10	HIGH
MONO	* 5.59 x10^9/L	0.16 - 1.12	HIGH
EOS	0.22 x10^9/L	0.06 - 1.23	
BASO	0.00 x10^9/L	0.00 - 0.10	
PLT	332 K/µL	148 - 484	

+ Treatment
  + IVFT – 3x maintenance
  + Methadone
  + Potentiated amoxicillin
+ Four hours later:
  + Slightly brighter, polydipsic
  + Creatinine static
+ Opted for referral

Cause of acute pancreatitis



Referral – Day 4

Physical examination

+ PE: QAR , 19.7kg, BCS 6/9. Skin tent
+ Hypersalivating
+ Pulses synchronous and normo-dynamic. NIBP 149/74-91.
+ Sp02 100% (room air)
+ Gut sounds present, but reduced

Additional work up

- PCV/TS: 54/90. Lac 3.8
- Urinalysis (catheter):
  - USG 1.025.
  - Dipstick pH 6, 3+ blood, bilirubin, and protein.
  - Sediment: +++ cocci, occasional rod
    - WBC, RBC. Moderate number of granular casts.

Problem list and considerations

Abdominal pain, cholestatic pattern, and increased cPL

Pancreatitis ?

- Likely, consider imaging
- Concurrent cholangio-hepatitis?
- Other GI vs extra GI

Azotaemia, USG 1.025, granular casts (fluids), PCV/TP ↗ ↗

AKI ?

- Pre-renal component? Yes!
- AKI: likely (casts), Leptospirosis?
- Multi-organ dysfunction syndrome?

Anorexia, hyper-salivation, vomiting

Nutrition

Hypo- to anorexia for 4 days.

Will require control of the clinical signs and support.

Possible ileus?

T: 39.4C

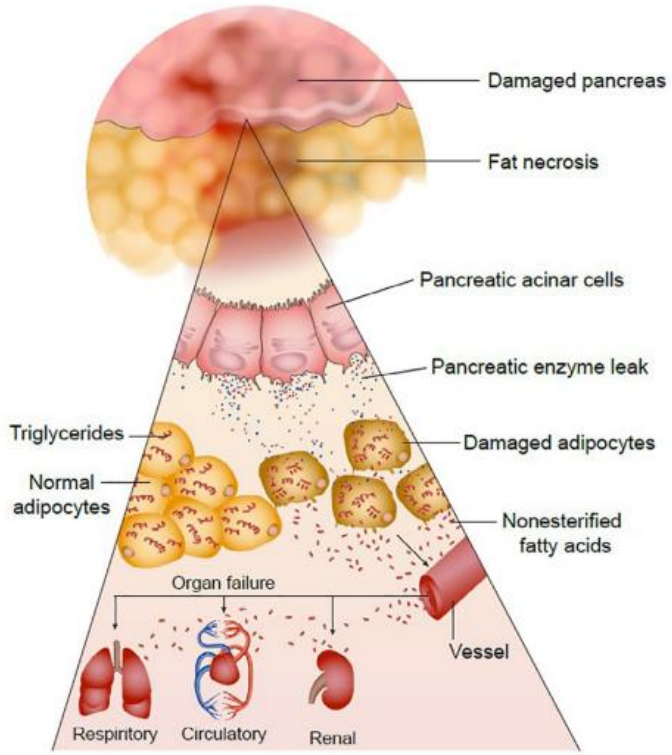
Pyrexia

Likely infectious or inflammatory

Ultrasound findings

Consistent with an acute pancreatitis.
Kidneys: Normal.

Acute pancreatitis – Spectrum of the clinical signs



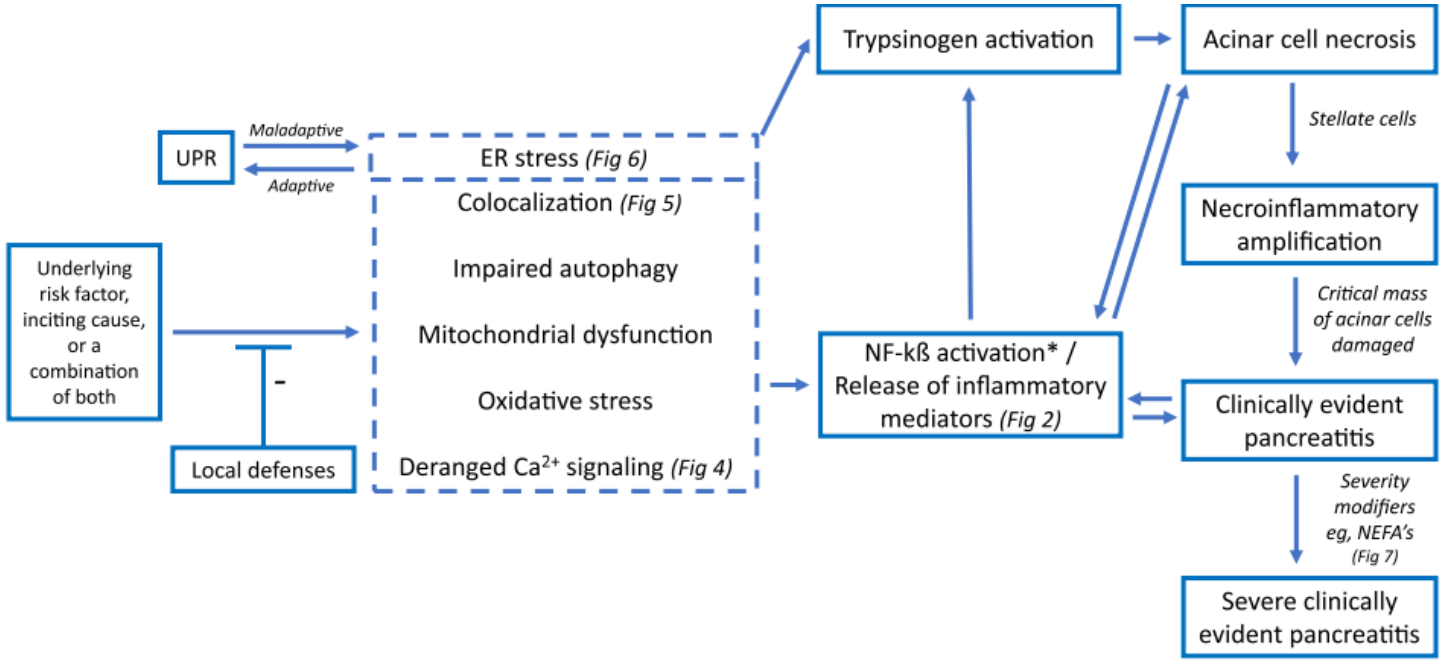


FIGURE 8 Proposed pathogenesis of pancreatitis. This figure outlines the key pathophysiologic mechanisms proposed in the development of clinically evident acute pancreatitis. UPR, unfolded protein response; *, context specific proinflammatory role
Source: This figure was adapted with permission from Barreto et al. *Gut*. 2021:70:194-203

- Peri-pancreatic fat digestion
- Production of non-esterified FA
- Systemic inflammation → Organ failure
- Importance of visceral adipose tissue?

Cridge, 2022 – DOI: 10.1111/jvim.16437

Treatment of acute-onset pancreatitis

Intravenous fluid

Analgesia

Anti-emetic

Nutrition

Treatment – IVFT

Re-hydration plan

- Weight 20kg
- Dehydration ~ 7%

- **Re-hydration**:
  - 7% * 20,000ml 1400ml

- **Maintenance** (dog):
  - 60ml/kg/day or 1200ml
  - 132 x BW(kg)$^{0.75}$ 1248ml

- **On-going loss** → Monitor and adjust
  - Vomiting, diarrhoea, PU/PD

Monitoring → Avoid overload

- IVFT plan: 2600ml/day or **108ml/h**
- Weight q4-8h
  - **Target weight**: 20kg +1.4kg = 21.4kg
- Respiratory rate q2h
- Skin tent, CRT

- Target weight achieve: Reassess!

- Potassium supplementation (20mEq/ml)

Treatment – Analgesia

Abdominal discomfort is likely

- Classical signs
  - Prayer posture.
  - Pain on abdominal palpation.
- Others
  - Restlessness, lethargy, trembling, vocalization.
- Physical examination
  - Tachycardia, tachypnoea, increased blood pressure.
- Pain scoring system (monitoring)

Parenteral analgesia

- Treatment IV
  - Methadone or fentanyl > buprenorphine.
    - Negative effect on GI motility.
    - Prolonged hospitalization in humans.
  - Ketamine and lidocaine CRI.
- Epidural analgesia?
- Monitoring q2-4h

Treatment – Analgesia

Oral analgesia

+ None of the PO options are very potent
+ Gabapentin – query how effective for strong pain… .
+ Codeine
+ Tramadol

NSAID

+ Avoid NSAID
  + Hypovolaemia
  + Dehydration

Treatment – Nutrition

- “Resting the gut” **NO !!!**

J Vet Intern Med 2011;25:419–425

A Pilot Study to Assess Tolerability of Early Enteral Nutrition via Esophagostomy Tube Feeding in Dogs with Severe Acute Pancreatitis

C.S. Mansfield, F.E. James, J.M. Steiner, J.S. Suchodolski, I.D. Robertson, and G. Hosgood

- Fasting → enterocyte damage, bacterial translocation
- Nutrition required to preserve epithelium integrity
- Early enteral nutrition: safe and tolerated:
  - Analgesia
  - Warming food / canned food
  - Anti-emetics (maropitant, ondansentron)
  - Appetite stimulant: capromorelin, mirtzapine

Treatment – When to implement nutrition

JAVMA AVMA

Nutritional management of pancreatitis and concurrent disease in dogs and cats

Harry Cridge, MVB, MS, DACVIM, DECVIM[1]*; Valerie J. Parker, DVM, DACVIM[2]; Aarti Kathrani, BVetMed, PhD, DACVIM[3]

[1]Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, East Lansing, MI
[2]Department of Veterinary Clinical Sciences, College of Veterinary Medicine, The Ohio State University, Columbus, OH
[3]Department of Clinical Science and Services, Royal Veterinary College, Hatfield, UK

http://doi.org/10.2460/javma.23.11.0641

Supplementary Material S1—Definitions for low, moderate, and high nutrient concentrations in canine and feline diets.

Nutrient Modification	Species	Ultra-Low	Low	Moderate	High
Fat	Canine	<1.7 g/100 kcal (<15% on a ME basis)	1.7-2.9 g/100 kcal (15-25% on a ME basis)	3-5 g /100 kcal (26-43% on a ME basis)	> 5 g /100 kcal (>43% on a ME basis)
	Feline	N/A	< 4 g/100 kcal (<34% on a ME basis)	4-6 g/100 kcal (34-51% on a ME basis)	> 6 g/100 kcal (>51% on a ME basis)
Protein	Canine	N/A	< 5 g/100 kcal (<18% on a ME basis)	5-8 g/100 kcal (18-28% on a ME basis)	> 8 g/100 kcal (>28% on a ME basis)
	Feline	N/A	< 7 g/100 kcal (<25% on a ME basis)	7-10 g/100 kcal (25-35% on a ME basis)	> 10 g/100 kcal (>35% on a ME basis)
Crude Fiber	Canine	N/A	< 1 g/100 kcal	1-2 g/100 kcal	> 2 g/100 kcal
	Feline	N/A	< 0.5 g/100 kcal	0.5-1 g/100 kcal	> 1 g/100 kcal
Total Dietary Fiber (TDF)	Canine	N/A	< 2 g/100 kcal	2-4 g/100 kcal	> 4 g/100 kcal
	Feline	N/A	< 1 g/100 kcal	1-2.5 g/100 kcal	> 2.5 g/100 kcal

Treatment – Nutrition during hospitalization

Increase likelihood of food uptake

- Energy requirement:
  - Body condition score ?
    - 10 kg dog, BCS 3/9 → ideal weight 10 + 1 = 11kg
  - RER (kcal/day) = 30 x BW (kg) + 70 or 70 × $BW^{0.75}$

- Start with 25% RER and increase over 3-4 days:
  - Maximum of 5 – 10ml/kg BW per feed
  - Painful
    - Analgesia
    - Reduce amount and adjust frequency
    - Reduce fat content
    - (Parenteral nutrition)

Treatment – Nutrition with no comorbid disease and at home

+ Limited evidence…

+ Low-fat or low- to moderate-fat hydrolysed

+ Hydrolysed protein

+ Energy requirement:
  + BCS (ideal)
  + RER (at least part of it)

- Avoid excessive protein, carbohydrate ok

Treatment – Nutrition with hypertriglyceridaemia

+ Confirm hypertriglyceridaemia
  + 16 hours fasting
  + Clinical AP → after resolution
  + TG >6.5mmol/L --> Intervene

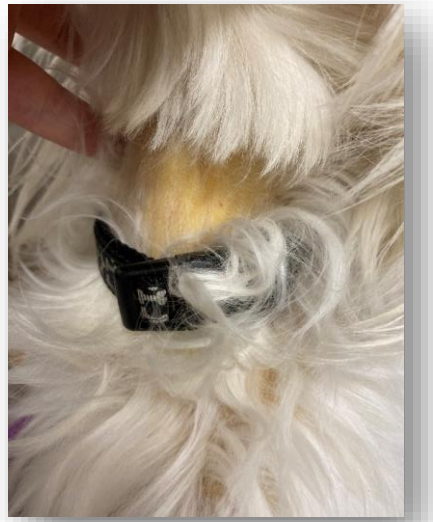
+ Rule out endocrine disease (hypothyroidism, hyperadrenocorticism, DM)

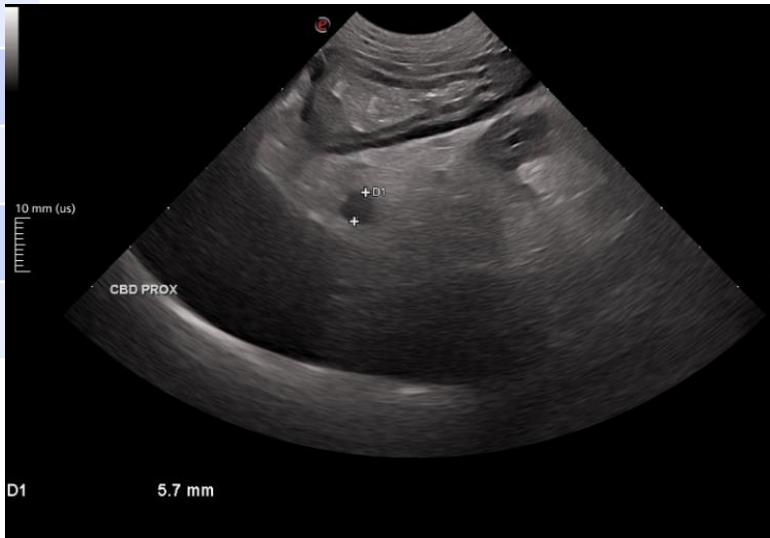
+ Treatment
  1. Low-fat diet
  2. ± omega-3 fatty acids [mg of EPA + DHA] $120 \times BW_{(kg)}^{0.75}$
  3. ± fenofibrate:
     - 6.5 – 10 mg/kg PO once daily with the first meal of the day
     - AE: GI signs. Monitor liver enzymes

Moderate to severe hypertriglicyeridaemia is unlikely to be due to acute pancreatitis alone

Day 14 – Milo is rechecked, clinically stable, but…

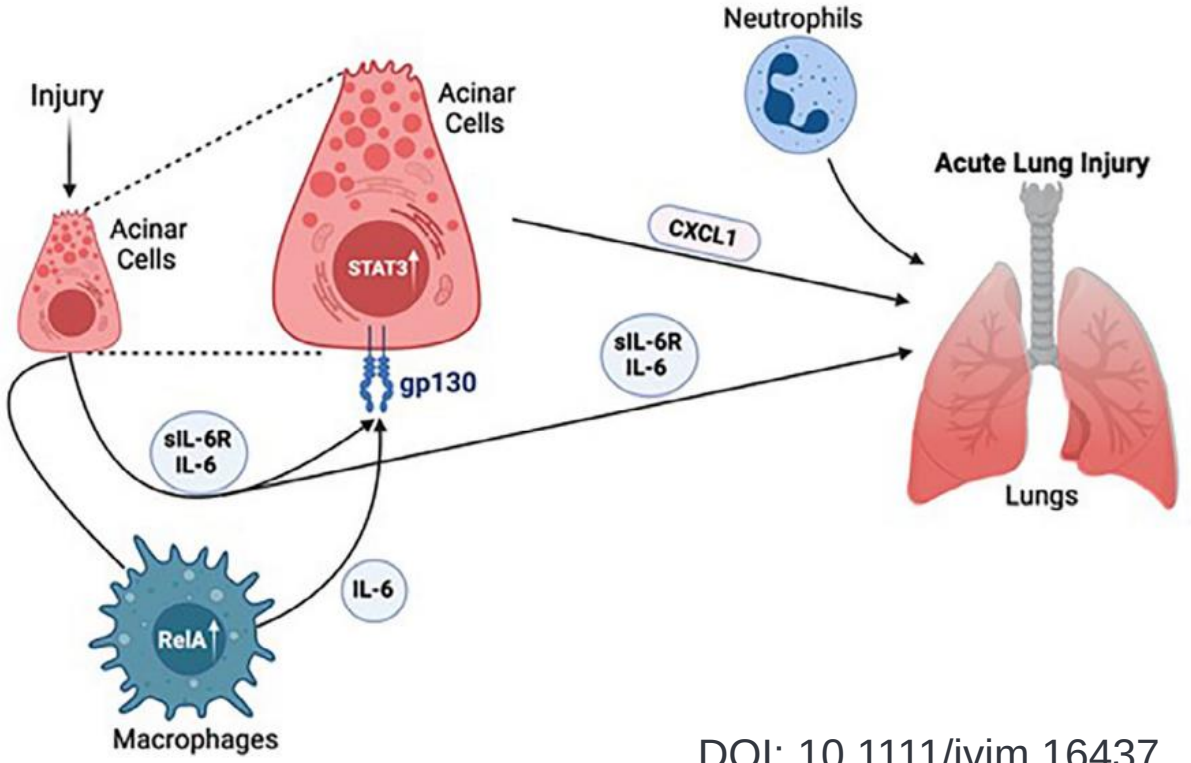
Test	RI	5 months ago	Day 4	Day 14
Glucose [mmol/L]	3.9 - 8.0	5.8	6.8	8.0
Creatinine [umol/L]	44 - 159	65	**646**	63
Urea [mmol/L]	2.5 - 9.6	3.4	**17.4**	3.5
Phosphate [mmol/L]	0.8 - 2.2	1.3	**4.8**	N/A
Calcium [mmol/L]	2.0 - 3.0	2.5	2.7	N/A
Albumin [g/L]	22 - 39	34	35	N/A
ALT [U/L]	10 - 125	60	112	**731**
ALP [U/L]	23 - 212	**508**	**940**	**>2,000**
TBIL [umol/L]	0 - 15	6	**22**	**175**
CHOL [mmol/L]	2.8 - 8.3	6.8	**9.85**	**11.1**
Lipase [U/L]	200 - 1800	917	**5811**	609
Pancr. lipase [U/L]	0 - 200	**232**	**1378**	N/A





Treatment of acute-onset pancreatitis – Anti-inflammatory treatment?

- Inflammation has a central role in the progression of pancreatitis
- AVOID NSAID: high risk in unstable dog and risk of gastric ulcerations…
- Prednisolone?
  - Only one retrospective study…
  - Anti-inflammatory (< 1mg/kg)
  - Adrenal insufficiency (?)
  - Risk of GI ulcerations



DOI: 10.1111/jvim.16437

Treatment of acute-onset pancreatitis – Anti-inflammatory treatment?

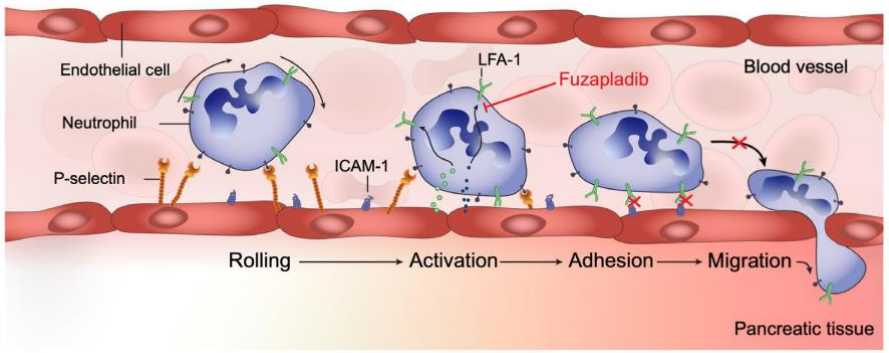
Received: 30 January 2023 | Accepted: 25 September 2023
DOI: 10.1111/jvim.16897

STANDARD ARTICLE

Journal of Veterinary Internal Medicine Open Access
ACVIM American College of Veterinary Internal Medicine

Fuzapladib in a randomized controlled multicenter masked study in dogs with presumptive acute onset pancreatitis

Joerg M. Steiner[1] | Chantal Lainesse[2] | Yuya Noshiro[3] | Yumiko Domen[4] | Heather Sedlacek[5] | Stephen E. Bienhoff[5] | Kelly P. Doucette[6] | David L. Bledsoe[6] | Hiroshi Shikama[7]



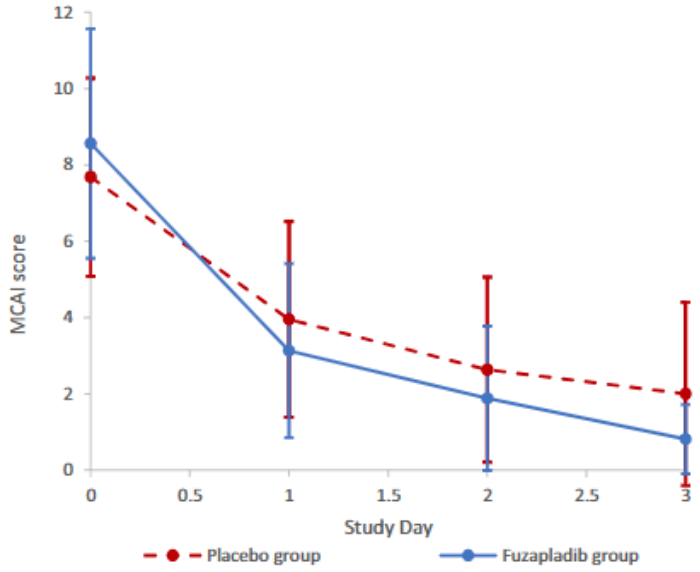


FIGURE 2 Mean total MCAI scores (±SD) over time from the PP population of 35 client-owned dogs with AP after a 3-day IV treatment with 0.4 mg/kg fuzapladib (n = 16) or a placebo (n = 19). Maximum total MCAI score possible was 19.

DOI: 10.1111/jvim.16437

DOI: 10.1111/jvim.16897

Treatment of acute-onset pancreatitis – Anti-inflammatory treatment?

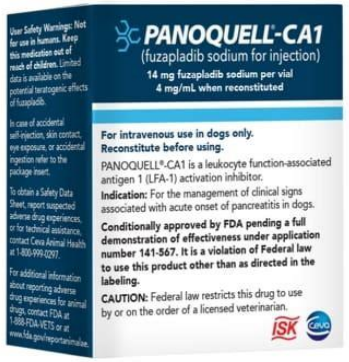
Received: 30 January 2023 | Accepted: 25 September 2023
DOI: 10.1111/jvim.16897

STANDARD ARTICLE

Journal of Veterinary Internal Medicine Open Access
ACVIM American College of Veterinary Internal Medicine

Fuzapladib in a randomized controlled multicenter masked study in dogs with presumptive acute onset pancreatitis

Joerg M. Steiner[1] | Chantal Lainesse[2] | Yuya Noshiro[3] | Yumiko Domen[4] | Heather Sedlacek[5] | Stephen E. Bienhoff[5] | Kelly P. Doucette[6] | David L. Bledsoe[6] | Hiroshi Shikama[7]

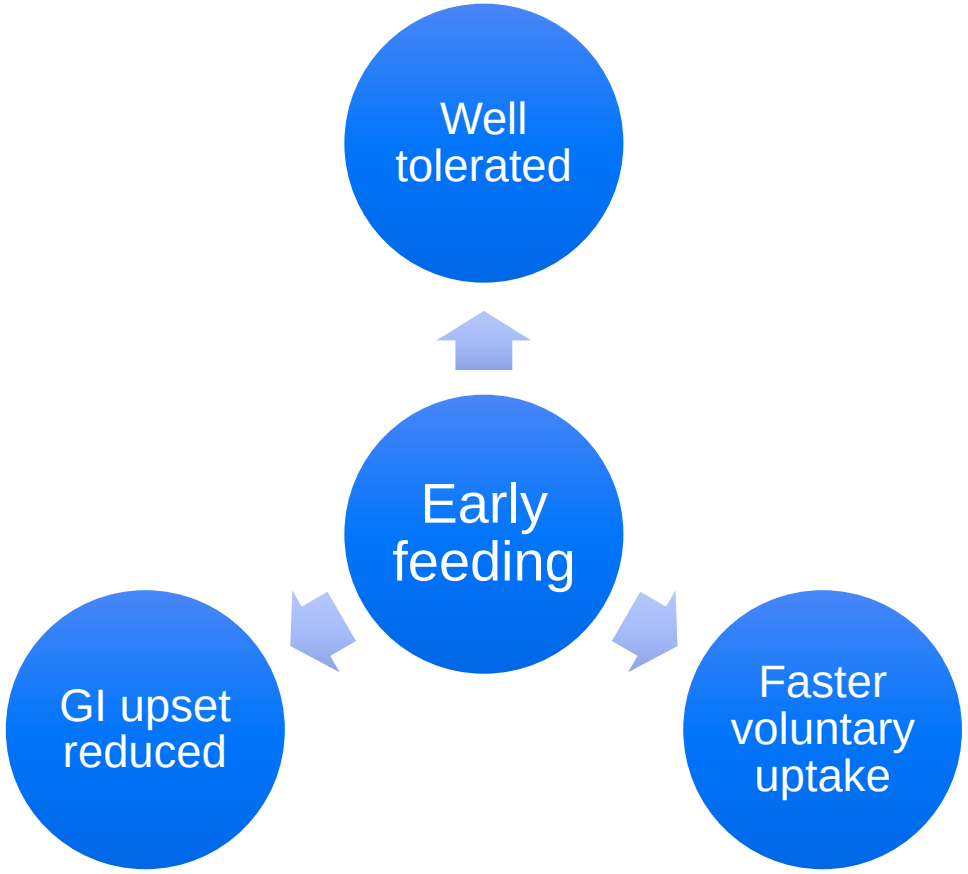


- One study (randomized, masked, and placebo)
- Some effect (cost-benefit?)
- Mostly mild to moderate disease
- Questions
  - Which patient?
  - Risk of infection?
  - Only approved in Japan and USA

DOI: 10.1111/jvim.16897

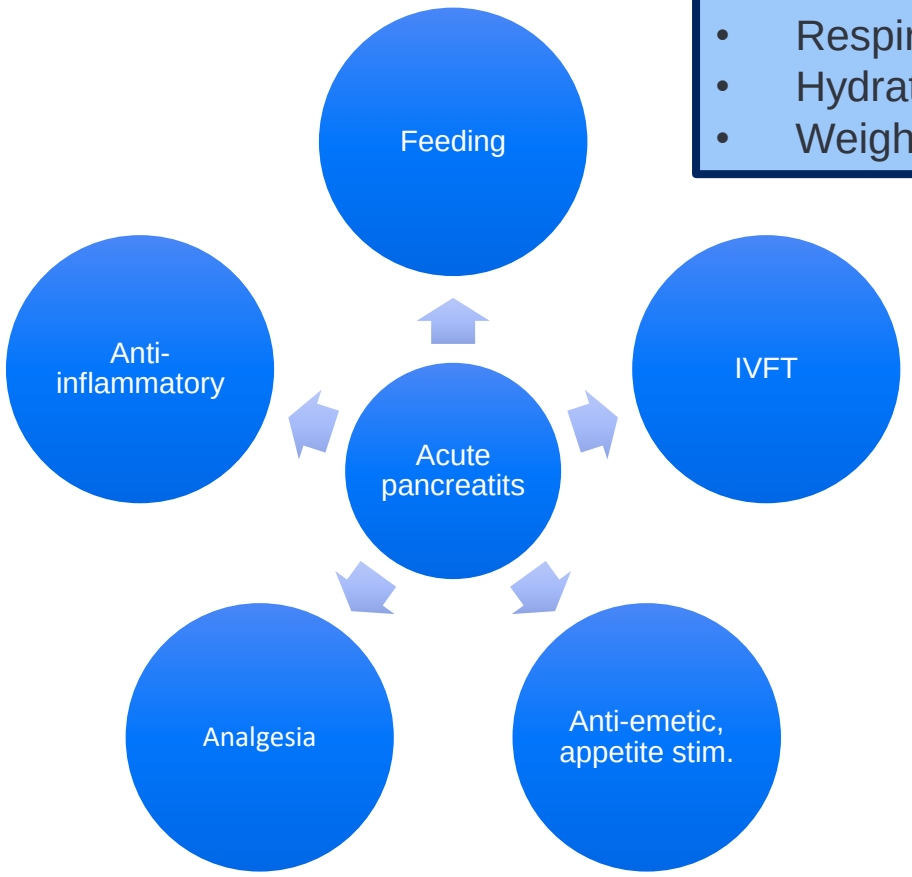
Conclusion

Central role of feeding



Multi-modal treatment

Monitoring
- Respiratory rate
- Hydration status
- Weight



Thank You!

THE UNIVERSITY of EDINBURGH
The Royal (Dick) School of Veterinary Studies

PURINA

IDEXX

First presentation: 5 months prior

- Hx: Vomiting, diarrhoea, and hyporexia waxing and weaning for 4 days
- PE: BAR, well hydrated. Abdominal palpation normal
- Weight loss: 1.5 kg (7.5%)
- Haematology: within normal
- And now?

Test	Reference interval	5 months ago
Glucose [mmol/L]	3.9 - 8.0	5.8
Creatinine [umol/L]	44 - 159	65
Urea [mmol/L]	2.5 - 9.6	3.4
Phosphate [mmol/L]	0.8 - 2.2	1.3
Calcium [mmol/L]	2.0 - 3.0	2.5
Albumin [g/L]	22 - 39	34
ALT [U/L]	10 - 125	60
ALP [U/L]	23 - 212	**508**
TBIL [umol/L]	0 - 15	6
CHOL [mmol/L]	2.8 - 8.3	6.8
Lipase [U/L]	200 - 1800	917
Pancr. lipase [U/L]	0 - 200	**232**

Treatment – Nutrition with no comorbid disease

- Energy: Ideally RER, but at least some energy… !

- Avoid high-fat: Limited evidence, but prudent:
  - Gastric emptying.
  - Consider meal size and frequency as well.
  - “50% reduction from normal diet fat content”.
  - Consider long-term low fat diet for recurrent acute and chronic pancreatitis.
- Protein: Avoid excess protein
- Carbohydrate: Not such an issues (DM!)

First presentation: 5 months prior

- Pancreatic lipase in the equivocal range (201-399 U/L)

- Interpretation:
  - Pancreatitis is possible

  - Consider additional diagnostics and/or treatment if clinical signs or other evidence of disease exist

  - Recheck Catalyst Pancreatic Lipase in 2-3 weeks

Treatment – Nutrition with hypertriglyceridaemia

- Free fatty acid → pancreatic acinar cells toxicity

- Schnauzer
  - Increase TG more likely with a history of AP
  - Association increased TG and cPL

- Moderate to severe hypertriglicyeridaemia
  - Unlikely to be AP alone
  - Look for underlying trigger