สมาคมสัตวแพทย์ผู้ประกอบการบำบัดโรคสัตว์แห่งประเทศไทย

โครงการ VPAT ACADEMY

VPAT ACADEMY WEBINAR

Catching Up with Clinical Trends

วีดีโอสำหรับทบทวนความรู้ด้านสัตว์เลี้ยง



VPAT PARTNERSHIP 2021





































































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ในคลิปบรรยายที่จัดทำขึ้นนี้ เป็นลิขสิทธิ์อย่างถูกต้อง
ของสมาคมสัตวแพทย์ผู้ประกอบการบำบัดโรคสัตว์แห่งประเทศไทย (VPAT)
ห้ามผู้ใดทำซ้ำ คัดลอก ดัดแปลง จัดเผยแพร่ จำหน่ายโดยไม่ได้รับอนุญาต"



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Canine Pancreatitis

Kittara chanmongkolpanit

Residency training program in small animal medicine, Mahidol university

Signalment

- **Species**: Canine
- **Breed:** Pomeranian
- **Sex:** Male (neutered)
- **Age:** 10 years
- **Body weight:** 3.6 kg
- **BCS:** 5/9



Chief complaint

Anorexia and vomiting

History

- MMVD stage C
- Medications : Pimobendan, Furosemide
- Anorexia for 6 days
- Vomit 2-3 times/day
- Fecal score 5/7
- Food : home-cooked diet (chicken breast with skin, rice, vegetables)

Physical examination

- General appearance: alert, responsive
- Mucous membrane: pink
- Hydration status: 5% dehydrated
- Heart rate: 120 bpm
- Heart sound: murmur grade 4/6 at left mitral area
- Respiratory rate: 30 bpm
- Lung sound: clear
- Body temperature: 101°F
- Abdominal palpation: pain at cranial abdomen

Problem lists

1. Vomiting
2. Cranial abdominal pain
3. Anorexia

Initial assessment

Problem list	System	Location	Lesion
Acute vomiting	Primary GI	Stomach	Gastritis ~~Gastric foreign bodies~~ Gastric ulceration Abnormal gastric motility ~~Toxin / Drug~~ ~~Dietary change~~
		Small intestine	Enteritis Intestinal obstruction Intussusception Neoplasia

Initial assessment

Problem list	System	Location	Lesion
Acute vomiting	Secondary GI	Liver	Hepatic disease
		Pancreas	Pancreatitis
		Kidney	Renal disease
		Neurological	~~Vestibular disease~~ ~~Brain trauma~~
		Endocrine	Hypoadrenocorticism

Initial assessment

Problem list	Location
Cranial abdominal pain	Stomach
	Duodenum
	Pancreas
	Liver
	Kidney
	Adrenal gland

Initial plan

- CBC
- Blood chemistry
- Spec cPL
- Ultrasonography

Complete blood count Day 0

Parameter	Value	Unit	Reference	Interpretation
WBC	12.4	$10^3/\mu L$	6.0 - 17.0	Unremarkable
Monocyte	0.37	$10^3/\mu L$	0.15 - 1.35	
Neutrophil	9.1	$10^3/\mu L$	3.0 - 11.5	
Lymphocyte	2.2	$10^3/\mu L$	1.0 - 4.8	
Eosinophil	0.62	$10^3/\mu L$	0.1 - 1.25	
Basophil	0.0	$10^3/\mu L$	0.0 - 0.1	
Band neutrophil	0.0	$10^3/\mu L$	0.0 - 0.3	

Complete blood count Day 0

Parameter	Value	Unit	Reference	Interpretation
RBC	6.64	$10^6/\mu L$	5.0 – 9.0	Unremarkable
HCT	44.6	%	35 – 55	
Hb	15.4	g/dL	10.0 – 18.0	
MCV	67.1	fL	60 – 77	
MCH	23.2	pg	20 – 25	
MCHC	34.5	g/dL	32.0 – 36.0	

Complete blood count Day 0

Parameter	Value	Unit	Reference	Interpretation
Platelet	104	$10^3/\mu L$	200 – 500	Thrombocytopenia
Platelet count	134	$10^3/\mu L$	200 – 500	
RDW	12.9	%	12 - 15	
Plasma protein	8.0	g/dL	6.0 – 7.5	
Platelet smear	Decreased			
Other	Giant platelet			

Blood chemistry Day 0

Parameter	Value	Unit	Reference	Interpretation
Albumin	2.7	g/dL	2.7 – 3.8	
ALT	58	U/L	10 – 100	
ALP	594	U/L	23 – 212	Elevated ALP
BUN	24	mg/dL	7 – 27	
Creatinine	0.87	mg/dL	0.50 – 1.80	

Test kit Day 0

Test kits	Result	Unit	Reference	Interpretation
cPL	1,980.8	ng/mL	0 - 199	Elevated

Revised assessment

Elevated cPL	→	Pancreatitis
Thrombocytopenia	→	1. Increase consumption 2. Increase destruction 3. Decrease production 4. Sequestration
Elevated ALP	→	1. Hepatobiliary disease 2. ~~Hyperadrenocorticism~~ 3. Neoplasia 4. ~~Bone~~

Further plan

- Ultrasonography
- C-reactive protein
- Snap 4DX

Test kit Day 0

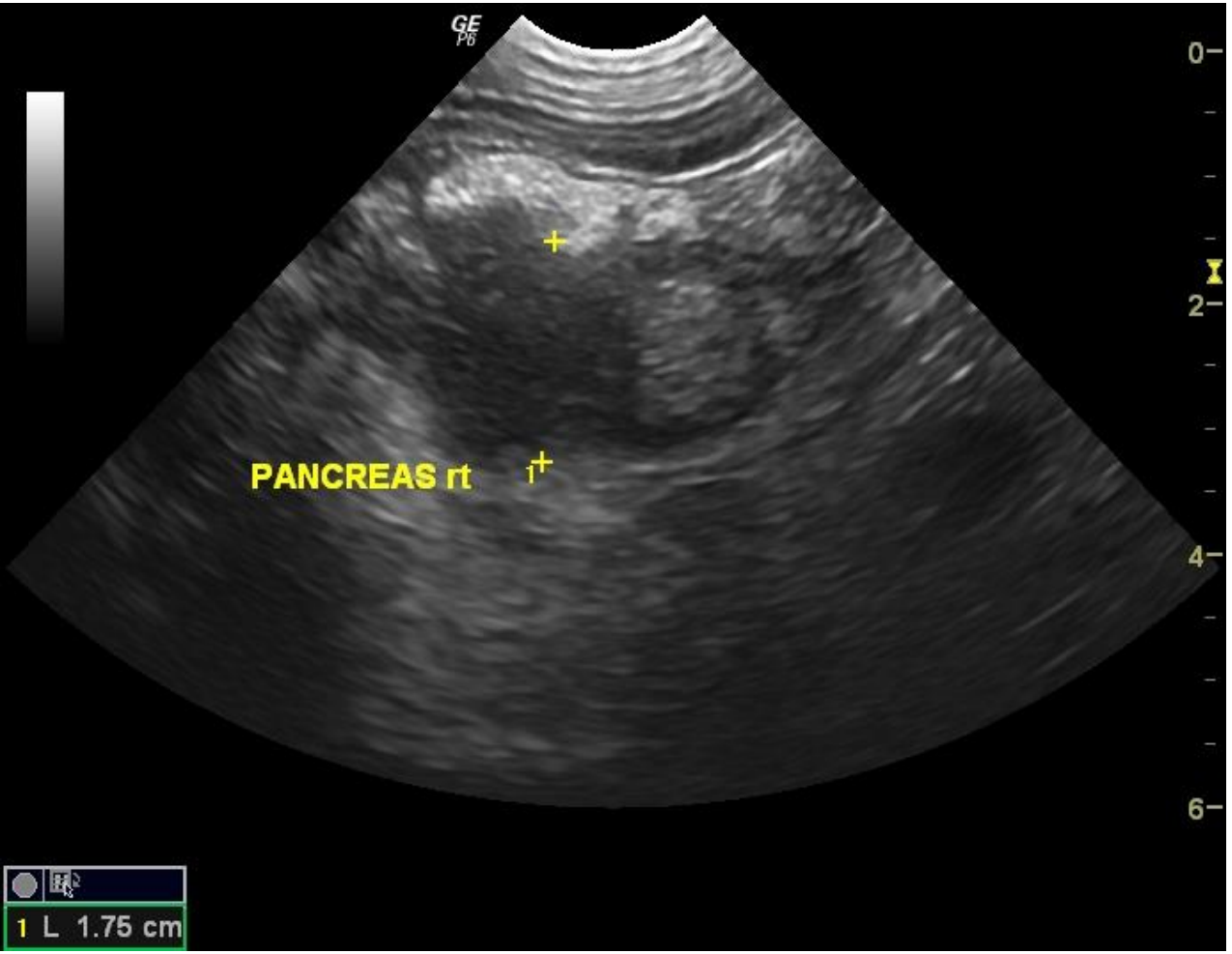
Test kits	Result	Reference	Interpretation
CRP	65	0 - 19	Elevated
Snap 4DX			
E.Canis / E.ewingii Ab	Negative	Negative	
A. phagocytophilum/ A. platys Ab	Negative	Negative	
Heartworm Ag	Negative	Negative	
Lyme disease	Negative	Negative	

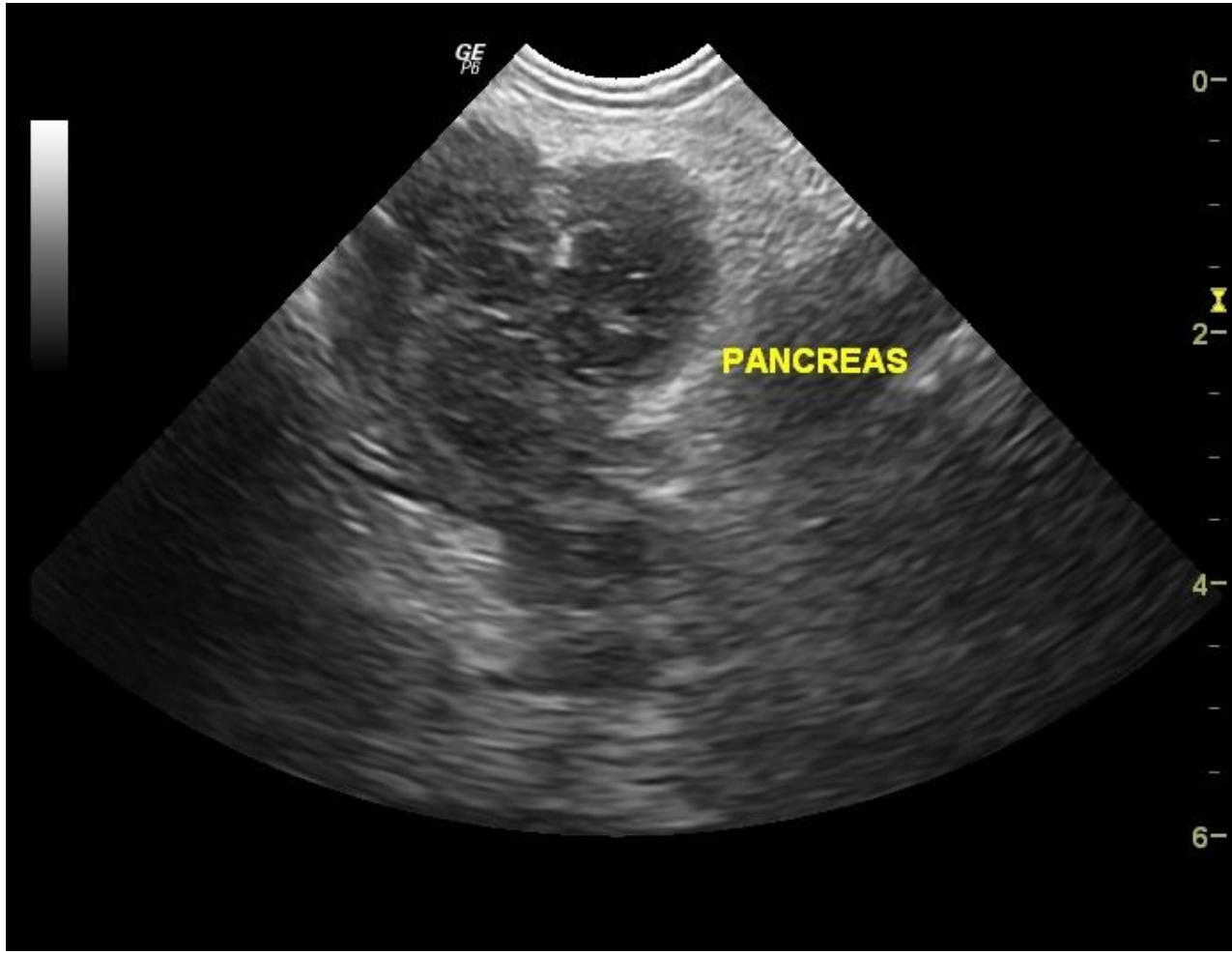
Ultrasonographic diagnosis Day 0

- Both kidneys
  - CKD with mineralization
- Liver
  - Fatty liver
  - Steroid hepatopathy
- Pancreas
  - Severe pancreatitis
  - DDx: granulomatous abscess / carcinoma

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Ultrasonographic diagnosis Day 0





Revised problem lists

1. Vomiting……6
2. Cranial abdominal pain……6,7
3. Anorexia……6,7
4. Thrombocytopenia……8?
5. Elevated ALP……8
6. Elevated cPL……8
7. Elevated CRP……8
8. Pancreatitis
9. CKD with mineralization
10. Fatty liver / Hepatopathy

} Need further investigations

Treatment

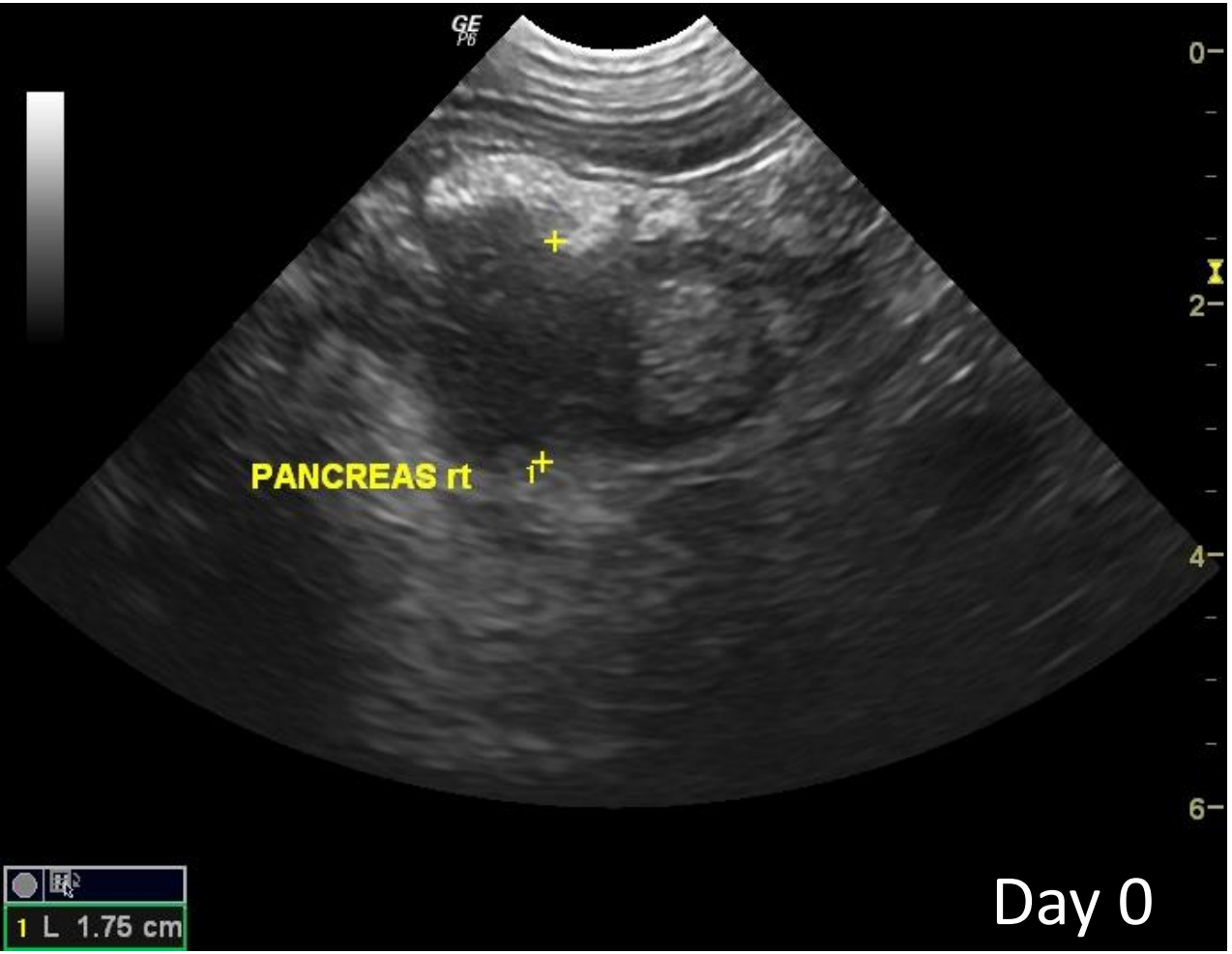
- **IV fluid:** Acetar rehydrated in 12 hours then maintenance rate
- **Antiemetic drug:** Ondansetron dose 0.2 mg/kg q12h IV
- **ABO:** Amoxicillin-clavulanic acid dose 20 mg/kg q8h IV
- **Pain management:** Morphine dose 0.3 mg/kg SC q8h, Fentanyl patch(25)
- **Diet:** Gastrointestinal low-fat diet

Follow-up

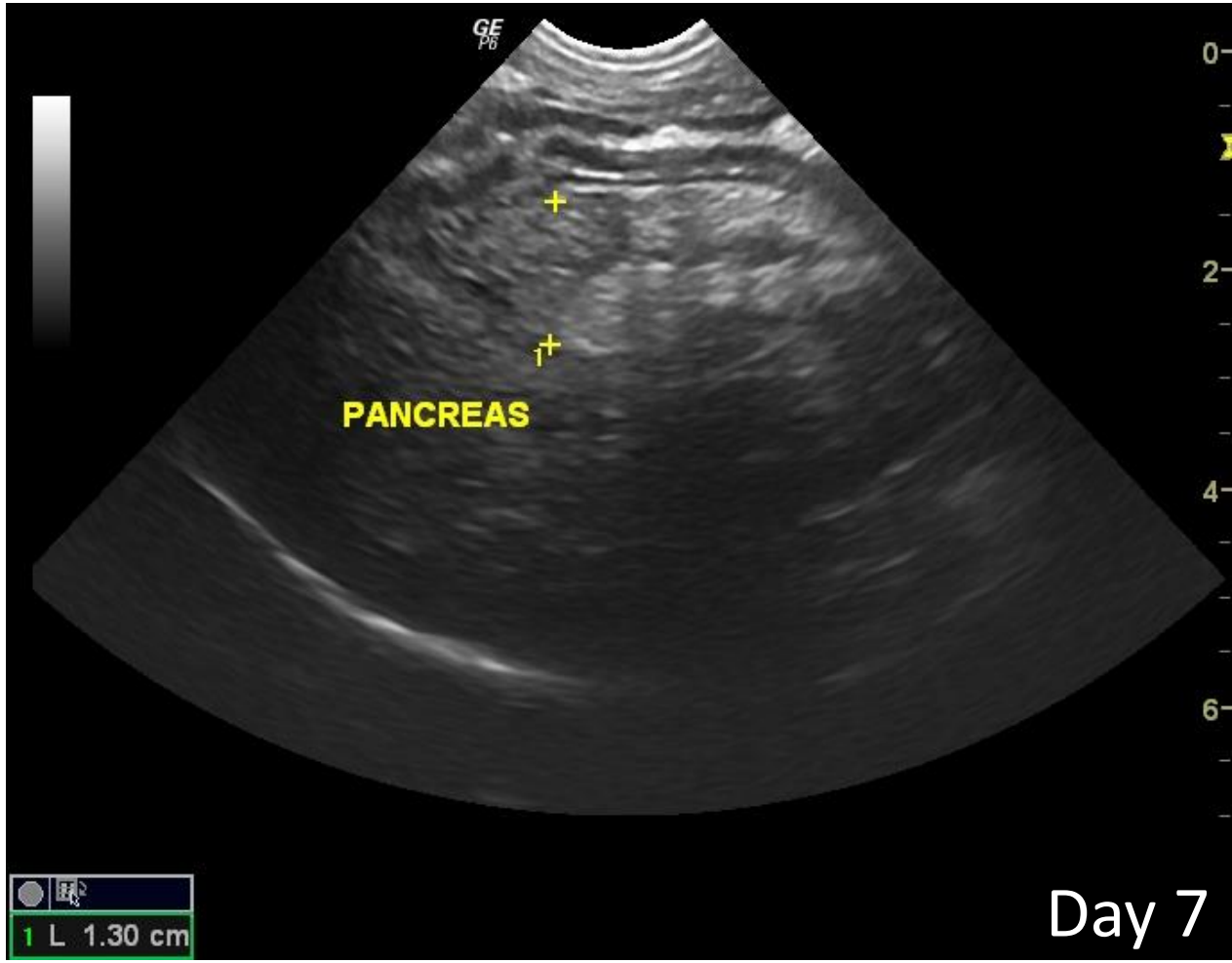
Parameter	Day 0	Day 7	Day 14	Day 30
WBC	12.4	18.11	12.85	10.57
HCT	44.6	47.0	43.1	50.0
PLT	104	217	179	298
ALT	58	50	103	56
ALP	594	516	515	321
BUN	24	23	16	20
Creatinine	0.87	1.04	1.00	1.03
Albumin	2.7	2.7	2.8	
cPL	1,980.8			522.7
CRP	65	43	18	

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Ultrasonography Day 7

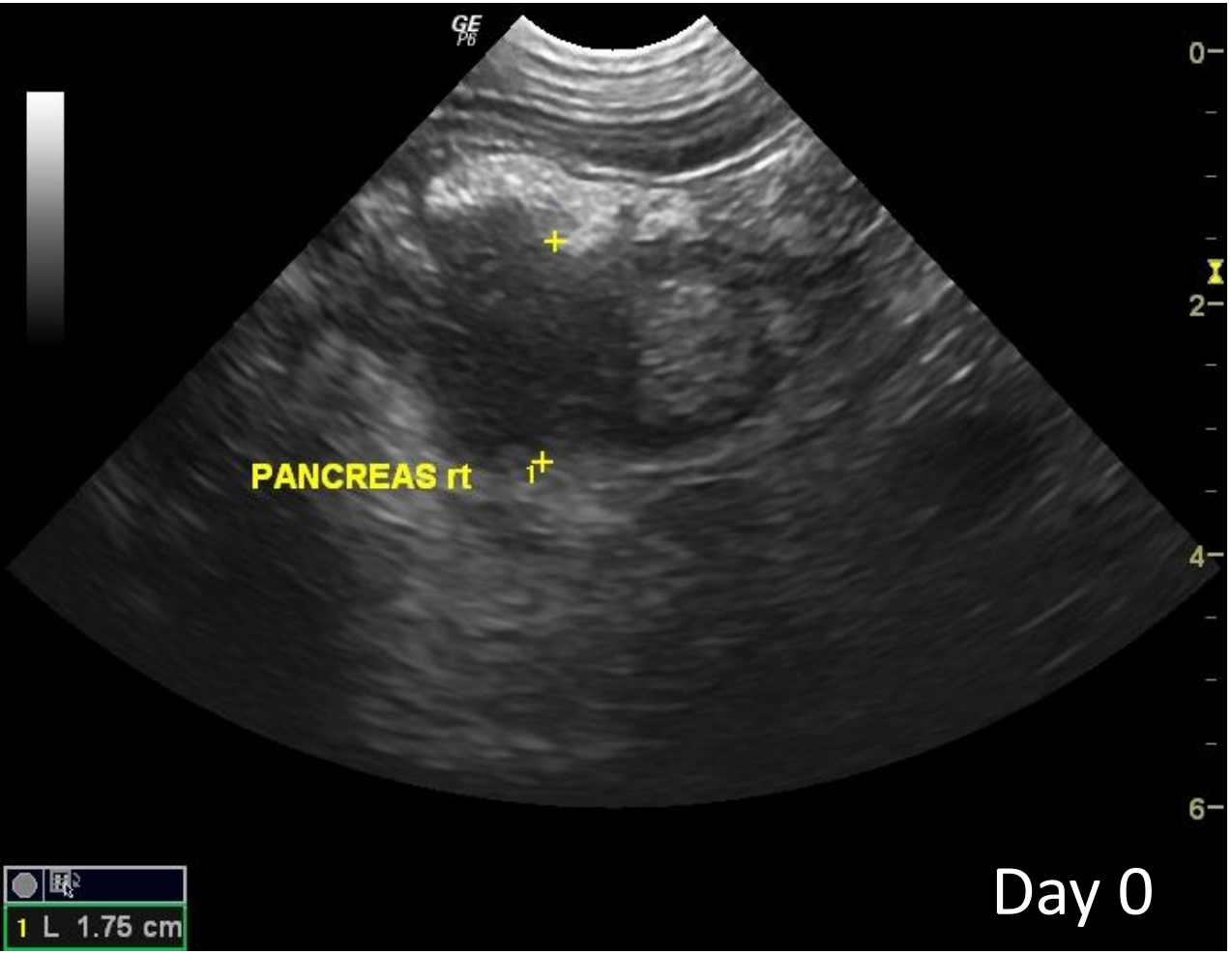


Day 0

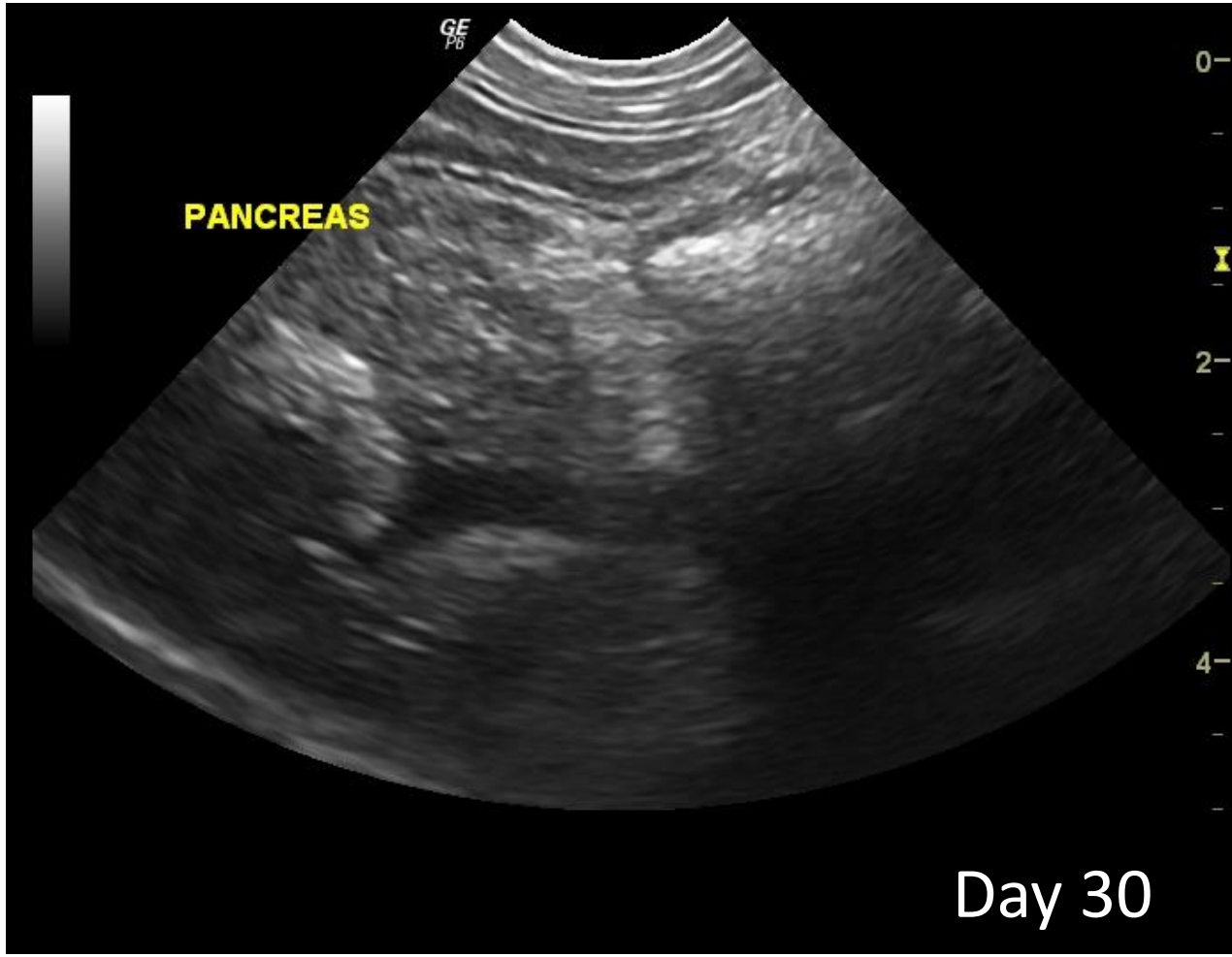


Day 7

Ultrasonography Day 30



Day 0



Day 30

Diagnosis of canine pancreatitis

1. Clinical signs
2. Diagnostic imaging
   - Abdominal ultrasonography
   - CT scan
3. Pancreatic lipase
4. Cytology
5. Histopathology

Diagnosis of canine pancreatitis

1. Clinical signs

- **Non – specific signs**
  - Hyporexia / anorexia
  - **Vomiting**
  - **Abdominal pain**
  - Lethargy
  - Dehydration

Diagnosis of canine pancreatitis

2. Diagnostic imaging

– Abdominal ultrasonography

- The most common used diagnostic imaging technique
- Also used to **rule out other diseases** that may cause similar clinical signs
- The **sensitivity** of abdominal ultrasonography is dependent on several factors.

(Ettinger, 2017)

Received: 31 August 2019 | Accepted: 19 December 2019
DOI: 10.1111/jvim.15693

STANDARD ARTICLE

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

Association between abdominal ultrasound findings, the specific canine pancreatic lipase assay, clinical severity indices, and clinical diagnosis in dogs with pancreatitis

Harry Cridge[1] | Alyssa M. Sullivant[1] | Robert W. Wills[2] | Alison M. Lee[1]

1. The **sensitivity and specificity of AUS** for the detection of clinical pancreatitis vary **depending on the definition** of ultrasonographic evidence of pancreatitis. (Sensitivity 43 – 89%, Specificity 43 – 92%)
2. AUS **should not be used in isolation to diagnose pancreatitis**
3. AUS is a **poor indicator of severity.**

veterinary sciences

MDPI

Article

Ultrasonographic Monitoring in 38 Dogs with Clinically Suspected Acute Pancreatitis

Federico Puccini Leoni, Tina Pelligra, Simonetta Citi *, Veronica Marchetti, Eleonora Gori and Caterina Puccinelli

- Pancreatic lipase might be elevated before ultrasonographic changes.
- If a patient is suspected of AP from clinical signs and pancreatic lipase, but normal pancreatic ultrasonography. It is advisable to ultrasonographic monitoring within **48 - 52 h after first ultrasonography** because ultrasonographic signs of AP may only become observable later. (Puccini Leoni, 2021)

Diagnosis of canine pancreatitis

2. Diagnostic imaging

– CT scan

- Three-phase computed tomographic angiography (CTA) has been shown to be a rapid and accurate method for the diagnosis of acute pancreatitis in people.

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Received: 4 June 2018 | Accepted: 8 October 2018
DOI: 10.1111/jvim.15364

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

STANDARD ARTICLE

Computed tomographic angiography and ultrasonography in the diagnosis and evaluation of acute pancreatitis in dogs

John M. French[1] | David C. Twedt[2] | Sangeeta Rao[2] | Angela J. Marolf[1]

Portal vein thrombosis was significantly more likely to be detected by CTA when compared to US (P = .004).

TABLE 1 Comparison of sequelae detection by ultrasound (US) and CT angiography (CTA)

	US	CTA
Entire pancreas visualized	19/26 (73%)	26/26 (100%)
Pancreatic enlargement	13/26 (50%)	18/26 (69%)
Portal vein thrombosis	1/26 (4%)	10/26 (38%)
Extra-hepatic biliary obstruction	6/26 (23%)	7/26 (27%)
Cholelithiasis	1/26 (4%)	11/26 (42%)
Gastric/intestinal wall thickening	8/26 (31%)	12/26 (46%)
Free fluid	17/26 (65%)	15/26 (58%)
Mesenteric changes	23/26 (88%)	20/26 (77%)

Received: 4 June 2018 | Accepted: 8 October 2018
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John M. French[1] | David C. Twedt[2] | Sangeeta Rao[2] | Angela J. Marolf[1]

- When comparing pancreatic contrast enhancement to spec cPL results, a **significantly higher median cPL** was observed in dogs with **heterogeneous** contrast enhancement (P = .007).
- Dogs with homogeneous contrast enhancement had a median spec cPL of 381 µg/L, whereas those with heterogeneous contrast enhancement had a median spec cPL of 1631.5 µg/L

Received: 4 June 2018 | Accepted: 8 October 2018
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STANDARD ARTICLE

Computed tomographic angiography and ultrasonography in the diagnosis and evaluation of acute pancreatitis in dogs

John M. French[1] | David C. Twedt[2] | Sangeeta Rao[2] | Angela J. Marolf[1]

In comparison to AUS, **CTA better identified** dogs with more severe acute pancreatitis and those with **portal vein thrombosis**, factors that may predict longer hospitalization and increased risk of relapse.

Diagnosis of canine pancreatitis

3. Pancreatic lipase

- **Colorimetric rapid point-of-care enzyme-linked immunosorbent assay (ELISA)**

– **SNAP cPL**

- Semi-quantitative assessment
- Useful to rule out

– **Spec cPL**

- Quantitative assessment
- The most sensitive and specific serum test for the diagnosis of AP in dogs

Diagnosis of canine pancreatitis

3. Pancreatic lipase

- **Catalytic lipase assay**
  - **1,2-o-dilauryl-rac-glycero glutaric acid-(6'-methylresorufin) ester (DGGR)** as substrate
  - DGGR lipase is **cheaper** than Spec cPL
  - The validated DGGR lipase assay had **similar sensitivity and specificity** for the diagnosis of acute and chronic pancreatitis to Spec cPL. (Goodband, 2018)

Standard Article
J Vet Intern Med 2018;32:658–664

Evaluation of SNAP cPL, Spec cPL, VetScan cPL Rapid Test, and Precision PSL Assays for the Diagnosis of Clinical Pancreatitis in Dogs

H. Cridge, A.G. MacLeod, G.E. Pachtinger, A.J. Mackin, A.M. Sullivant, J.M. Thomason, T.M. Archer, K.V. Lunsford, K. Rosenthal, and R.W. Wills

1.SNAP cPL, Spec cPL, VetScan cPL Rapid test and Precision PSL Assay have a **good level of agreement** for diagnosis pancreatitis.

2.**No single assay** had high enough diagnostic specificity **to conclusively diagnose pancreatitis** based on a single test result.

Test	Sensitivity	Specificity
SNAP cPL	73.9 - 100%	71.1 - 77.8%
Spec cPL	81.0 – 90.9%	74.1 – 81.1%
VetScan cPL rapid test	73.9 – 83.3%	76.9 – 83.3%
Precision PSL	85.7 – 90.9%	64.0 – 74.3%

Cridge, 2018

SNAP cPL, Spec cPL, VetScan cPL Rapid test and Precision PSL have **similar specificity and sensitivity.**

Diagnosis of canine pancreatitis

4. Cytology

- Relatively noninvasive diagnostic tool
- Ultrasound-guided FNA of the pancreas did not cause immediate adverse effects and did not cause a change in cPL values with short-term follow up. (Cordner, 2010)

Brief Communication

Journal of Veterinary Diagnostic Investigation
2015, Vol. 27(2) 236–240
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DOI: 10.1177/1040638715574862
jvdi.sagepub.com

Cytologic findings and diagnostic yield in 92 dogs undergoing fine-needle aspiration of the pancreas

Amy P. Cordner, Leslie C. Sharkey,[1] P. Jane Armstrong, Kaitlyn D. McAteer

1. Diagnostic yield was 73.5%, and **cytologically correlated with histopathology** in 10 out of 11 cases.
2. Clinical complications of pancreatic FNA were at 6.3%. Include seizure, arrest, fever.

Discussion

Diagnosis

- In this case, FNA pancreas should be performed to cytology and bacterial culture.

Diagnosis of canine pancreatitis

5. Histopathology

- The **gold standard** of pancreatitis diagnosis
- Absence of pancreatitis cannot be proven by histopathology even if multiple biopsies are taken. (Ettinger, 2017)
- Invasive and expensive

Management of acute pancreatitis

Treatment of cause

Supportive care

Analgesia

Antiemetics

Proteinase inhibitors?

Fresh frozen plasma?

Antibiotics?

Anti-inflammatory agents?

Management of acute pancreatitis

Treatment of cause

- **Most cases of pancreatitis are considered idiopathic**
- Dietary indiscretion
- Severe hypertriglyceridemia (>850 mg/dL)
- Surgical trauma
- Hypoperfusion of the pancreas during anesthesia
- *Babesia canis* and *Leishmania infantis* (rare)
- Drugs: potassium bromide, phenobarbital, calcium, L-asparaginase

Management of acute pancreatitis

Supportive care

- Fluid therapy
- Dietary management
  - Ultra-low-fat diet (<20g fat per 1000kcal)
  - Nasogastric tube, esophagostomy tube, gastrotomy tube
- Dogs fed by esophagostomy tube **improved significantly faster** than did dogs fed parenterally.

Management of acute pancreatitis

Analgesia

- Butorphanol
- Buprenorphine
- Morphine
- Fentanyl
- Methadone
- Combinations of multiple analgesic drugs

Management of acute pancreatitis

Antiemetics

- **Maropitant**, NK_1 antagonist
  - 1 mg/kg SC q24h
- **Ondansetron**, 5-HT3 antagonist
  - 0.1 – 0.2 mg/kg slowly IV q6-12h
- **Metoclopramide** CRI, 1 – 2 mg/kg/day
  - For management of intestinal ileus

Management of acute pancreatitis

Proteinase inhibitors?

- Inhibit premature activation of trypsinogen in initial pathogenesis of pancreatitis
- Aprotinin, in experimental pancreatitis in dogs, had been shown to prevent death when **administered at the same time as pancreatitis is being induced**.
- **No studies** have been able to **show strong evidence of efficacy** in dogs with spontaneous pancreatitis.

Management of acute pancreatitis

Fresh frozen plasma (FFP) ?

- FFP contain alpha2-macroglobulin, albumin, anticoagulant and clotting factors.
- Administration of FFP is associated with a worse outcome (Weatherton and Streeter, 2009)
- May be useful in dogs with severe forms of pancreatitis
  - Bleeding signs, coagulopathy, DIC?

Management of acute pancreatitis

Antibiotics?

- Dogs with pancreatitis **rarely have bacterial infectious** complications. (Ettinger, 2017)
- Antibiotics should be limits to those dogs that have demonstrated bacterial infectious complications
  - Aspiration pneumonia
  - Infected necrosis

Discussion

Treatment

- Amoxicillin-clavulanic acid was used in this case because abscess-liked lesion was found on abdominal ultrasonography.

Management of acute pancreatitis

Anti-inflammatory agents?

- **NSAIDs (not recommended)**
  - Potentially causing pancreatitis, AKI, gastric ulceration
- **Glucocorticoids???**

BSAVA BRITISH SMALL ANIMAL VETERINARY ASSOCIATION

PAPER

Comparison of initial treatment with and without corticosteroids for suspected acute pancreatitis in dogs

H. Okanishi*,†, T. Nagata†, S. Nakane† and T. Watari[1,*]

*Laboratory of Veterinary Internal Medicine, Department of Veterinary Medicine, Faculty of Bioresource Sciences, Nihon University, Fujisawa, 252-0880, Japan
†Nakane Animal Hospital, Tokyo, 115-0045, Japan

Initial treatment with **prednisolone dose 1 mg/kg/day** resulted in earlier reductions in C-reactive protein concentration and **earlier improvement** of clinical signs.

Limitations: **non-blinded, non-randomised clinical study**

Management of acute pancreatitis

Other therapies

Fuzapladib sodium hydrate

- Targets the **leukocyte function–associated antigen 1 (LFA-1)** pathway
  - Prevent inflammatory cells from adhering to vascular endothelial cells and infiltrating tissue
  - Control exacerbation of pancreatitis

Discussion

Monitoring

- Serum cPL
- Serum CRP
- Modified canine activity index (MCAI)
- Canine acute pancreatitis clinical severity index (CAPCSI)

Discussion

Monitoring

- **Serum cPL**
  - Released into the circulation because of damage and necrosis of the pancreas
  - Half-life of lipase in dogs is 1–3 hours
- **Serum CRP**
  - Serum **CRP** concentration is an **inflammatory marker**, affected by a wide variety of conditions of different organ.
  - Estimate half-life of CRP is 162 hours
  - Serum **CRP** concentration might be more useful in dogs with pancreatitis **without** concurrent conditions or complications.

Modified canine activity index (mcai)

Activity	Appetite	Vomiting	Cranial abdominal pain	Dehydration	Feces consistence	Blood in the feces
0 = Normal	0 = Normal (ate more than ¾ of the food offered)	0 = None	0 = None	0 = None	0 = Normal	0 = Absent
1 = Slightly decreased (stand less than usual)	1 = Slightly decreased (ate about ½ of the food offered)	1 = 1 – 2 times/day	1 = Mild	1 = Mild	1 = Soft	1 = Present
2 = Moderately decreased (reluctant to stand up)	2 = Moderately decreased (ate about ¼ of the food offered)	2 = 3 – 4 times/day	2 = Moderate	2 = Moderate	2 = Diarrhea	
3 = Severely decreased (can not stand up)	3 = Severely decreased (did not eat food)	3 = ≥ 5 times/day	3= Severe	3= Severe	3 = Watery	

Keany, 2021

Canine acute pancreatitis clinical severity index (CAPCSI)

Cardiac	Respiratory	Intestinal intregity	Blood pressure
0 = No abnormalities	0 = No abnormalities	0 = No abnormalities	0 = No abnormalities
1 = >60 ventricular premature complexes/24-h period or heart rate > 180 beats/min	1 = Clinical evidence of dyspnea or tachypnea (>40 breaths/min)	1 = Intestinal sounds not detected during >3 auscultations in 24-h period	1 = Systolic arterial blood pressure <60 or >180 mm Hg or serum albumin concentration <1.8 g/dL
2 = Paroxysmal or sustained ventricular tachycardia	2 = Clinical evidence of pneumonia or acute respiratory distress syndrome	2 = Hematochezia, melena, or regurgitation	2 = Systolic arterial blood pressure <60 or >180 mm Hg and serum albumin concentration < 1.8 g/dL
		3 = No enteral food intake for >3d	
		4 = No enteral food intake for >3 d and at least 2 of the following: hematochezia, melena, or regurgitation	

Keany, 2021

Received: 12 February 2021 | Accepted: 22 June 2021
DOI: 10.1111/jvim.16218

STANDARD ARTICLE

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ACVIM American College of Veterinary Internal Medicine

Serum concentrations of canine pancreatic lipase immunoreactivity and C-reactive protein for monitoring disease progression in dogs with acute pancreatitis

Kirstin M. Keany[1,5] | Geoffrey T. Fosgate[2] | Sean M. Perry[3] | Shannon T. Stroup[1] | Joerg M. Steiner[4]

1. The **MCAI** severity score have **significant correlation** with serum **CRP and cPL** concentrations.
2. The MCAI clinical scores might be useful for clinical evaluation of pancreatitis.

Discussion

Prognosis

- There are 2 scoring systems that were shown to predict **short-term mortality (ie, death within 30 days)** of dogs with acute pancreatitis.
  - **Canine Acute Pancreatitis Severity (CAPS) score**
    - Optimal cut-off = 11, Sensitivity 89% and specificity 90%
    - Formula = 8 × (1 if SIRS, 0 otherwise) + 3 × (1 if coagulation disorders, 0 otherwise) + 4 × (1 if increased creatinine, 0 otherwise) + 3 × (1 if ionized hypocalcemia, 0 otherwise).
  - **Simplified version of CAPS score (sCAPS)**
    - Optimal cut-off = 6, Sensitivity 96% and specificity 77%
    - Formula = 3 × (1 if RR ≥ 24 bpm, 0 otherwise) + 3 × (1 if coagulation disorders, 0 otherwise) + 4 × (1 if increased creatinine, 0 otherwise) + 3 × (1 if ionized hypocalcemia, 0 otherwise).

Received: 12 April 2018 | Accepted: 8 January 2019
DOI: 10.1111/jvim.15421

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

Check for updates

STANDARD ARTICLE

Development and validation of a novel clinical scoring system for short-term prediction of death in dogs with acute pancreatitis

Virginie Fabrès[1] | Olivier Dossin[2,3] | Clémence Reif[1] | Miguel Campos[1,4,5] | Valerie Freiche[1] | Christelle Maurey[1] | Fanny Pilot-Storck[5] | Loïc Desquilbet[5,6] | Ghita Benchekroun[1,5]

Both CAPS and sCAPS score allow early and accurate prediction of short-term death in dogs with AP.

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Thank you

for your attention

