

LSU

LOUISIANA STATE UNIVERSITY



nUTRAMaxTM
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*“Don’t copy the behavior and customs of this world, **but let God transform you** into a new person by changing the way you think. Then you will learn to know God’s will for you, which is good and pleasing and perfect.”*



- Romans 12:2



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Presents

A Case-based Approach to the Vomiting Cat: Hepatic Disease

Joseph Taboada, DVM, Dipl. ACVIM

School of Veterinary Medicine

Louisiana State University



Conflict of Interest Disclosure

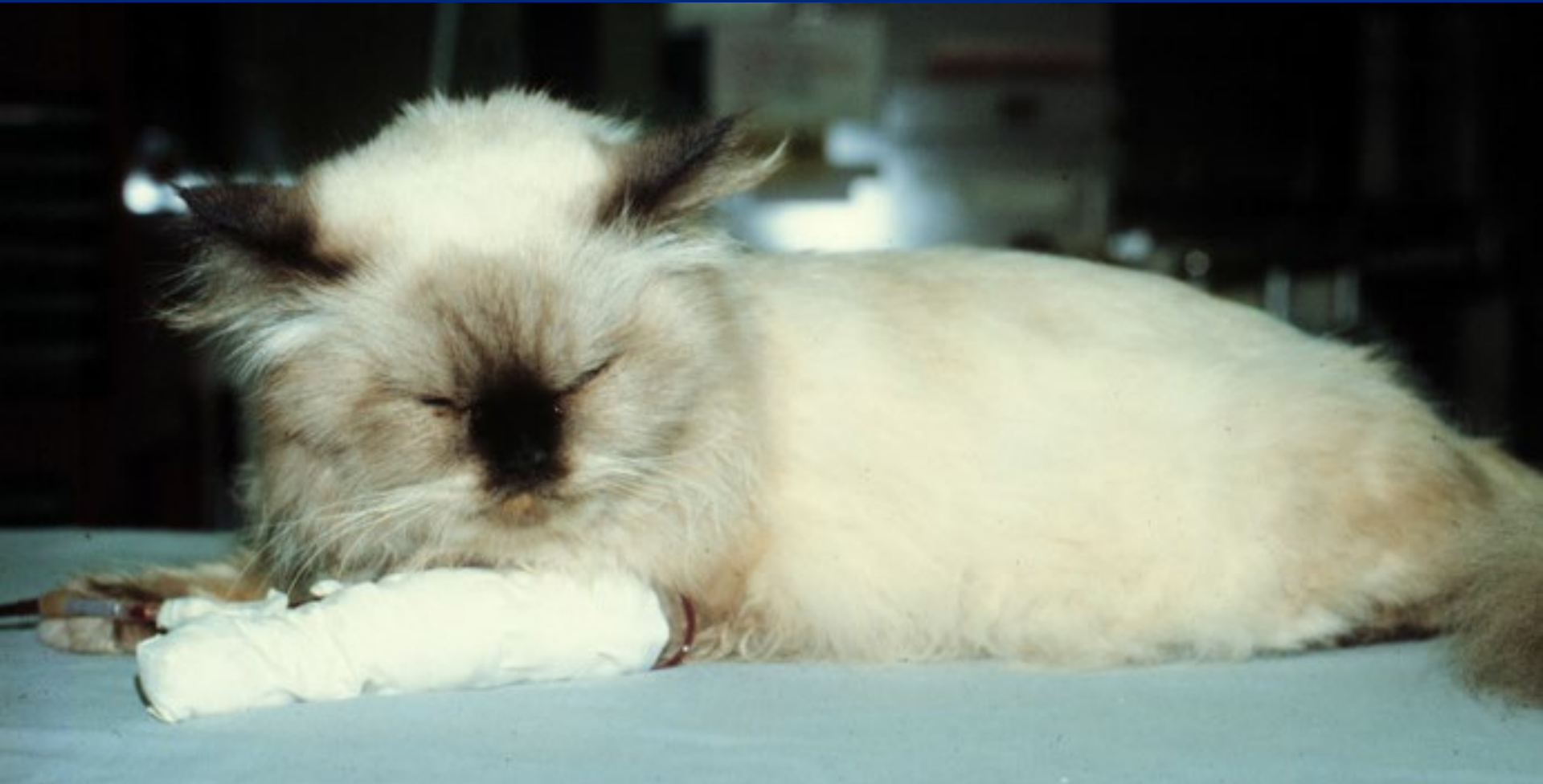
Occasionally speak for Nutramax

Current Grants: NIH, BI, HSUS, ASPCA,
PetSmart Charities, PetCo

Consulting: None



“Little Dinosaur”



7 yr old, M/C, Himalayan

Little Dinosaur

- Signalment: 7 yr old, m/c, Himalayan
- History:
 - Vomiting – intermittent for 1 month
 - Anorexia – partial for 2 weeks, progressively getting worse

icterus



Little Dinosaur

- Signalment: 7 yr old, m/c, Himalayan
- History:
 - Vomiting – intermittent for 1 month
 - Anorexia – partial for 2 weeks, progressively getting worse
- Physical Exam:
 - Depressed, lethargic, evidence of weight loss
 - Temp 103.5°F
 - Icteric

Rank the following differential diagnoses given what you now know about Little Dinosaur:

Inflammatory Liver Disease
(Cholangitis)

Pancreatitis

Inflammatory Bowel Disease

Toxic hepatopathy

Hyperthyroidism

Hepatic lipidosis

Hemolytic Anemia (Infectious,
toxic, immune mediated)

https://www.polleverywhere.com/free_text_polls/UShCLlqAnL0BPY

**What would you do next for
Little Dinosaur?**



When poll is active, respond at PollEv.com/josephtaboada

Text **JOSEPHTABOADA** to **37607** once to join

What would you do next with Little Dinosaur?

“Cytology”

4 months ago

“Fna”

4 months ago

“Fna”

4 months ago

“Aspirate”

4 months ago

“Cytology first, t”

4 months ago

CBC

"Little Dinosaur"
7-year-old, M/C, Himalayan

PCV (%)	34	(29-48)	WBC	17,300	(6,000-19,500)
PP (g/dl)	6.3	(6.0-7.5)			
Eryth	6.3	(5-10)	neut	14,600	(2,500-12,500)
Hct (%)	33.8	(30-48)	band		(0-300)
Hb (g/dl)	11.8	(12-15.5)	eos	300	(0-1,500)
MCV (fl)	53.9	(41-57)	mono	1,500	(0-800)
MCHC	34.7	(30-35)	lymph	900	(1,500-7,000)
RDW (%)	15.5	(14.5-18.1)			
			Plat	adequate	

1+ anisocytosis, 1+ poikilocytosis

Chem Panel

"Little Dinosaur"
7-year-old, M/C, Himalayan

SALT (U/L)	230	(0-90)	BUN (mg/dl)	22	(18-30)
SAST (U/L)	121	(0-60)	Creat (mg/dl)	1.4	(0.8-2.2)
SAP (U/L)	121	(0-45)	Ca (mg/dl)	9.9	(9.1-10.8)
GGT (U/L)	5	(0-4)	P (mg/dl)	6.7	(4.0-6.6)
CPK (U/L)	331	(0-300)			
T.Bili (mg/dl)	4.7	(0.0-0.2)	Na (mEq/L)	140	(140-153)
Glu (mg/dl)	115	(85-115)	K (mEq/L)	3.3	(3.8-5.5)
T.Pro (g/dl)	6.4	(6.0-8.1)	Cl (mEq/L)	110	(107-115)
Alb (g/dl)	2.2	(2.7-4.1)	TCO ₂ (mEq/L)	24.5	(17-27)
Glob (g/dl)	4.2	(3.3-4.9)			

Urinalysis

SG	1.030
pH	6.5
protein	neg
ketones	neg
glucose	neg
hemoglobin	neg
bilirubin	4+
RBC (/hpf)	2-3
WBC (/hpf)	0-1

SPEC fPL neg

FeLV/FIV neg/neg

Radiograph/Ultrasound

No significant findings

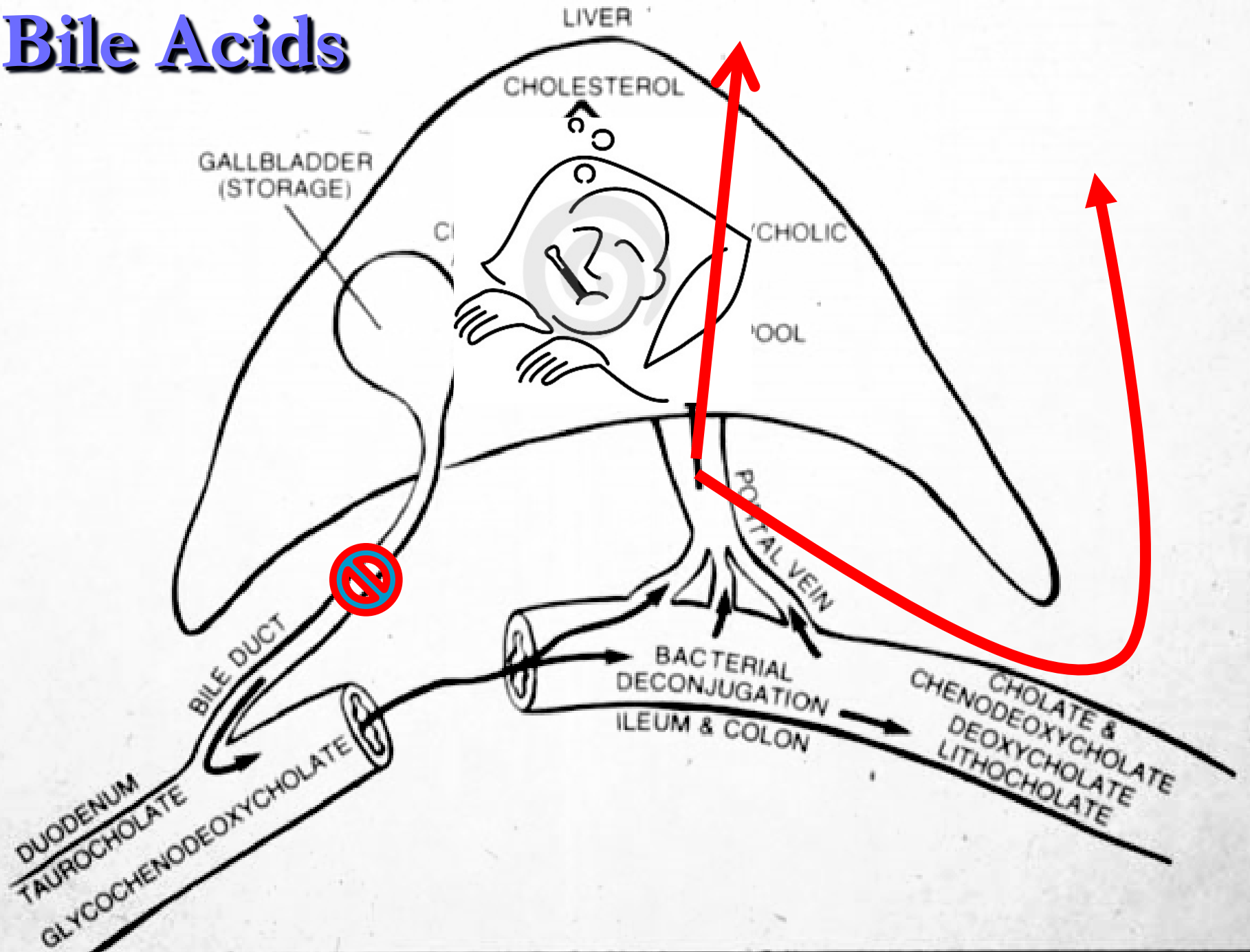
Bile acids

fasting 54 (<5umol/L)

post pr 92 (<20umol/L)

Did we gain
anything from
the bile acids?

Bile Acids



https://www.polleverywhere.com/free_text_polls/UShCLlqAnL0BPY

**What would you do next for
Little Dinosaur?**



What would you do next with Little Dinosaur?

“Fna”

2 years ago

“Fna”

2 years ago

“Fna”

2 years ago

“FNA”

2 years ago

“Aspirate”

2 years ago

“Liver FNA”

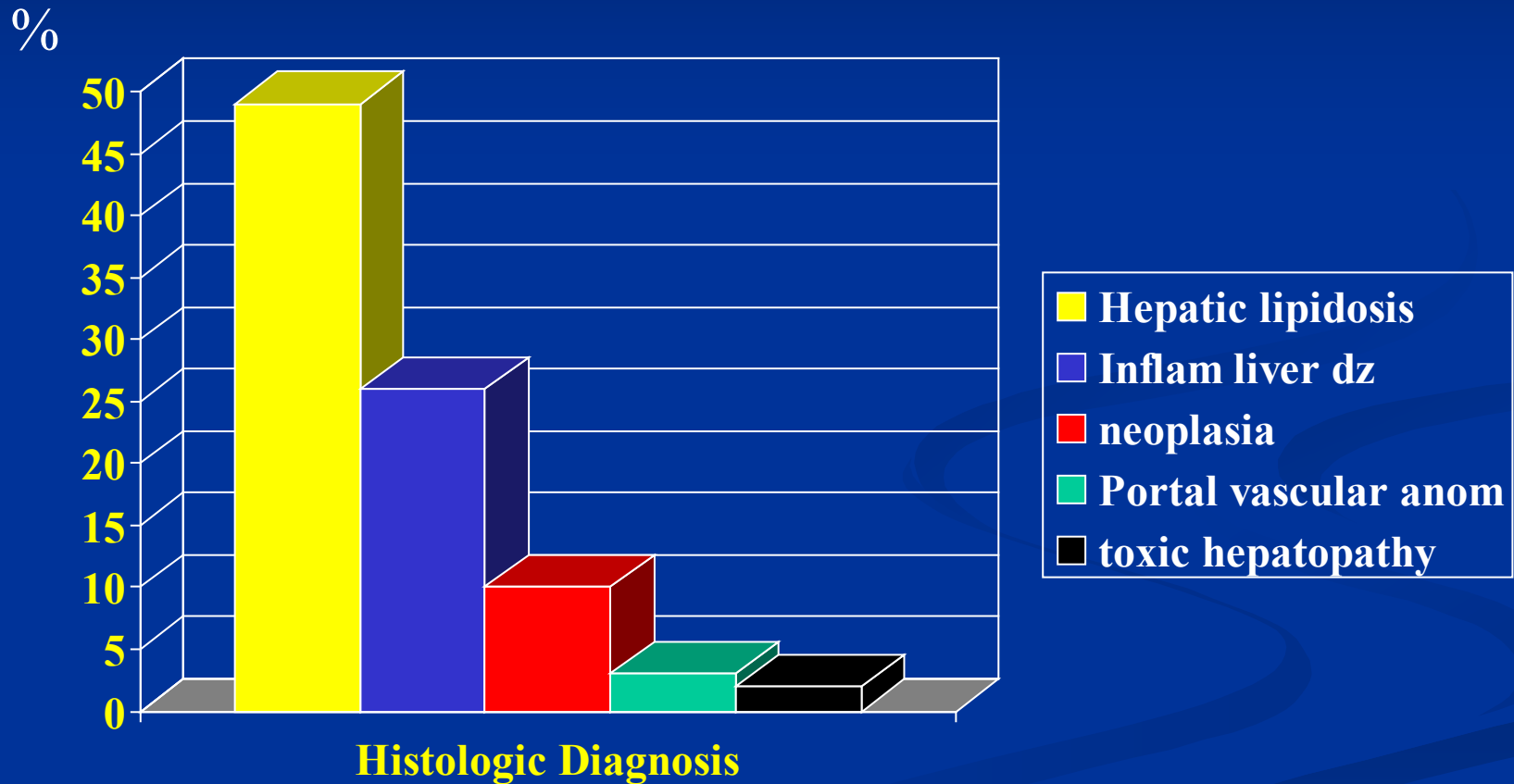
2 years ago

“X-ray”

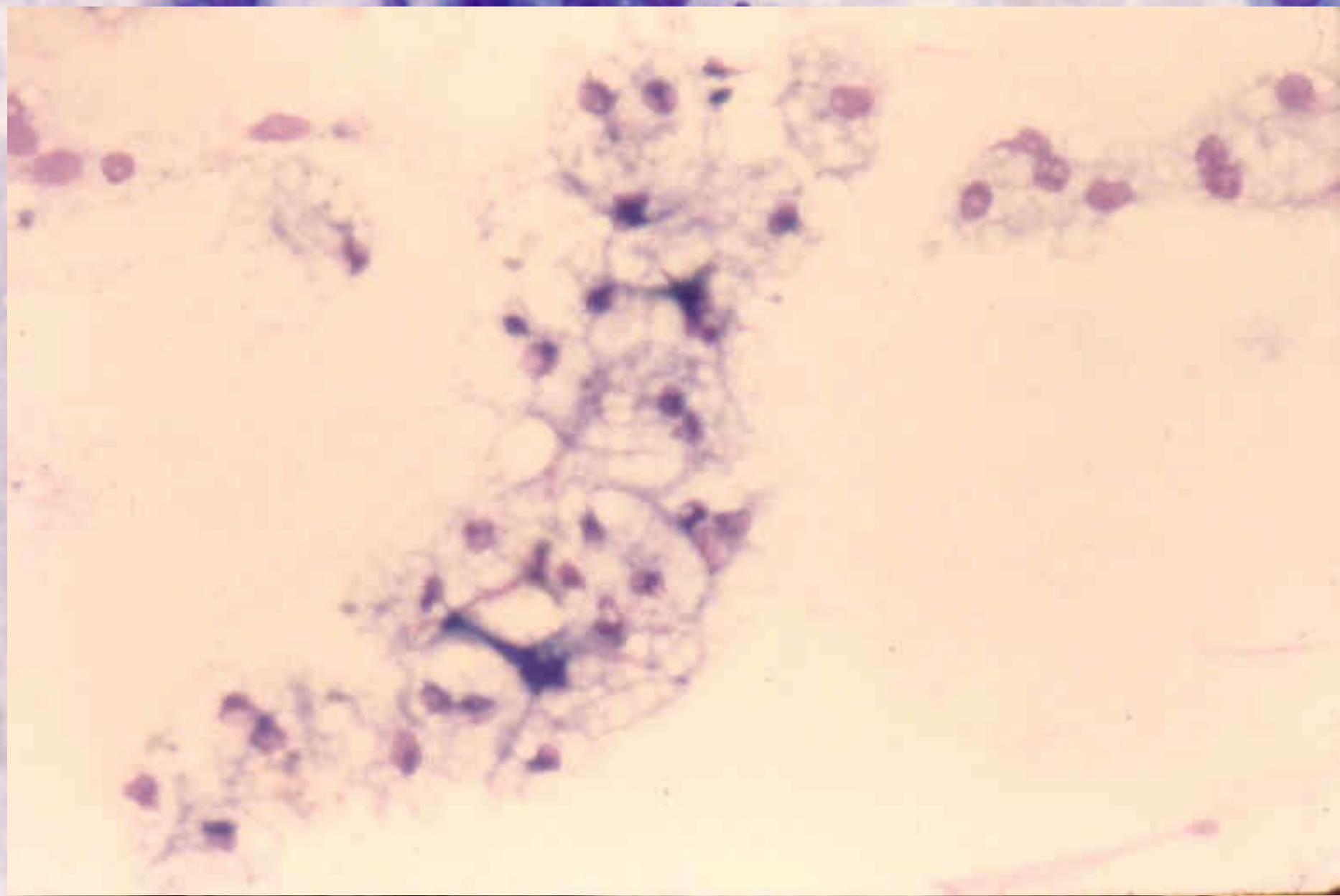
2 years ago

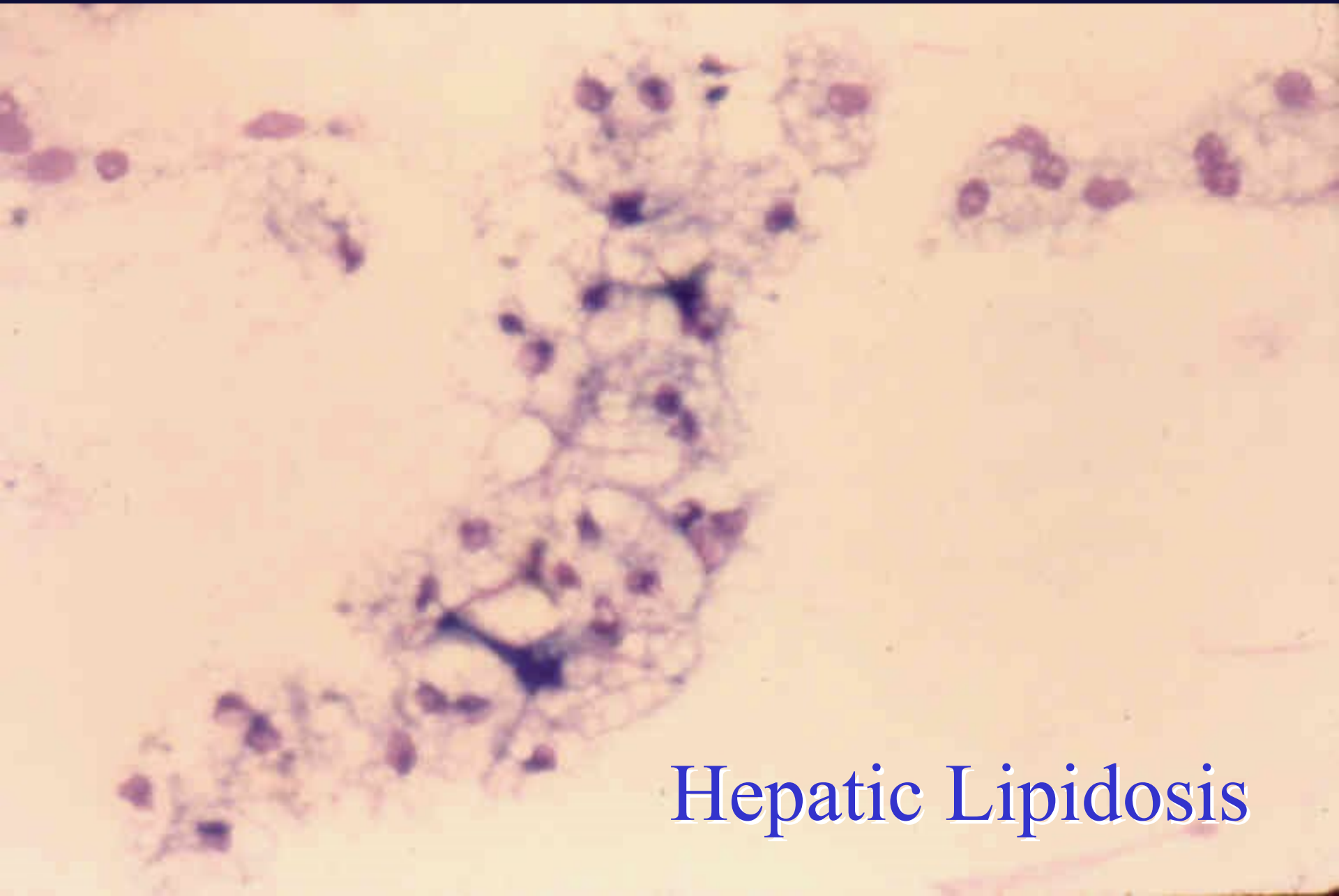
Liver Disease Prevalence - Cats

175 cases

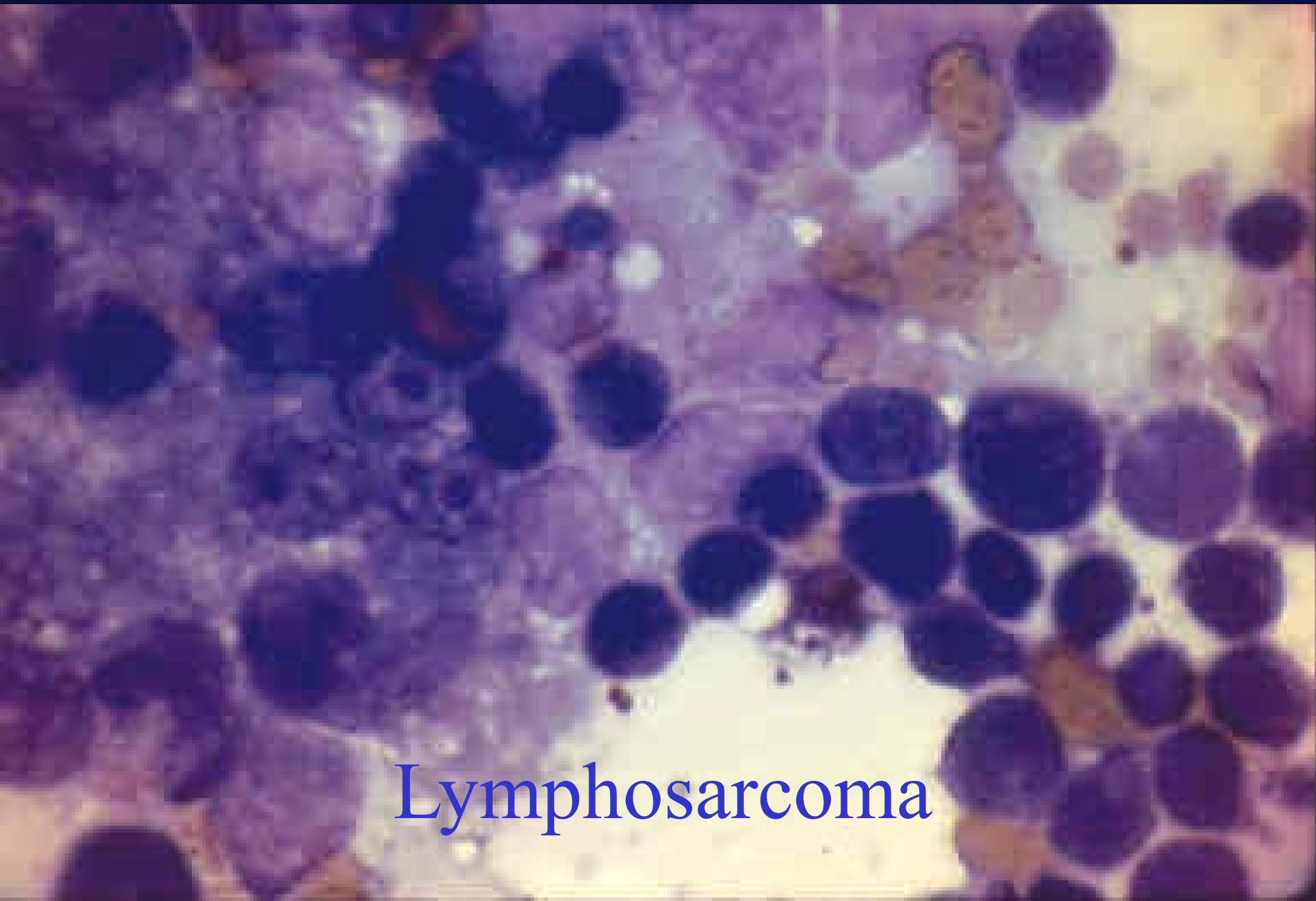


Gagne JM et al. *JAVMA* 214:513; 1999.





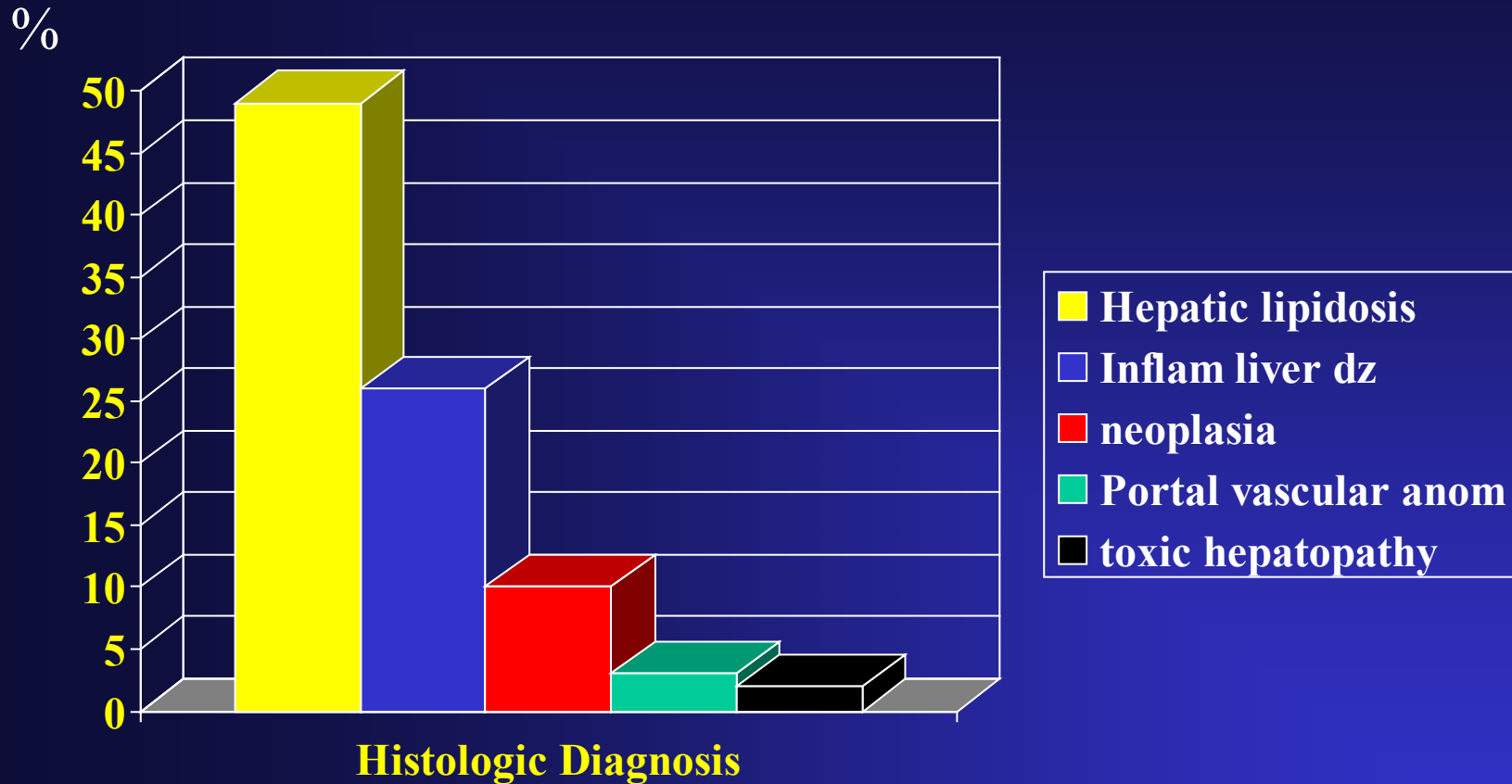
Hepatic Lipidosis



Lymphosarcoma

Liver Disease Prevalence - Cats

175 cases



Gagne JM et al. *JAVMA* 214:513; 1999.

https://www.polleverywhere.com/free_text_polls/lyXXNiZbdvNxnEP

**Given the results of the FNA,
what would you do next for
Little Dinosaur?**



Given the results of the FNA, what would you do next with Little Dinosaur?

“Biopsy”

2 years ago

“IV fluids, antibiotics”

2 years ago

“Liver support - fluids, food, steroids, Denamarin, Metronidazole, etc”

2 years ago

“Treat with fluids and antibiotics”

2 years ago

“Fluids, supportive care, feeding tube likely”

2 years ago

“Biopsy”

2 years ago

“Biopsy”

2 years ago

“I've fluids supportive care”

2 years ago

“37607”

2 years ago

“Supportive therapy”

2 years ago

“Supportive care”

2 years ago

“Biopsy or start antibiotics”

2 years ago

“Start Tx. Similar to the HL cat”

2 years ago

“Feeding tube and biopsy”

2 years ago

“Start abx and biopsy”

2 years ago

“Biopsy”

2 years ago

“Fluids pt / ptt”

2 years ago

“70670”

2 years ago

“Fluids, lactulose, pt, ptt, antibiotics, supportive care”

2 years ago

“Antioxidants”

2 years ago

“Steroids 🙄”

2 years ago

“Ultrasound with poss biopsy”

2 years ago

“Radiograph”

2 years ago

“3767”

2 years ago

Is a biopsy needed? Would it help?



When poll is active, respond at pollev.com/josephtaboada

Text **JOSEPHTABOADA** to **37607** once to join

Would biopsy of the liver be an appropriate next step for Little Dinosaur?

Yes

No

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Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

In the last icteric cat I saw I biopsied/referred for a liver biopsy:

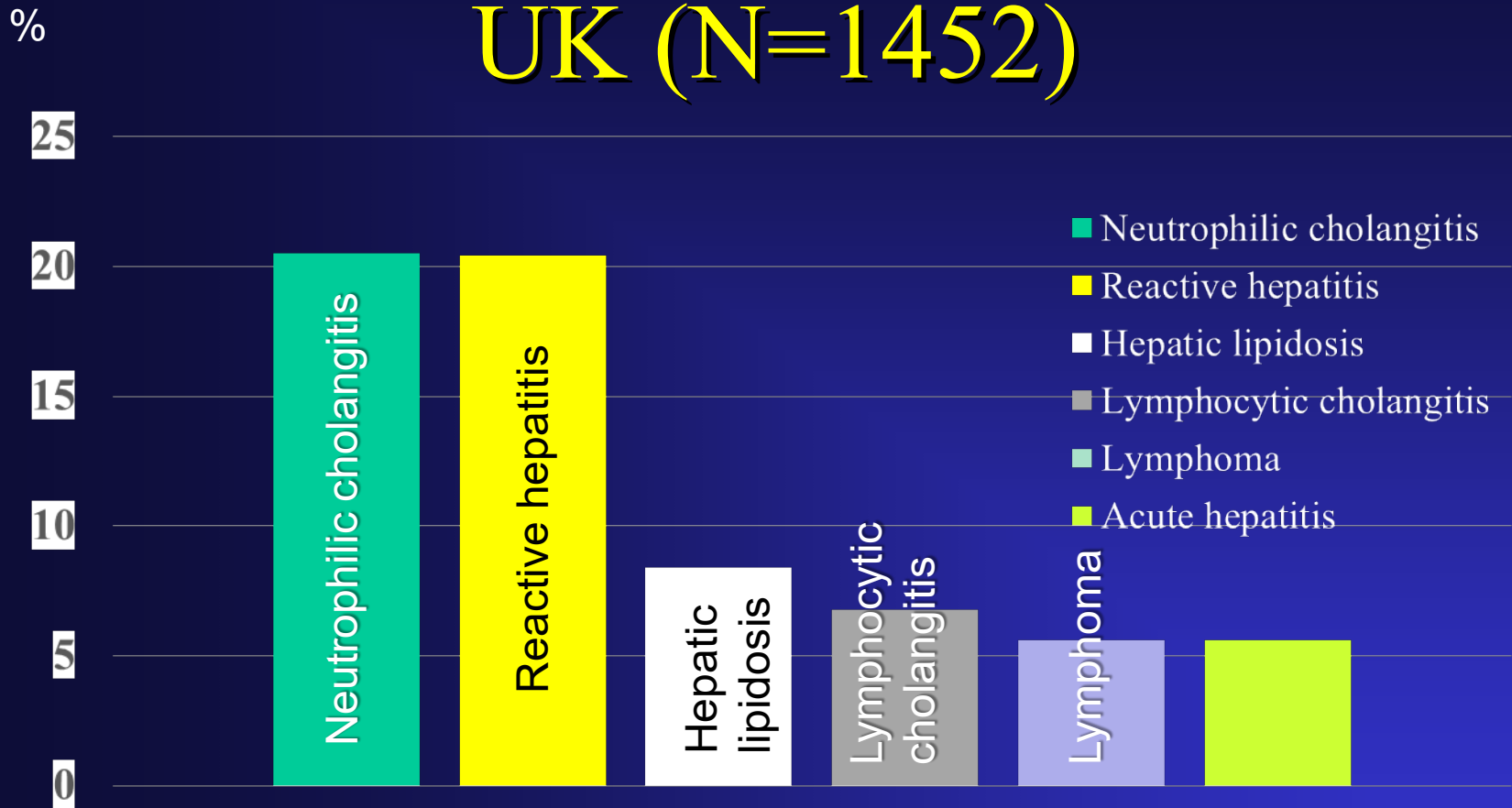
Yes **A**

No **B**

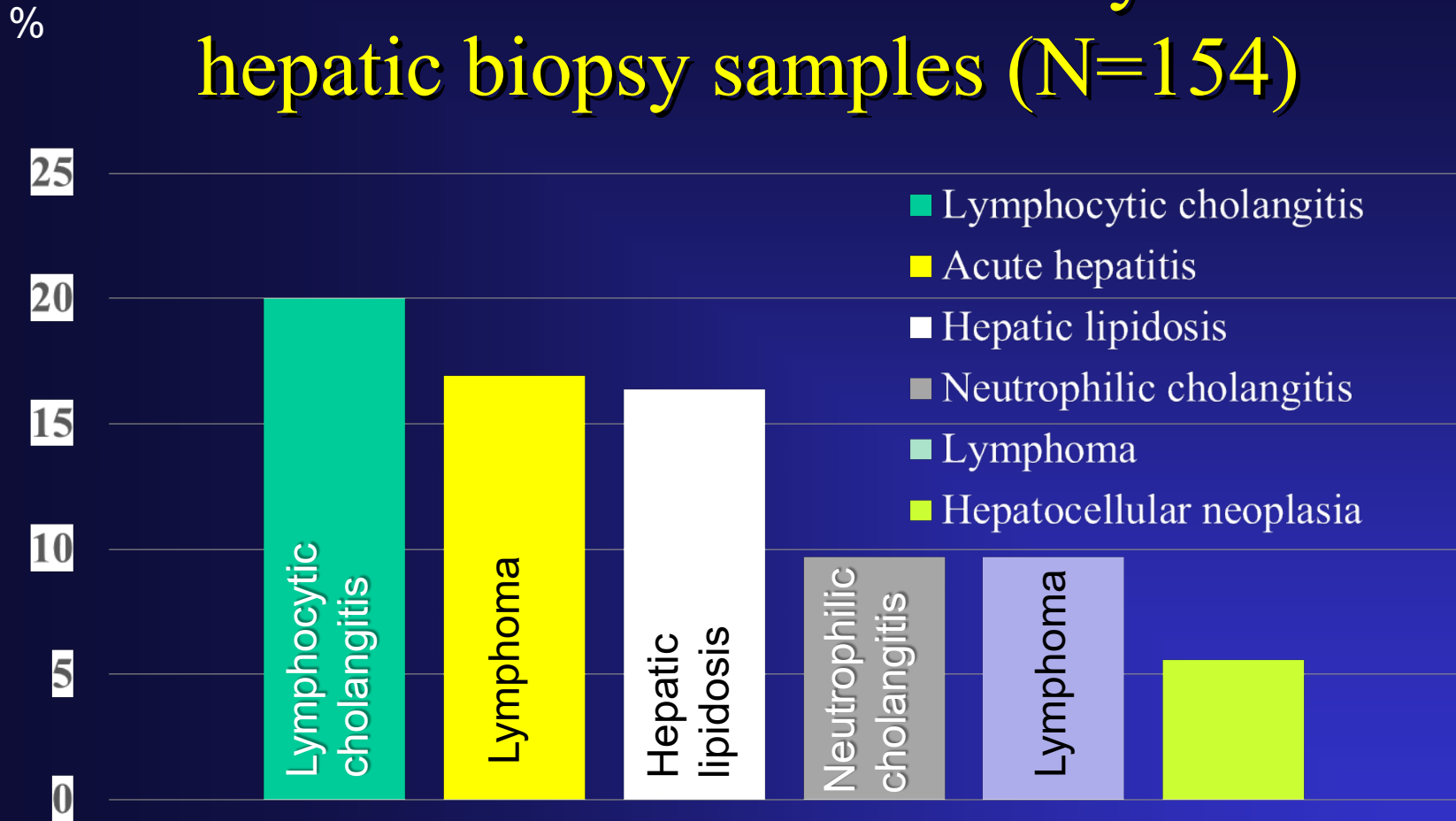
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Histopathological frequency of feline hepatobiliary disease in the UK (N=1452)



Retrospective study of the relative frequency of feline hepatobiliary disease in New Zealand based on 10 years of hepatic biopsy samples (N=154)



What about doing a coagulation profile before biopsy?

Is it predictive of complications?

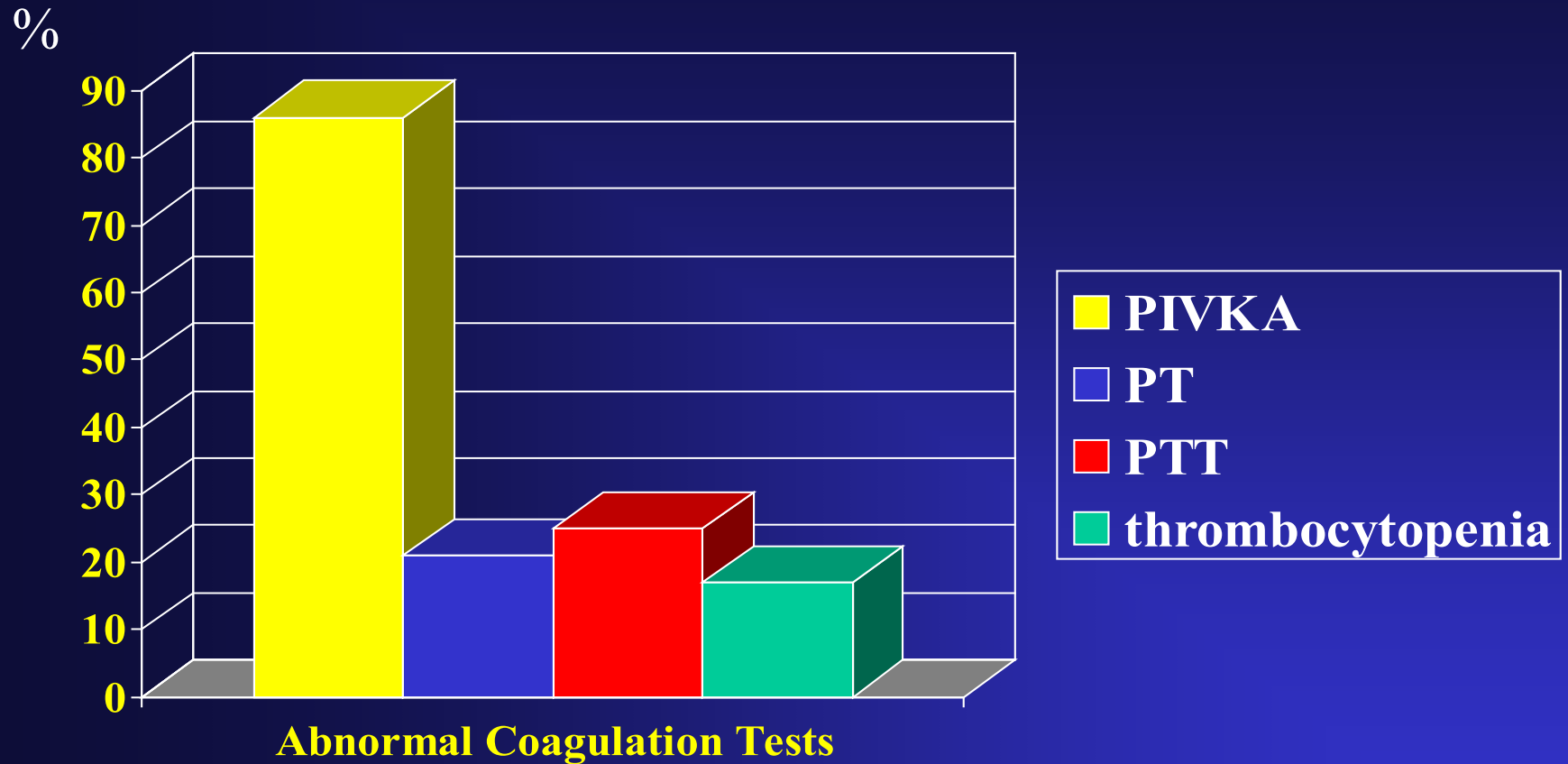
Is it going to change what you do?



Correlation Between Coagulation Profile Findings and Bleeding Complications After Ultrasound-Guided Biopsies: 434 Cases (1993-1996)

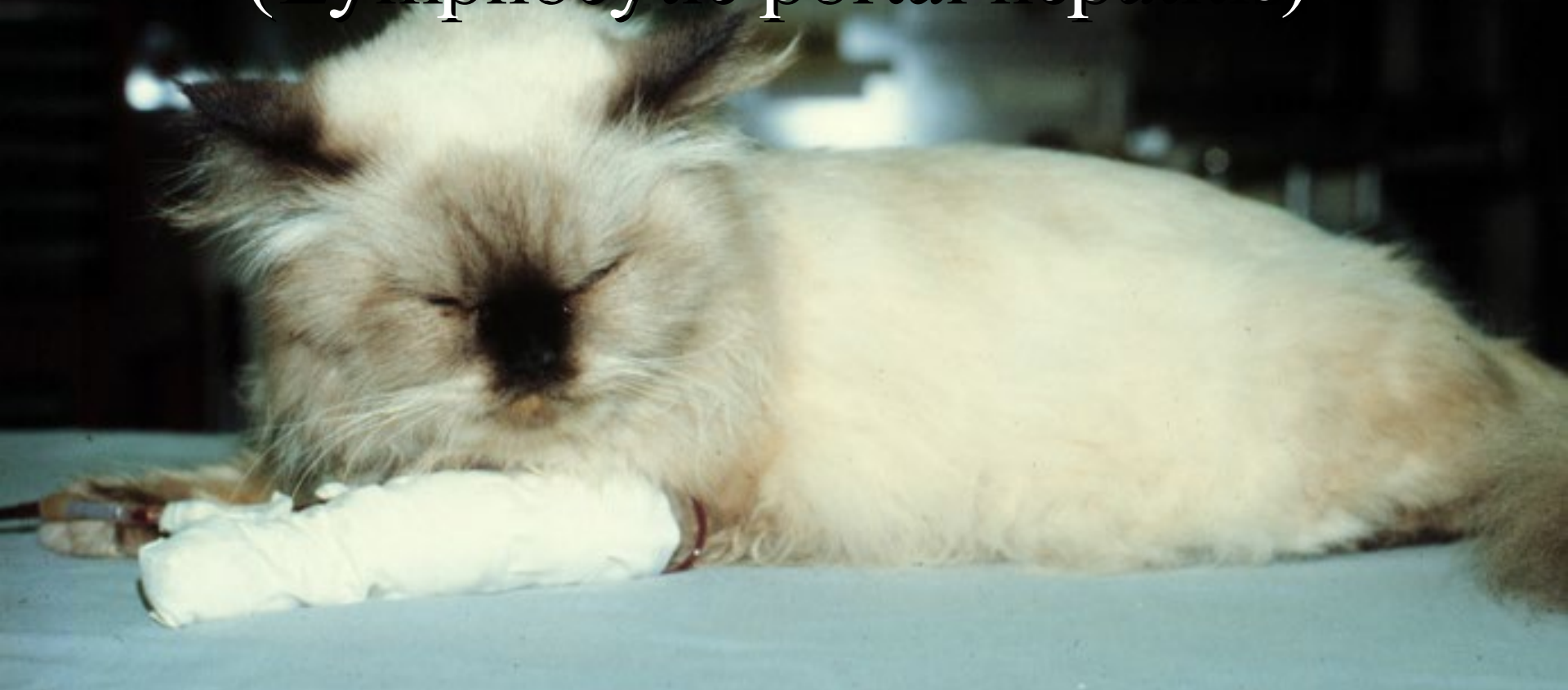
- Dogs (310), Cats (124) – abdominal organs biopsied; Major complications (6%); minor complications (21%)
- Few (3 dogs, 6 cats) with bleeding complications associated with liver biopsy; more complications following kidney biopsies
- Low platelet count (dogs and cats), prolonged PT (dogs), and 1.4x prolonged PTT (cats) were more likely to bleed but only if all biopsies were included (not for liver)

Bleeding tendency (22 cats)



“Little Dinosaur”

Diagnosis – Lymphocytic Cholangitis
(Lymphocytic portal hepatitis)



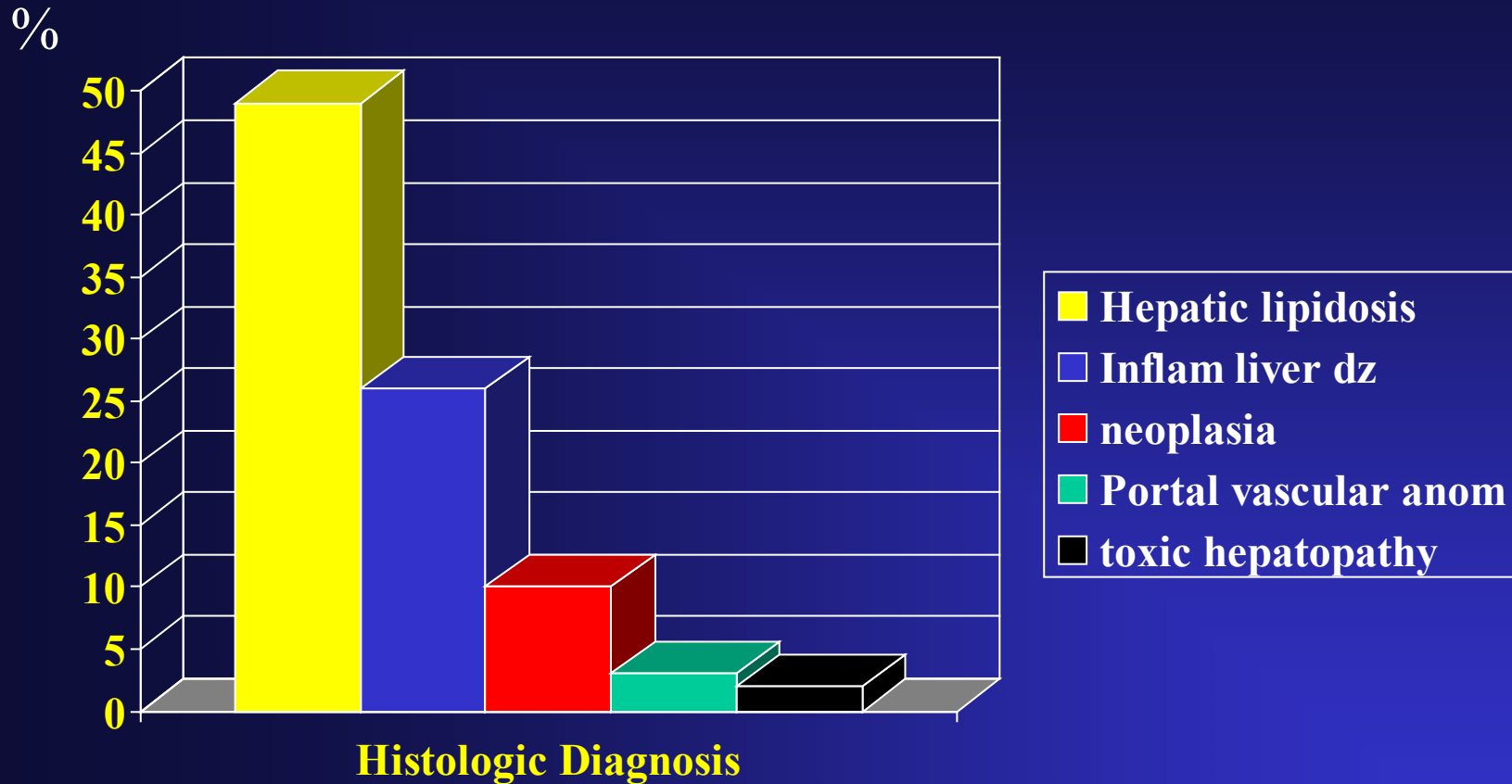
7 yr old, M/C, Himalayan

Inflammatory Liver Disease



Liver Disease Prevalence

175 cases



Gagne JM et al. *JAVMA* 1999; 214:513

Inflammatory Liver Disease: cholangitis complex

■ Suppurative cholangitis

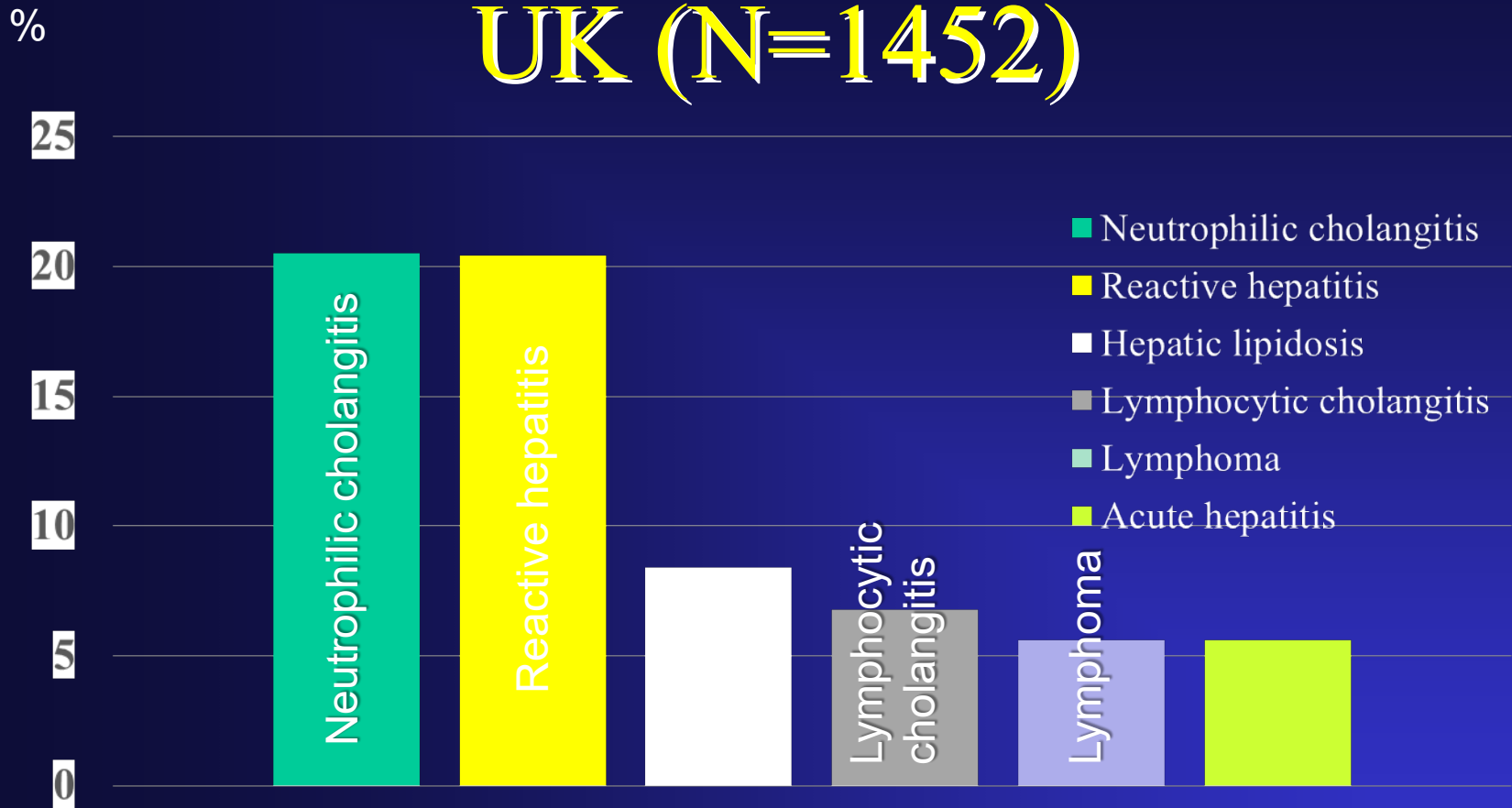
■ Non-suppurative (Lymphocytic) cholangitis

- Chronic progressive lymphocytic-plasmacytic cholangiohepatitis
- Lymphocytic portal hepatitis

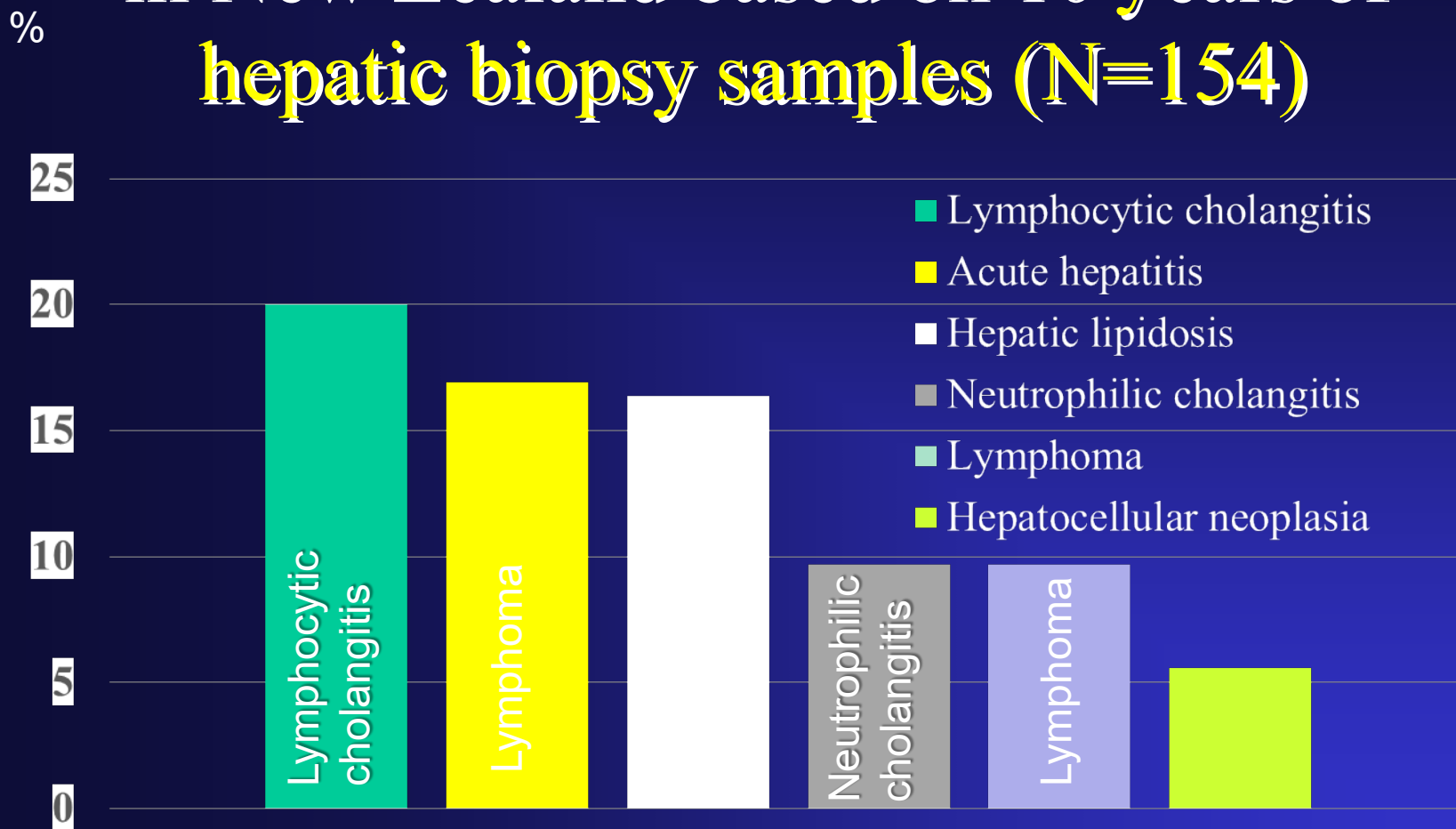
■ Sclerosing lymphocytic cholangitis

■ Biliary cirrhosis

Histopathological frequency of feline hepatobiliary disease in the UK (N=1452)



Retrospective study of the relative frequency of feline hepatobiliary disease in New Zealand based on 10 years of hepatic biopsy samples (N=154)



Misha; 3 yr, F/S, DSH



Misha

- **Signalment:** 3 yr old, f/s, DSH
- **History:**
 - Vomiting – for 3 days, normal before
 - Anorexia –for 3 days
- **Physical Exam:**
 - Normal except for:
 - Icteric



CBC

"Misha"

3-year-old, female-spayed, DSH

PCV (%)	30	(29-48)	WBC	24,300	(6,000-19,500)
PP (g/dl)	6.1	(6.0-7.5)			
Eryth	5.7	(5-10)	neut	21,600	(2,500-12,500)
Hct (%)	30.4	(30-48)	band		(0-300)
Hb (g/dl)	12.1	(12-15.5)	eos	300	(0-1,500)
MCV (fl)	52.6	(41-57)	mono	1,600	(0-800)
MCHC	33.7	(30-35)	lymph	800	(1,500-7,000)
RDW (%)	15.5	(14.5-18.1)			
			Plat	adequate	

1+ anisocytosis, 1+ poikilocytosis

Chem Panel

"Misha"
3-year-old, female-spayed, DSH

SALT (U/L)	1530	(0-90)	BUN (mg/dl)	38	(18-30)
SAST (U/L)	821	(0-60)	Creat (mg/dl)	2.4	(0.8-2.2)
SAP (U/L)	189	(0-45)	Ca (mg/dl)	8.9	(9.1-10.8)
GGT (U/L)	25	(0-4)	P (mg/dl)	6.9	(4.0-6.6)
CPK (U/L)	231	(0-300)			
T.Bili (mg/dl)	3.7	(0.0-0.2)	Na (mEq/L)	148	(140-153)
Glu (mg/dl)	104	(85-115)	K (mEq/L)	3.5	(3.8-5.5)
T.Pro (g/dl)	6.1	(6.0-8.1)	Cl (mEq/L)	112	(107-115)
Alb (g/dl)	2.8	(2.7-4.1)	TCO ₂ (mEq/L)	21.7	(17-27)
Glob (g/dl)	3.3	(3.3-4.9)			

Urinalysis

"Misha"

3-year-old, female-spayed, DSH

SG	1.035
pH	6.5
protein	neg
ketones	neg
glucose	neg
hemoglobin	neg
bilirubin	4+
RBC (/hpf)	2-3
WBC (/hpf)	0-1

FeLV/FIV neg/neg

SNAP[®] fPL[™] neg

Abdominal Radiographs
and Ultrasound

Normal

What would you do next for Misha? (Diagnostically)

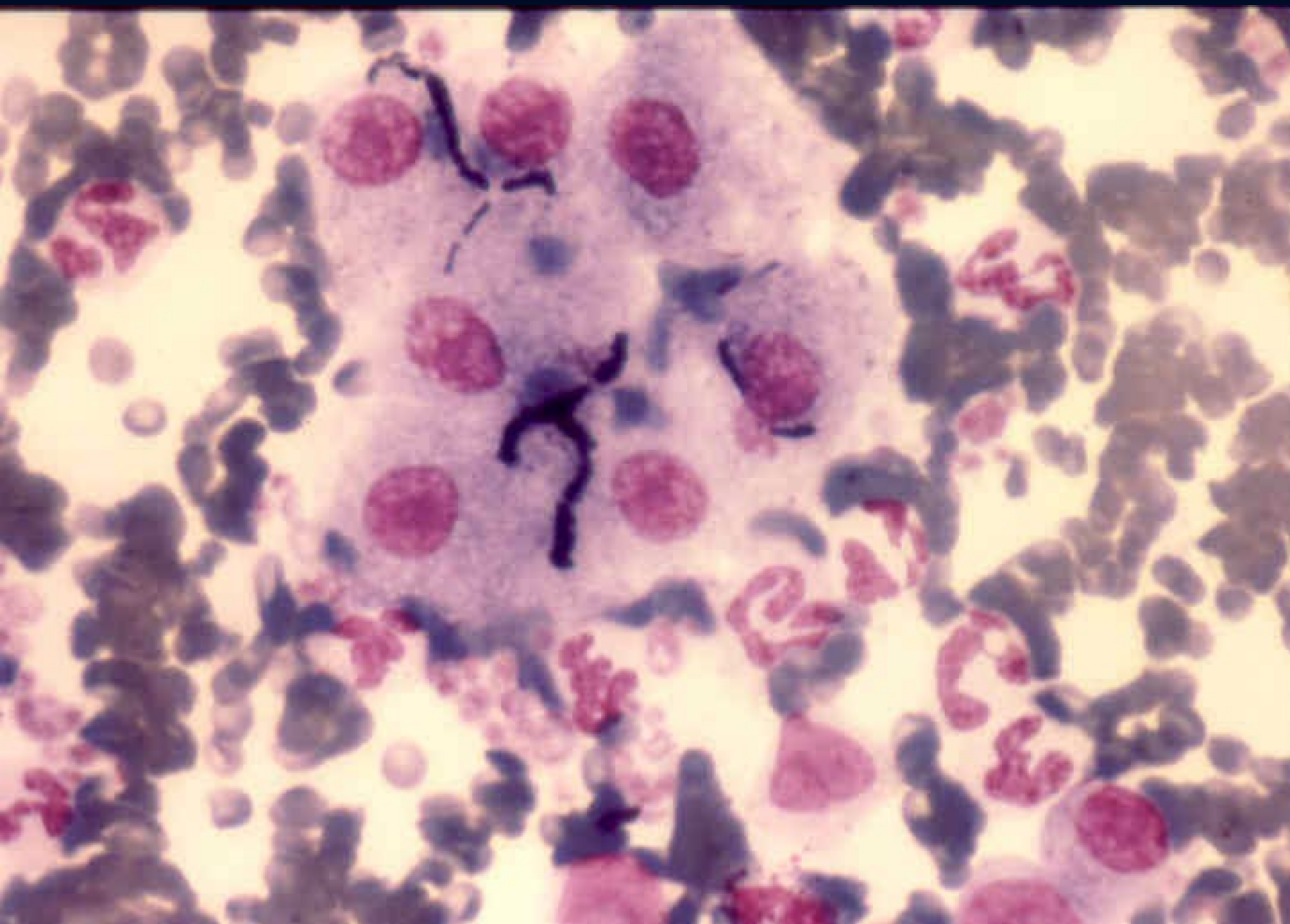
Bile Acids

Blood Ammonia

FNA of the Liver

Liver Biopsy

No other diagnostics;
start treatment



Misha; 3 yr, F/S, DSH
Diagnosis – Suppurative Cholangitis



What would be the MOST IMPORTANT aspect of treatment for Misha?

- Antibiotics **A**
- Steroids (eg. prednisolone) **B**
- Other immunosuppressives (eg. chlorambucil) **C**
- Lactulose and neomycin **D**
- Neutraceuticals (eg. SAmE, silymarin) **E**
- Ursodeoxycholic acid **F**
- Nutritional support **G**

Rank the treatment options for Misha.

Antibiotics

Prednisolone

Other immunosuppressives
(eg, Chlorambucil)

SAMe, silybin (Denamarin)

Ursodeoxycholic acid

Lactulose and neomycin

Nutritional support

Inflammatory Liver Disease Treatment Options



Symptomatic Therapy

■ Fluids

- Sodium chloride (0.45% or 0.9%), Normasol, or Ringer's)
- Dextrose should be added if the cat is hypoglycemic
- Potassium should be added if hypokalemic or while not eating
- B-vitamins important in cats

■ Heptoencephalopathy

- Lactulose
- Antibiotic (Neomycin, Metronidazole)

■ Avoid hypokalemia and alkalosis

- Monitor K^+ and TCO_2

Specific Therapy – Inflammatory Liver Disease

- Antibiotics
 - Amoxicillin-Clavulanate
 - Fluoroquinolone
 - Cephalosporin
 - Metronidazole
- Antioxidant/hepatoprotective therapy
- Ursodeoxycholic acid

- Immunosuppressive therapy – start in LC
hold off in SC unless not responding to
above or chronic



Culture-Independent Detection of Bacteria in Feline Inflammatory Liver Disease

D.C. Twedt¹; S.D. Janeczko²; K.W. McCord¹; J.L. Dudak¹; J.M. Cullen³; P. Fisher³; K.W. Simpson²

¹Colorado State University, Fort Collins, CO;

²Cornell University, Ithaca, NY;

³North Carolina State University, Raleigh, NC



ACVIM Forum, 2009



Culture-Independent Detection of Bacteria in Feline Inflammatory Liver Disease

■ Results

- Bacteria noted in 13/40 (32%) samples
- Concurrent disease, predominately pancreatic and GI disease, was present in 12 of 14 cats with intrahepatic bacteria.
- Bacterial culture was positive in 12/24 samples
 - 5 *E.coli*
 - 3 *Enterococcus*
 - 2 *Staphylococcus*
 - 1 *Actinomyces*
 - 1 *Streptococcus*
- FISH and culture concurred in 15/24 cases. FISH and culture revealed *E.coli* in 3/3 NC with invasive bacteria.
- In 3/6 sections with capsular bacteria FISH and culture concurred, and 3 FISH positive samples were culture negative.

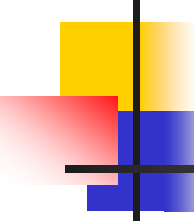


Culture-Independent Detection of Bacteria in Feline Inflammatory Liver Disease

■ Conclusions

- The results of this study suggest that bacteria may play a role in the etiology of feline inflammatory liver disease. The localization of intrahepatic bacteria suggests translocation of enteric bacteria is a likely source of infection.





Bacterial culture results from liver, gallbladder, or bile in 248 dogs and cats evaluated for hepatobiliary disease: 1998-2003

Wagner KA, Hartmann FA, Trepanier LA

University of Wisconsin - Madison



J Vet Intern Med. 2007; 417-24.



Results

- Biliary cultures yielded a significantly higher percentage of positive results overall (30% [18 of 60]) than did hepatic cultures (7% [15 of 215]).
- In patients with cholecystitis, 62% (8 of 13) had positive biliary cultures.
- In patients with hepatic inflammation, 23% (7 of 30) had positive bile cultures, whereas only 6% (6 of 103) had positive hepatic cultures.



Specific Therapy – Inflammatory Liver Disease

- Antibiotics
 - Amoxicillin-Clavulanate
 - Fluoroquinolone
 - Cephalosporin
 - Metronidazole
- Antioxidant/hepatoprotective therapy
- Ursodeoxycholic acid

- Immunosuppressive therapy – start in LPH
hold off in CH unless not responding to
above

Immunosuppressive Therapy

- Prednisone/Prednisolone - anti-inflammatory vs. immunosuppressive
 - [4 mg/kg/day for 2-3 weeks then taper]
- Chlorambucil
 - [1 mg po twice/wk; < 7 lbs]
 - [2 mg po twice/wk; > 7 lbs]
- Ursodeoxycholic acid [10-15 mg/kg/day]

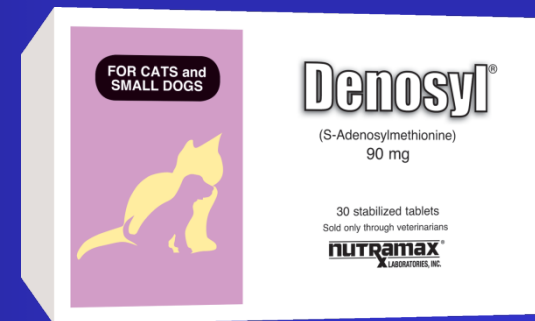
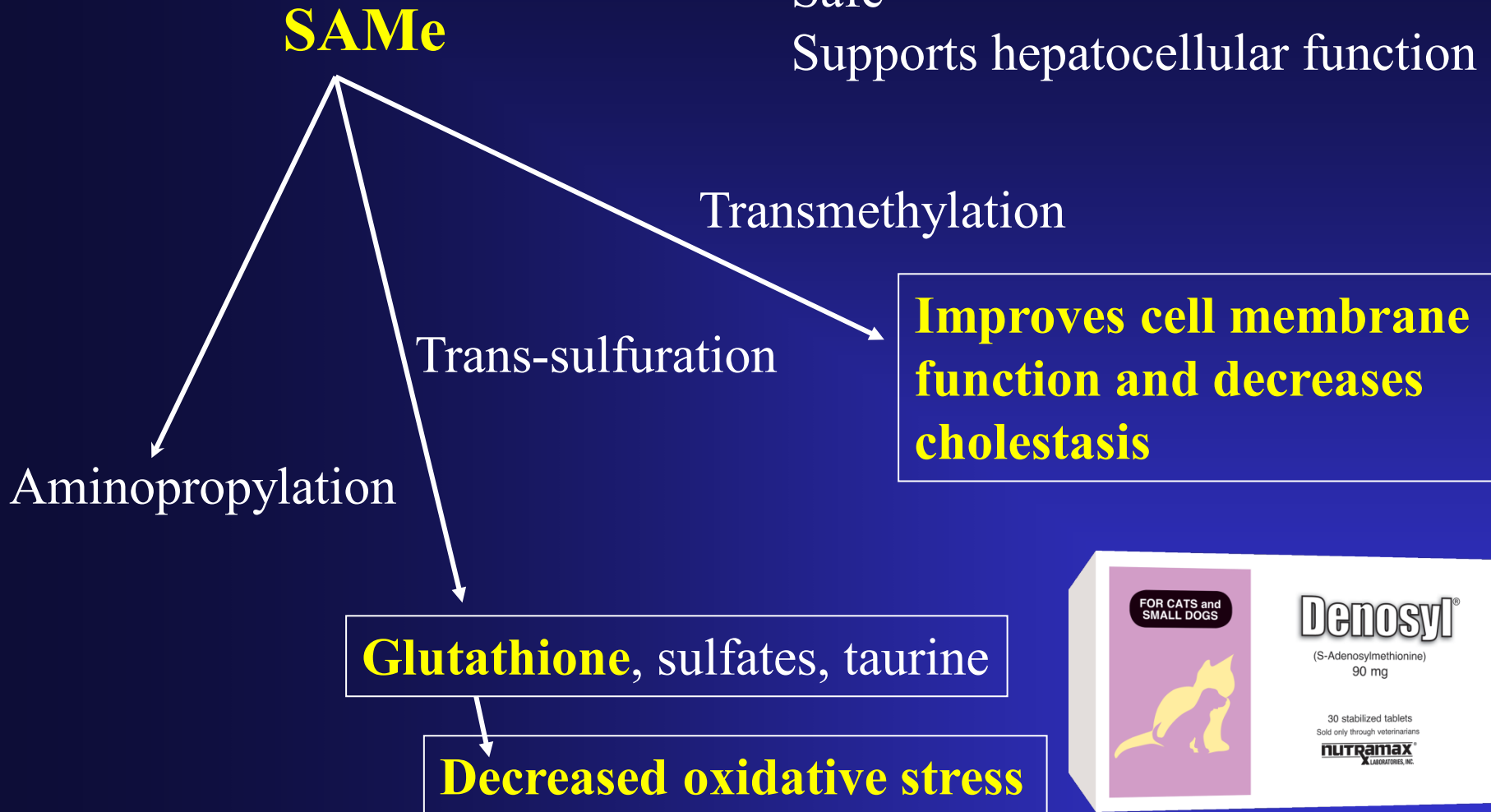
Other Therapy



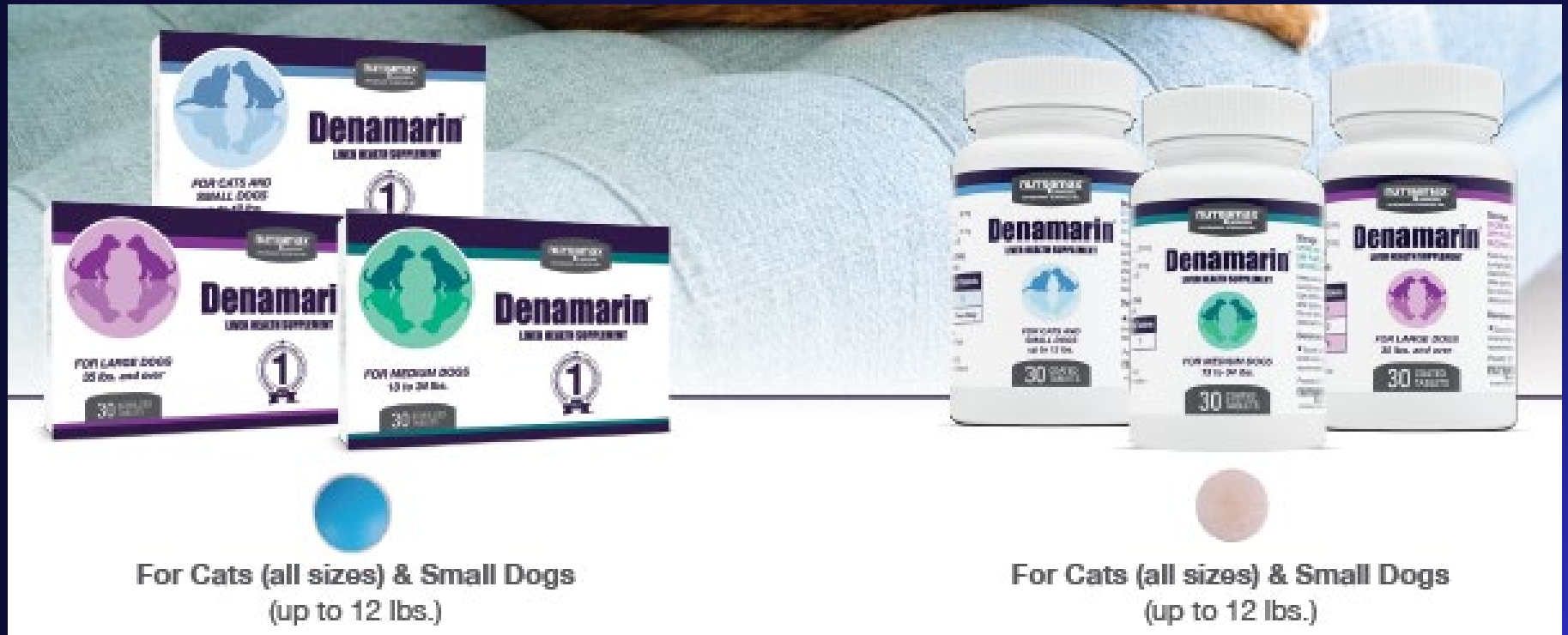
- Vitamin K₁ – [0.5-1.5 mg/kg IM 24 hours before biopsy]
- Vitamin B supplementation
- Vitamin E – antioxidant [aqueous alpha-tocopherol, 10-100 IU/kg/day; use higher dose in cats with partial biliary obstruction]
- Ursodeoxycholic acid [10-15 mg/kg/day]
- **SAMe** – [90-180 mg po SID]
 - Precursor of glutathione
 - Glutathione reduced in dogs and cats with liver disease
 - Glutathione important antioxidant
 - Important in hepatic metabolism and detoxification
- Silymarin – Milk thistle [50-200mg/kg po SID]

SAMe [S-Adenosylmethionine; Denosyl®]

Safe
Supports hepatocellular function



Silymarin + SAMe



Denamarin Advanced

- Improved bioavailability
 - Reduced costs
- Chewable tablet
 - Improved palatability



Nutritional Support

- Most important part of treatment of hepatic lipidosis but also important in other liver diseases of cats.
- Caloric intake should be:
(80-100 kcal/kg/day)











Nutritional Support

- Appetite stimulants

 - Mirtazapine (2 mg po)

 - Capromorelin (Elura™) (2 mg/kg po sid)

 - May cause bradycardia and hypotension

 - Cyproheptadine (2 mg po)

 - B-vitamins

 - Oxazepam (0.1 mg/kg po sid/bid)

 - Diazepam [Valium] (0.1 ml IV)

 - Midazolam (2-5 mcg/kg IV)

- Enteral feeding - necessary in most cases of idiopathic hepatic lipidosis



Mirtazapine as an appetite stimulant in cats

- Mirtazapine (Mirataz™)

- Appetite stimulant
- Antiemetic

- Mixed-Profile Serotonin Agonist/Antagonist Tetracyclic Antidepressant that increases serotonin by stimulating 5HT1 receptors centrally while antagonizing 5HT2 and 5HT3 receptors; also has antihistaminic properties

- Dose – 1/8 to 1/4 of a 15 mg tab po twice a week
 - (3.75 mg/cat twice a week or 1 mg/cat sid)

- Serotonin Syndrome – potential side effect

- Agitation, crying, diarrhea, hypertension, depression, blindness – dose dependent



Feline Pancreatitis



Difficult to diagnosis disease



What is the association between....

IBD

Liver disease

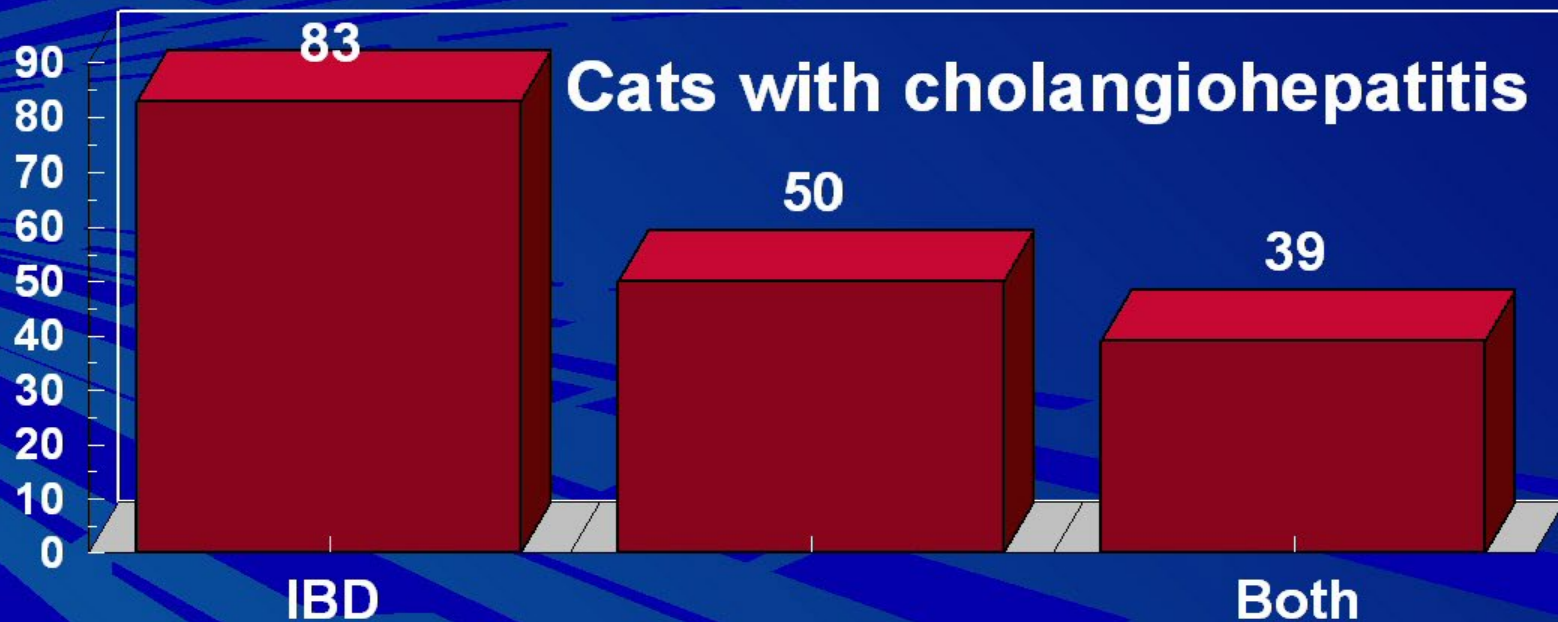
Pancreatitis



Relationship between inflammatory hepatic disease and inflammatory bowel disease, pancreatitis, and nephritis in cats

percent

Weiss et al. JAVMA 1996



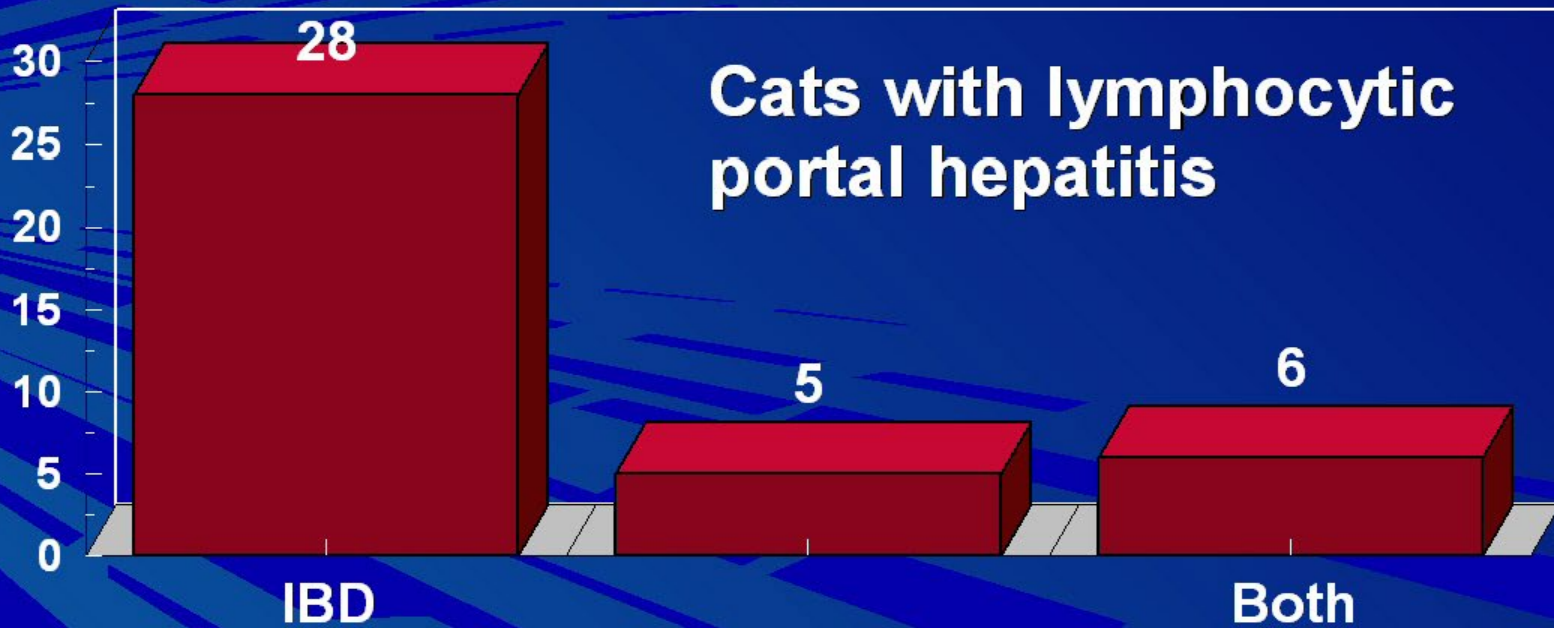
n=18

*significant

Relationship between inflammatory hepatic disease and inflammatory bowel disease, pancreatitis, and nephritis in cats

Weiss et al. JAVMA 1996

percent



Cats with lymphocytic portal hepatitis

IBD

Pancreatitis

Both

*not significant

n=39

Feline cholangitis: a necropsy study of 44 cats (1986-2008) Clark J, et al.

- Forty-four cats diagnosed with moderate to severe cholangitis at necropsy
- ANC (7) and CNC (33) comprised the majority of cases.
- Liver enzyme activity - not predictive of degree of inflammation.
- Inflammatory bowel disease (50%), pancreatitis (60%), or both (32%) commonly accompanied cholangitis.

Diagnosing feline pancreatitis

- **Clinical signs** – usually non-specific
- **Radiographs** – not as useful as in dogs
 - CT – not useful in diagnosing pancreatitis
- **Ultrasound** – low sensitivity (30%) and specificity
- **Amylase/Lipase** – useless in cats
- **fTLI** – low sensitivity, moderate specificity
- **fPLI** – longer half life and higher concentrations than fTLI in experimentally induced pancreatitis

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- **Ultrasound** – low sensitivity (30%) and specificity
- **Amylase/Lipase** – useless in cats??
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Agreement of the Serum Spec fPL™ and 1,2-O-Dilauryl-Rac-Glycero-3-Glutaric Acid-(6'-Methylresorufin) Ester (DGGR) Lipase Assay For the Determination of Serum Lipase in Cats with Suspicion of Pancreatitis

S. Oppliger; S. Hartnack; B. Riond; C.E. Reusch; P.H. Kook

University of Zurich, Switzerland



ACVIM Forum, 2013



DGGR Lipase and Feline Pancreatitis

- The aims of this study were to:
 - Evaluate the agreement of the DGGR-lipase activity and Spec fPL concentration in cats with suspicion of pancreatitis
 - Assess the effect of concurrent azotemia



DGGR Lipase and Feline Pancreatitis

■ Conclusions

- Results of both tests agree substantially.
- Concurrent azotemia does not seem to have a major effect on agreement of both methods of serum lipase determination.
- Based on these results the DGGR-assay seems a comparably useful and cost-efficient method for the determination of serum lipase in feline pancreatitis cases.



Feline Pancreatitis



Treatment??





Your poll will show here

1



Install the app from
pollev.com/app

2

Make sure you are in
Slide Show mode

Still not working? Get help at pollev.com/app/help
or

[Open poll in your web browser](#)



Chronic Feline Pancreatitis

How do I treat?

- If inflammatory liver disease and/or IBD
 - Manage those diseases
- If not or not sure I still manage as for inflammatory liver disease

Chronic Feline Pancreatitis

How do I treat?

- Antioxidant therapy??
- Steroids?
- Nutritional support?
- Antiemetics?
- Antibiotics?
- Pain management?

Pain Scores in Cats with Pancreatitis Compared to Control Cats

Mehain S, Slovak J, Villarino, N; Grubb, T

Washington State University Veterinary Teaching Hospital



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Pain Scores in Cats with Pancreatitis

■ Introduction

- Only two validated pain assessment scales for cats:
 - UNESP-Botucatu multidimensional composite pain scale (UBMCPS) and
 - Glasgow composite measure pain scale (GCMPS).
- These scales have been validated in cats with acute, post-operative pain.

■ Goal

- To determine if cats diagnosed with clinical pancreatitis had higher pain scores using the UBMCPS and GCMPS when compared to a control population of cats without clinical pancreatitis.

Choose the most appropriate expression from each section and total the scores to calculate the pain score for the cat. If more than one expression applies choose the higher score

LOOK AT THE CAT IN ITS CAGE:

Is it?

Question 1

- Silent / purring / meowing 0
- Crying/growling / growling 1

Question 2

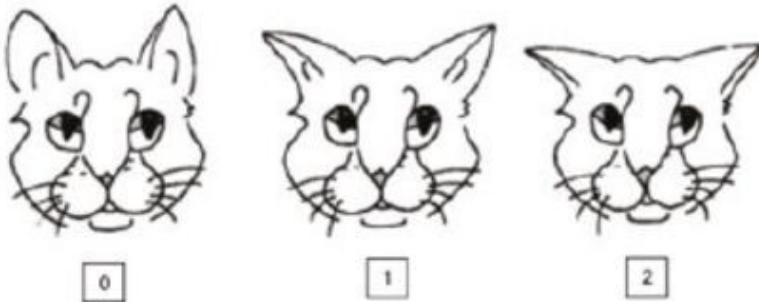
- Relaxed 0
- Licking lips 1
- Restless/cowering at back of cage 2
- Tense/crouched 3
- Rigid/hunched 4

Question 3

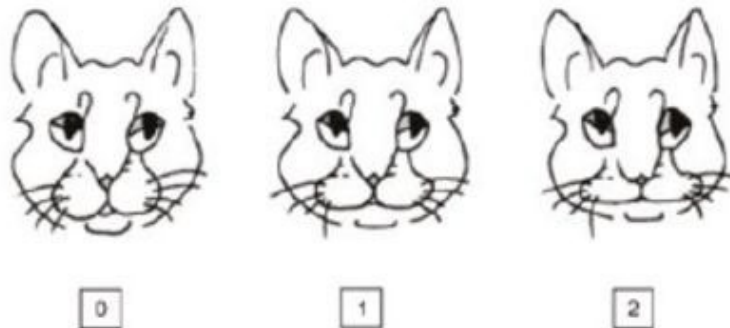
- Ignoring any wound or painful area 0
- Attention to wound 1

Question 4

a) Look at the following caricatures. Circle the drawing which best depicts the cat's ear position?



b) Look at the shape of the muzzle in the following caricatures. Circle the drawing which appears most like that of the cat?



Question 5

Does it?

- Respond to stroking 0

Is it?

- Unresponsive 1
- Aggressive 2

IF IT HAS A WOUND OR PAINFUL AREA, APPLY GENTLE PRESSURE 5 CM AROUND THE SITE. IN THE ABSENCE OF ANY PAINFUL AREA APPLY SIMILAR PRESSURE AROUND THE HIND LEG ABOVE THE KNEE

Question 6

Does it?

- Do nothing 0
- Swish tail/flatten ears 1
- Cry/hiss 2
- Growl 3
- Bite/lash out 4

Question 7





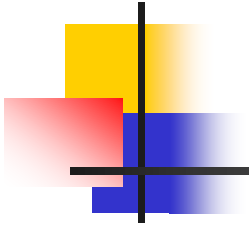
Pain Scores in Cats with Pancreatitis

- Methods
 - Prospective study
 - 18 cats presenting for suspected pancreatitis
 - 13 qualified for enrollment based on clinical signs (ex. lethargy, dysrexia, anorexia, weight loss) and abnormal feline pancreatic lipase immunoreactivity (Spec fPLI)
 - All 13 cats had initial pain scores on admission performed using both pain scales (UBMCPS and GCMPS).
 - 7 cats enrolled as controls that had normal Spec fPLI values and had also received pain scoring.



Pain Scores in Cats with Pancreatitis

- Results and Conclusions
 - Cats with pancreatitis did not have higher pain scores than cats without pancreatitis.
 - Based on the authors' clinical impression of the cats, the results likely indicate that the pain scoring systems used are not sensitive indicators of chronic medical pain in cats.



Pain Assessment in Feline Pancreatitis at Diagnosis Compared to Recheck Evaluation

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Pain Assessment in Feline Pancreatitis

■ Methods

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- All 13 cats had initial pain scores on admission performed using both pain scales (UBMCPS and GCMPS)
- 10 of the cats had follow-up pain scores at recheck



Pain Assessment in Feline Pancreatitis

■ Results

- Cats had lower overall pain scores using both pain scales at follow-up compared to at the time of initial presentation.

■ Conclusions

- These results support that cats with pancreatitis have a detectable reduction in their pain scores at the time of recheck evaluation compared to their initial presentation at the time of diagnosis with pancreatitis.

Pain Management – Feline Pancreatitis

- Buprenorphine (0.005 - 0.02 mg/kg IV, IM, or PO (transmural) q 4 to 12hr)
- Meperidine (1 - 2 mg/kg IM q 2 to 4 hours)
- Butorphanol (0.2 - 0.4 mg/kg IM q 2 to 4 hours)
- Fentanyl (CRI) (2-4 μ g/kg/hr)
- Lidocaine (CRI) (20 μ g/kg per minute IV)
- Ketamine (CRI) (2 - 20 μ g/kg per minute or 0.1 - 1.2 mg/kg/ hr IV)
- Tramadol (1–4 mg/kg PO q 12 hr)
- Gabapentin (5mg/kg PO q 24 hr) Ramp up or taper to effect (range 5–20mg/kg)

Feline Pancreatitis



Prognosis??



Clinical Significance of Increased Serum Feline Pancreatic Lipase Immunoreactivity Concentrations in Cats with Inflammatory Bowel Disease

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Feline PLI in Cats with IBD

■ Conclusions

- A high number of cats with IBD had increased serum fPLI concentrations.
- The outcome for cats with increased serum fPLI concentrations was not different from cats with normal serum fPLI concentrations.
- It is noteworthy that cats with serum fPLI concentrations ≥ 12.0 $\mu\text{g/L}$ have lower serum albumin and cobalamin concentrations than cats with serum fPLI concentrations in the questionable and reference range, respectively.



