

The Philosophy Behind Diagnosing GI & Liver Disease

Craig B. Webb, PhD, DVM, DACVIM
Professor, Small Animal Medicine
Colorado State University
cbwebb@colostate.edu



Dr. Eric Shreves



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cbwebb@colostate.edu



Disclosure

I have nothing to disclose and none of the patients in these presentations are members of my immediate family



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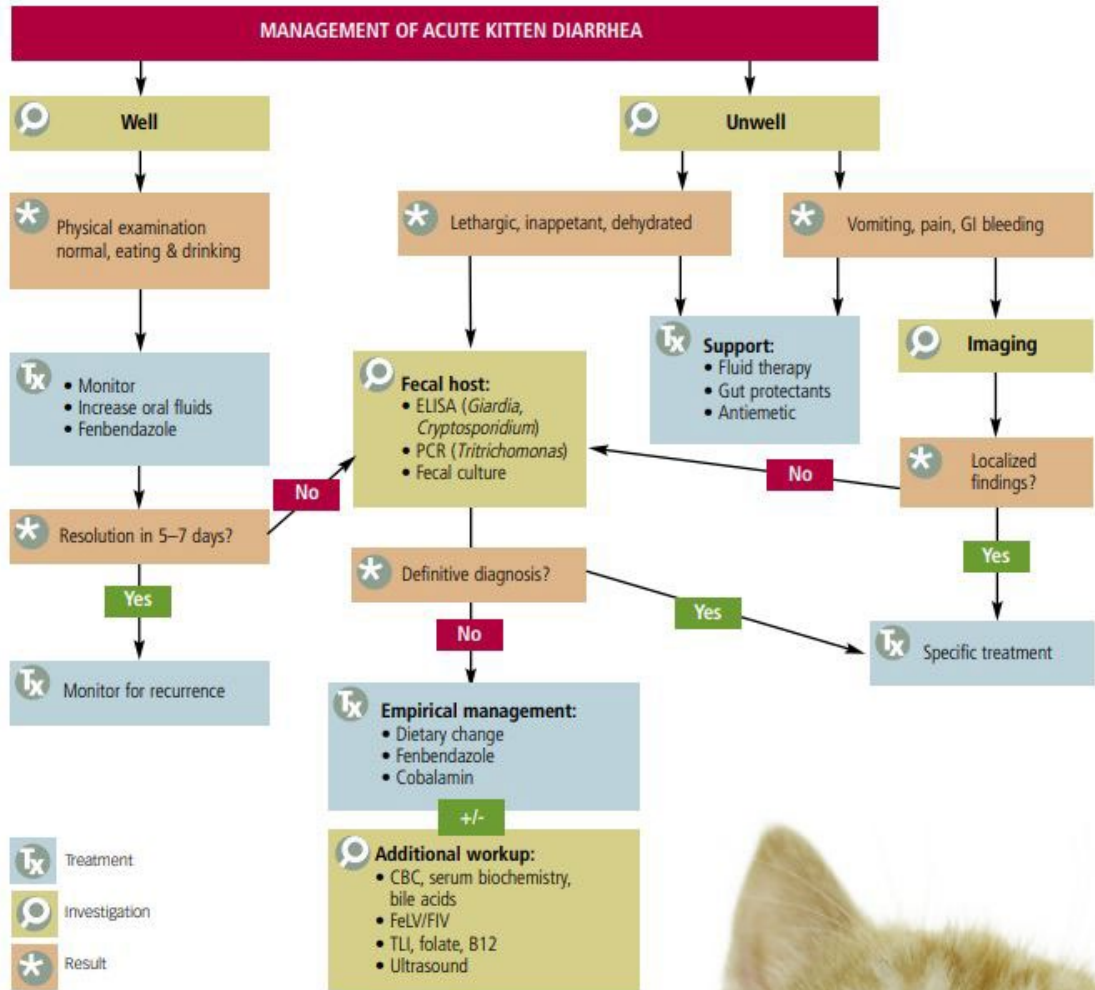
Learning Objectives: Specific Action Items

- 1) “After participating in this session, attendees should be able to...List the rule-outs for diarrhea in a kitten.”

Management of Kitten Diarrhea

Kittens with diarrhea present with a spectrum of clinical signs ranging from mild and self-limiting to severe and life-threatening, especially when serious complications, such as dehydration, sepsis, and gastrointestinal hemorrhage, occur.

Melanie Craven, BVetMed,
DSAM, MRCVS,
Diplomate ECVIM
(Companion Animal)
Cornell University



CBC = complete blood count; ELISA = enzyme-linked immunosorbent assay;
 FeLV = feline leukemia virus; FIV = feline immunodeficiency virus; GI = gastrointestinal;
 PCR = polymerase chain reaction; TLI = trypsin-like immunoreactivity

- 1) Treat the Underlying Disease
- 2) Tell the truth and shame the Devil
- 3) By failing to prepare, you are preparing to fail
- 4) Doubt the conventional wisdom; verify it with reason and experiment
- 5) The eye sees only what the mind is prepared to comprehend
- 6) There are no right answers to wrong questions

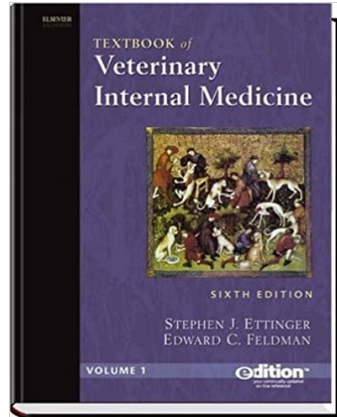
8) We are not makers of history.

We are made by history.

9) One finger in the throat and one in the rectum
makes a good diagnostician

10) Elementary, my dear Watson

Objective #1



Treat the Underlying Disease



6 yo FS DLH

**The Problem: Chronic intermittent
vomiting**



The Diagnosis



The Treatment



HAIR BALLS IN CATS

A normal nuisance or a sign that something is wrong?

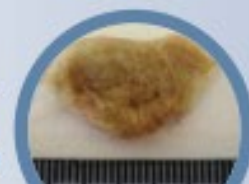
Martha Cannon

Just how limited is our knowledge?

Vomiting of hair balls (fur balls) is a common problem in domestic cats, to the extent that it is considered by many owners to be a normal feline



Practical relevance: Vomiting of hair balls is a common problem in domestic cats, to the extent that it is considered by many owners and veterinarians to be



The Truth Is WE DON'T KNOW

Evidence base: Studies concerning this common problem are lacking and there are no previously published data regarding the incidence of hair balls in pet cats or potential predisposing causes. Although a range of commercial hair ball control diets are available there is no objective information in the public domain regarding their efficacy. Similarly, no studies have evaluated the success of other commonly recommended preventive strategies.

Obj #2: Tell the truth, shame the Devil



François Rabelais

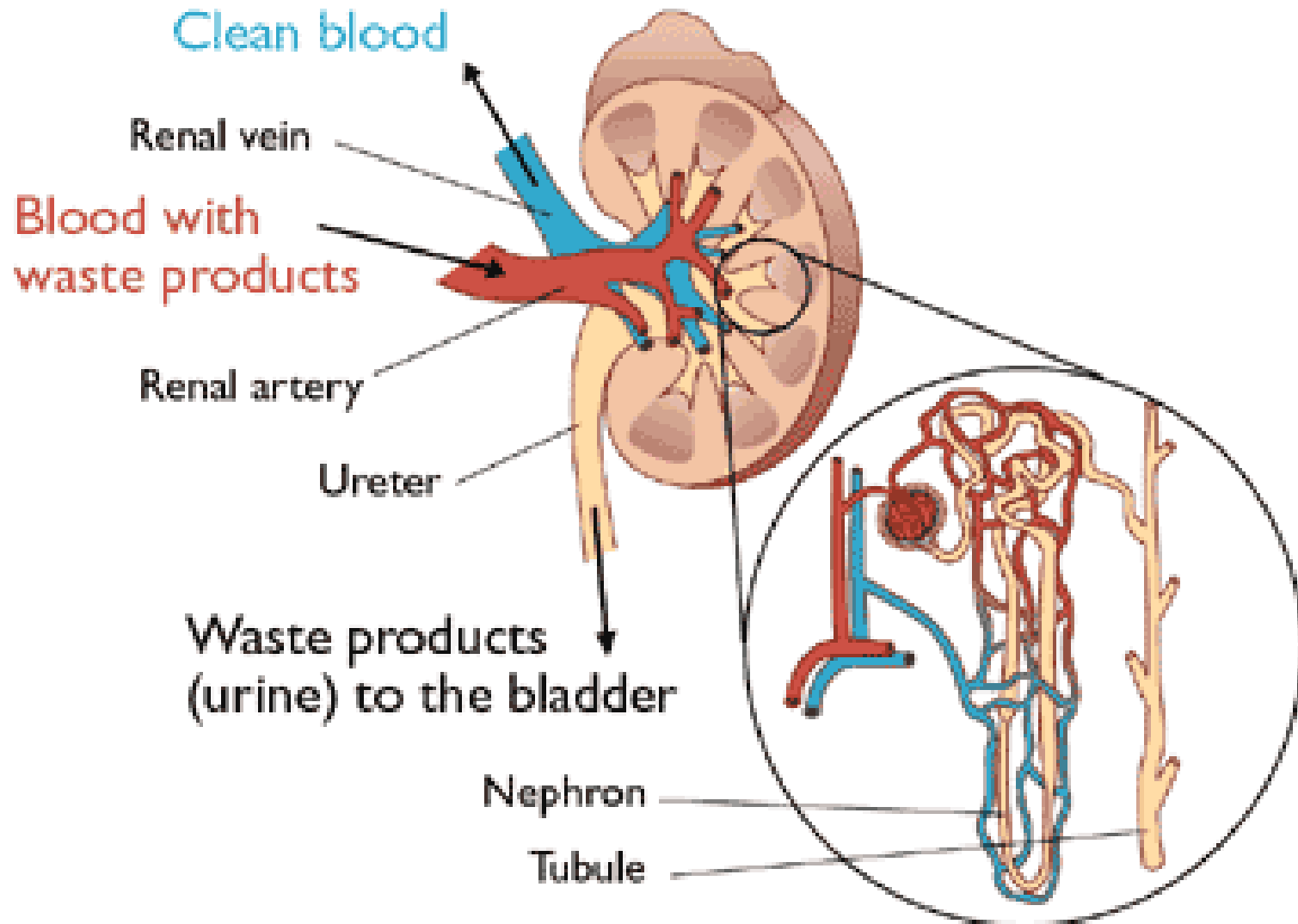
“Big Ben”

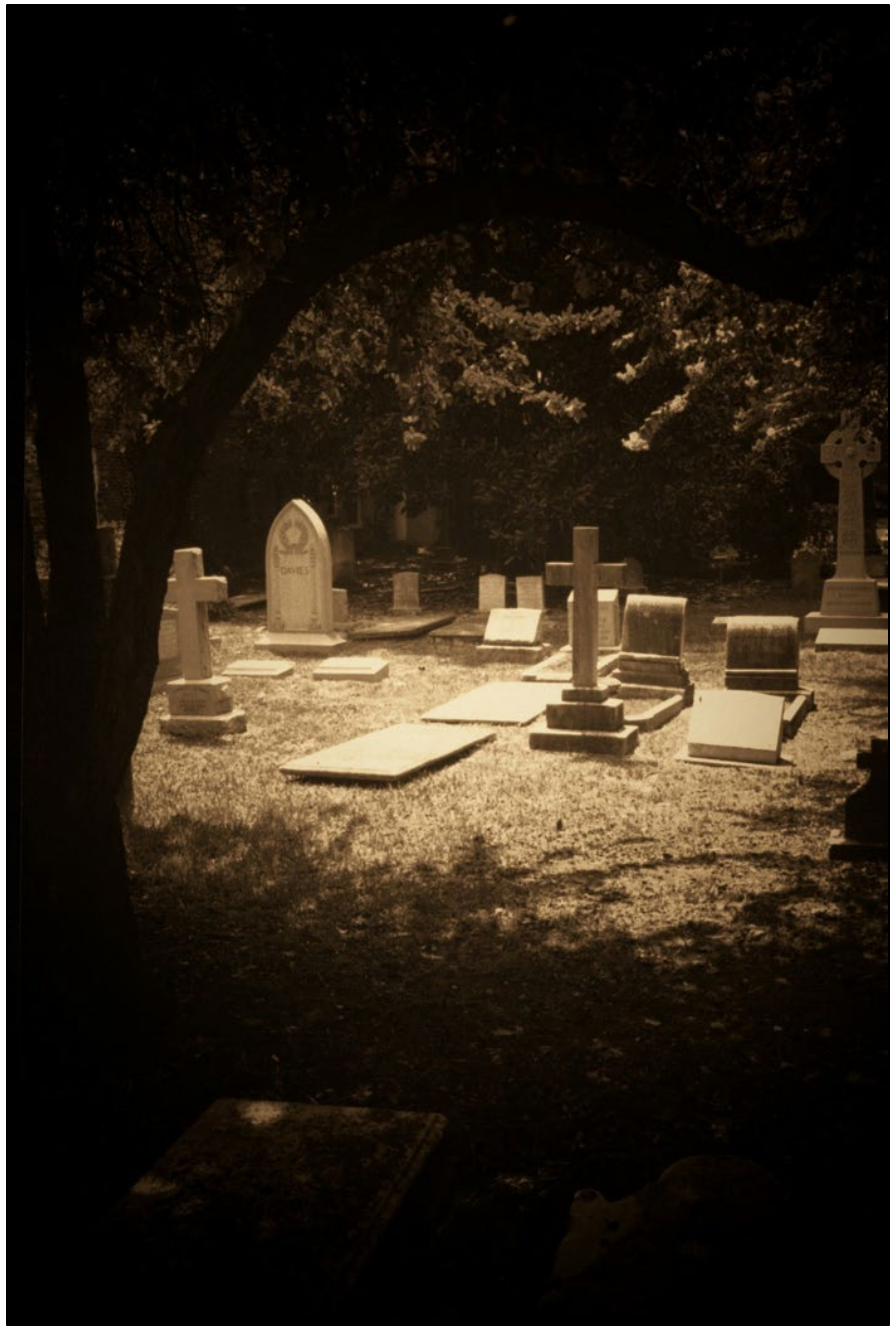
Sig: 2 yr old MC Lab

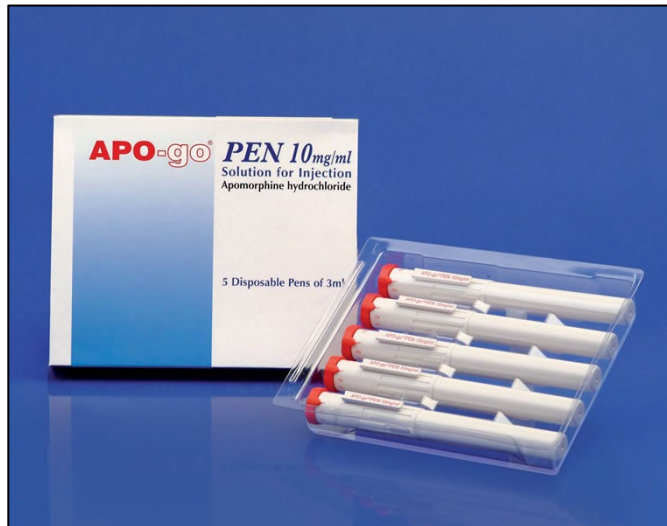
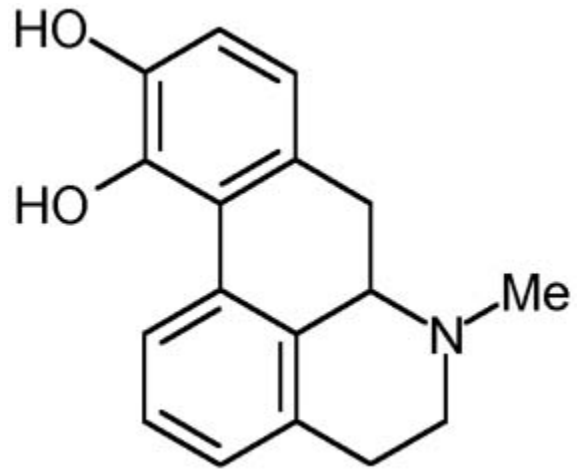




How the kidney works





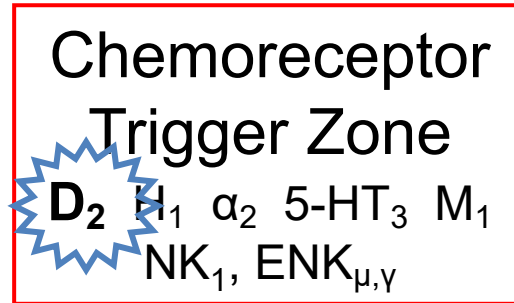
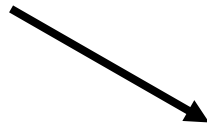


Dopaminergic Receptor

Apomorphine

D₂ agonist

K-9 Emetic



D₂ = Dopaminergic

H₁ = Histaminergic

α₂ = Adrenergic

5-HT₃ = Serotonergic

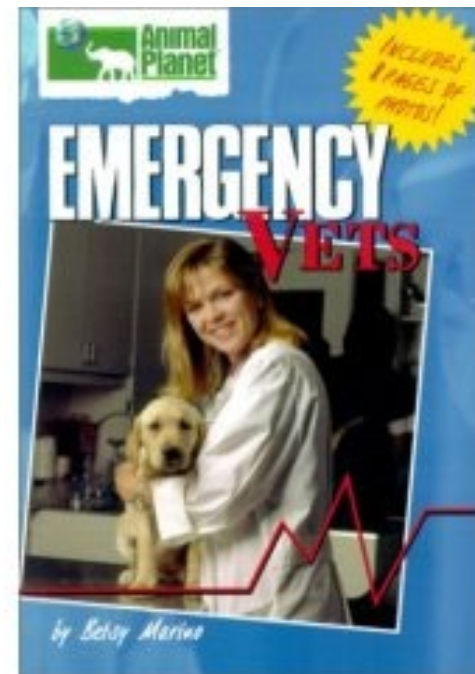
M₁ = Muscarinic (ACh)

ENK_{μ,γ} = Enkephalinergic

NK₁ = Neurokinergic



Intern Stud





animalplanet.com

EMERGENCY
VETS

People
HOME .com



Most
Beautiful
People
2002



Dr. Steve Petersen
CSU Graduate
Board Certified Surgeon
Alameda Intern Director





Apomorphine in Cats

▶ **“Use of apomorphine in cats is controversial and many recommend not using in this species.”**

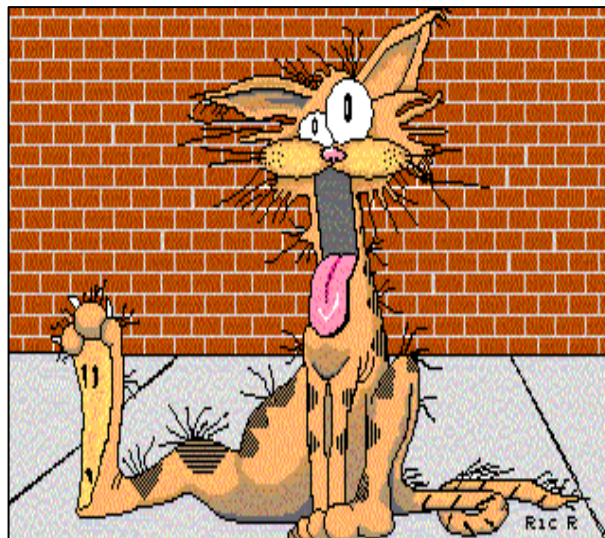
– Plumb pg. 86



Dopaminergic Receptor

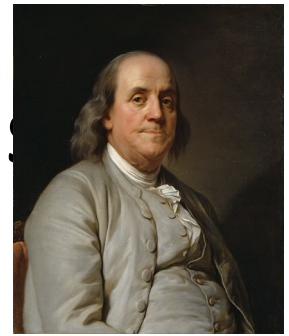
Chemoreceptor
Trigger Zone

~~D₂~~ H₁ α₂ 5-HT₃ M₁
NK₁ ENK_{μ,γ}

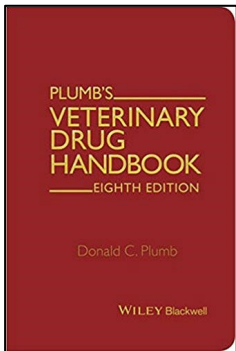


Obj #4: By failing to prepare, you are preparing to fail.

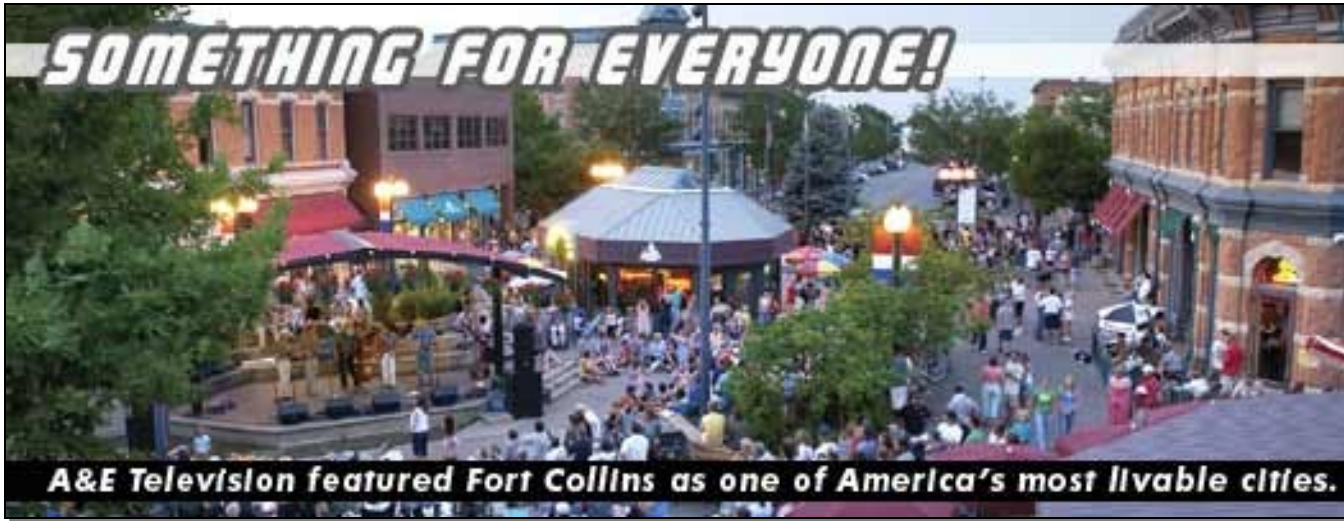
Read up on the mechanisms and effects of drugs **BEFORE** you administer them.



Big Ben

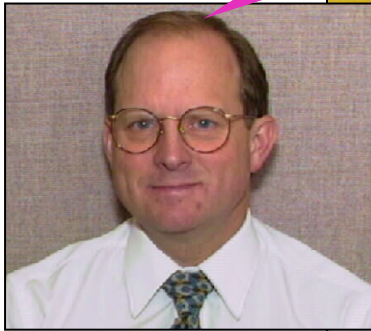


A screenshot of a web browser window. The address bar shows the URL 'https://beta.vin.com/members/frontpage/default.aspx'. The browser has two tabs: 'Front Page - VIN' and 'College of Veterinary Medicine...'. The page content includes a navigation menu with links like 'Admin AppRes - Home', 'Canvas Login', 'CSU - Research Integrity ...', 'Veterinary Information Ne...', and 'VTH Scheduler - Dashboard'. There is a search bar with the text 'All resources' and a search icon. At the bottom, there are two advertisements: 'The Daily pearl' on the left and 'Plumb's Small Animal Veterinary Drug Handbook, New 8th Edition' on the right.



Sig: 6 month old FS Devon Rex

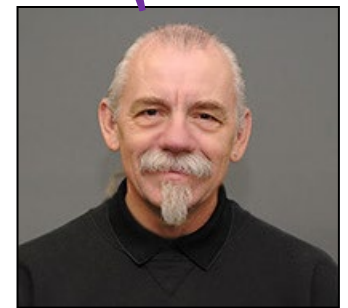
CC: acute onset vomiting



“GI Foreign Body – Scope!”



“Immune Mediated”



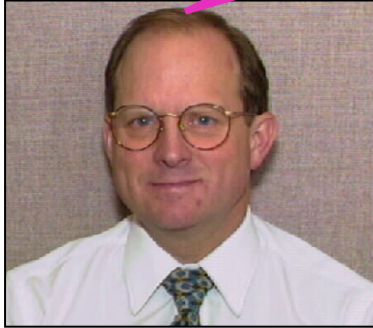
“Skin Issues” – Food Allergy”



“Shelter adoption – Infectious”

Sig: 6 month old FS Devon Rex

CC: acute onset vomiting



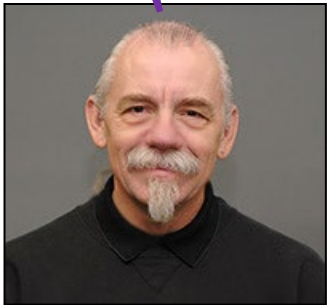
“GI Foreign Body – Scope!”



“What a cutie!”



“Immune Mediated”



“Skin Issues – Food Allergy”



“Shelter adoption – Infectious”





**Sig: “Gumby” 14 FS DLH
CC: Anorexia**



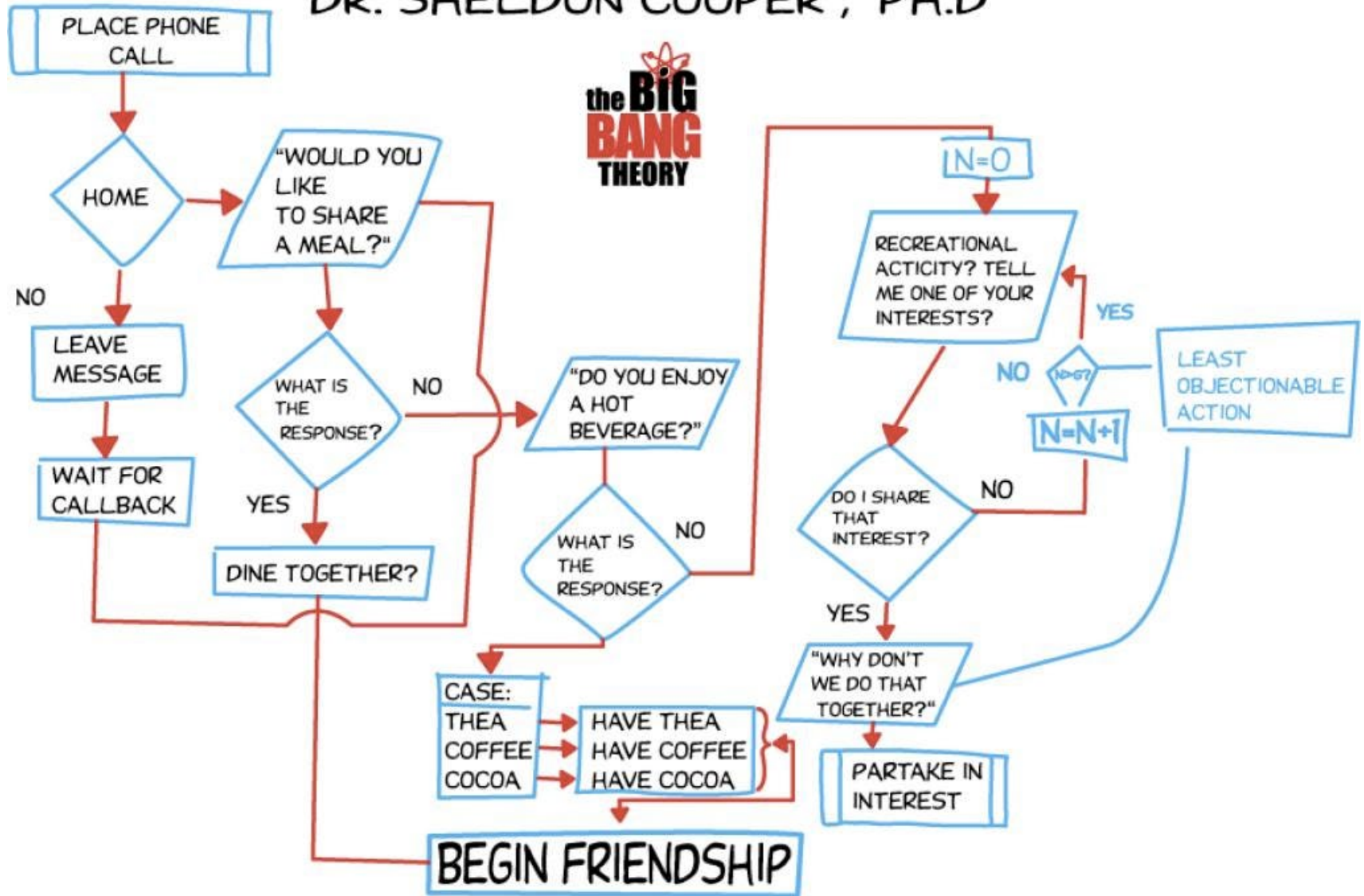
“Not eating is not normal for cats”



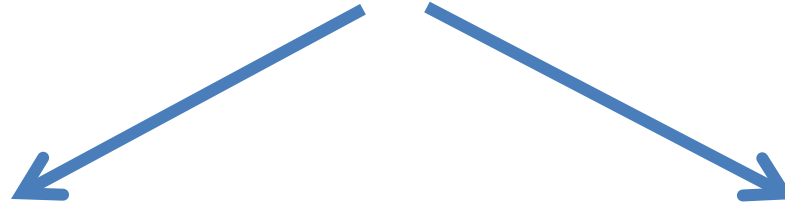
Dr. Tony Buffington

THE FRIENDSHIP ALGORITHM

DR. SHELDON COOPER, PH.D



ANOREXIA



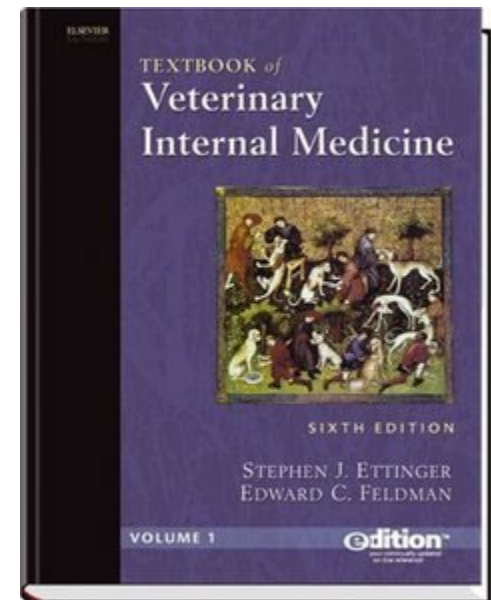
1° ANOREXIA

Brain Disease
Brain Trauma
Brain Tumor
Anosmia ([æ'n'ɒzmiə](#))

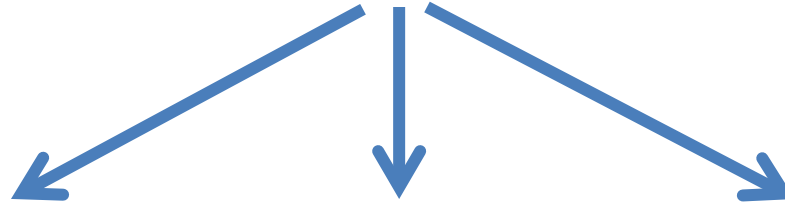


2° ANOREXIA

Everything Else



ANOREXIA



1° ANOREXIA

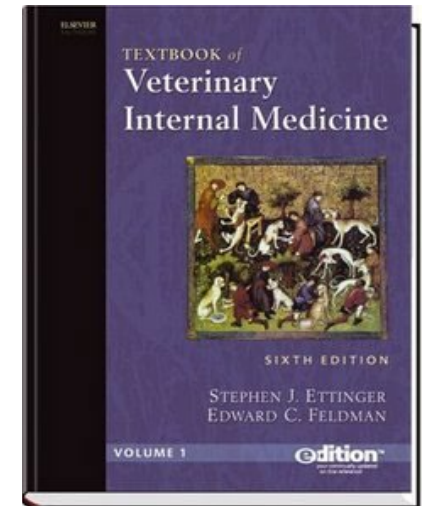
Brain Disease
Brain Trauma
Brain Tumor
Anosmia ([æn'ɒzmiə](#))



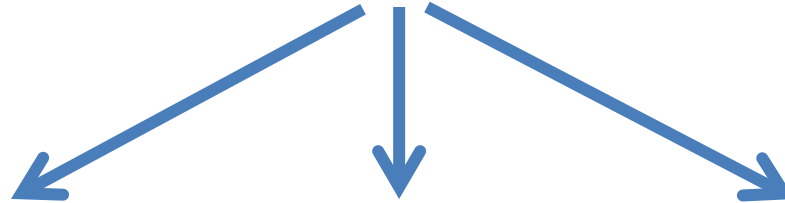
2° ANOREXIA Everything Else



Dr. Mike Lappin



ANOREXIA



1° ANOREXIA

Pseudo
ANOREXIA

2° ANOREXIA

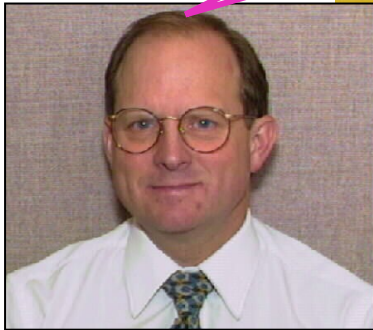
Dental Disease
Musculoskeletal
Pain
Routine, Change
Stress, Anxiety
Depression
Finicky
Food Addiction
Bowl design

**Sig: “Gumby” 14 FS DLH
CC: Anorexia**



Sig: 6 month old FS Devon Rex

CC: acute onset vomiting



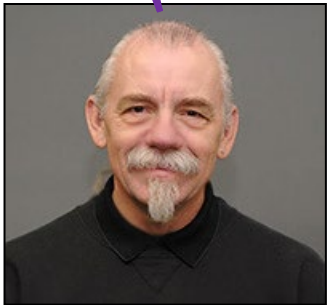
“GI Foreign Body – Scope!”



“What a cutie!”



“Immune Mediated”



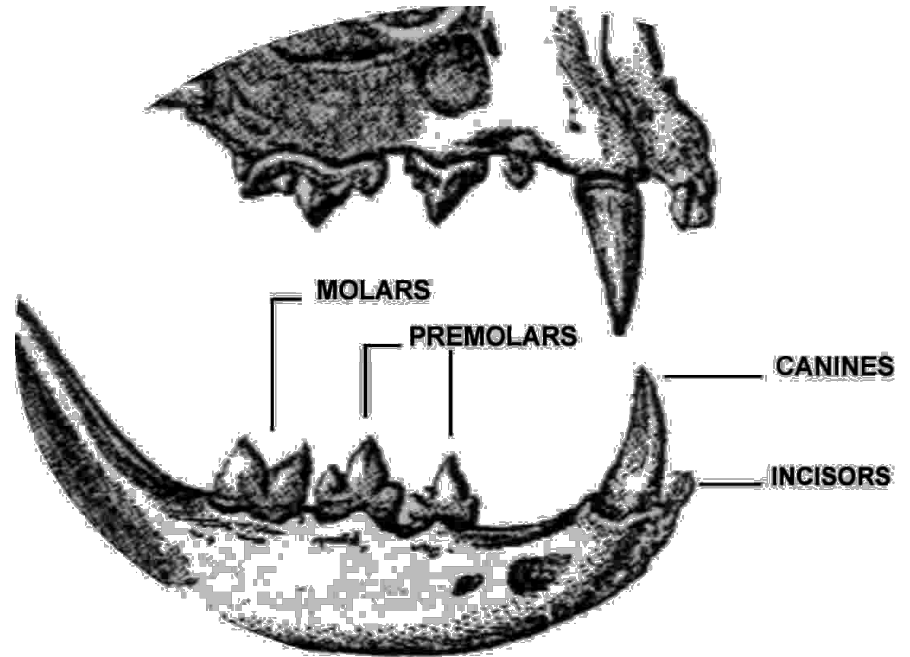
“Skin Issues – Food Allergy”



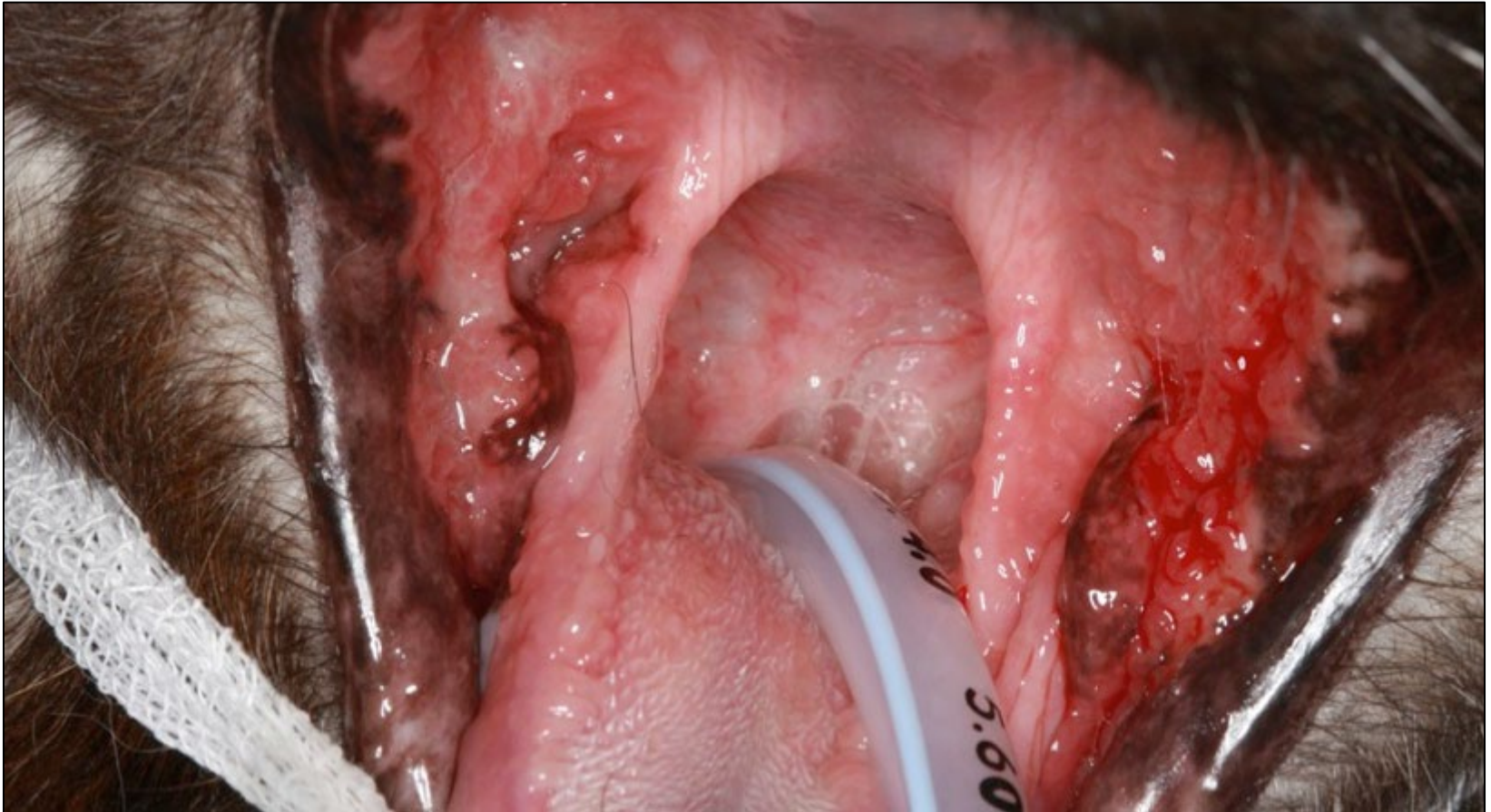
“Shelter adoption – Infectious”



Physical Examination



Feline Chronic Gingivostomatitis



Verify, Verify, Verify



**Obj #5: Doubt the conventional wisdom;
verify it with reason and experiment**

Steve
Albini

“Lilly” 2 yr. F Chinese Crested

- 2 months duration
- Poor appetite
- Lethargy
- Vomiting
 - Bile
 - Gastric fluid
 - Blood



P: Minimum Data Base (MDB)

PCV	31	(37-55)
WBC	10.2×10^3	$(6-17 \times 10^3)$
Neut	4.9×10^3	$(3-11 \times 10^3)$
Lymph	5.0×10^3	$(1-4.8 \times 10^3)$
Mono	0.2×10^3	$(0.2-1.4 \times 10^3)$
Eos	0.9×10^3	$(0.1-1.2 \times 10^3)$
BUN	62	(7-28)
Cr	1.9	(1.6-2.5)
Chol	125	(130-300)
Gluc	69	(65-122)
Na	149	(145-158)
K	5.2	(4.1-5.5)

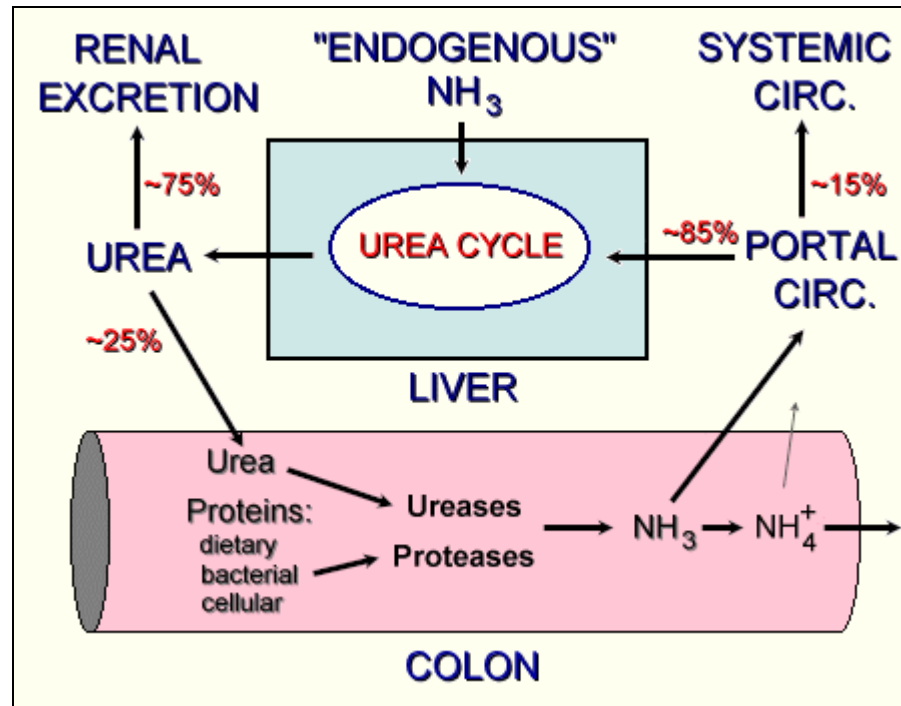
What do the MDB abnormalities tell you about your case?

P: MDB

PCV	31	(37-55)
WBC	10.2×10^3	$(6-17 \times 10^3)$
Neut	4.9×10^3	$(3-11 \times 10^3)$
Lymph	5.0×10^3	$(1-4.8 \times 10^3)$
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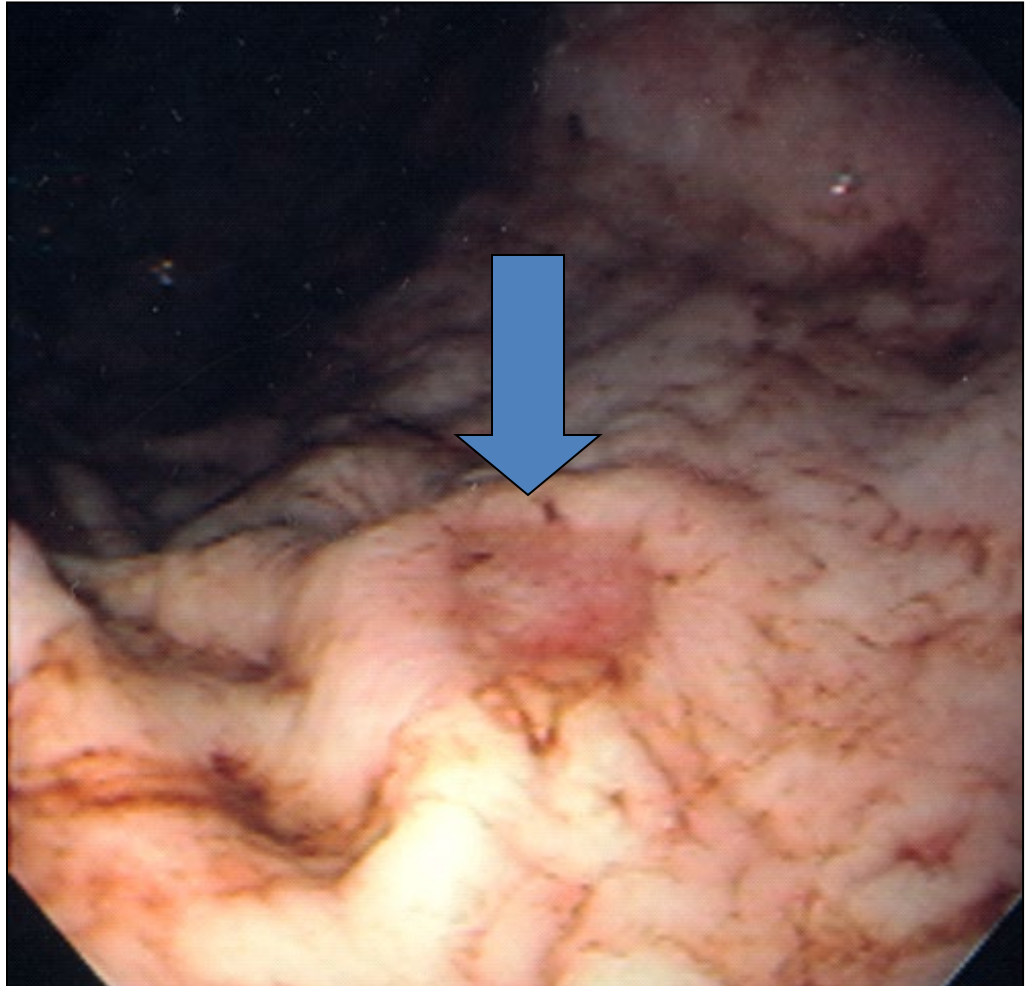
BUN:Cr Ratio

> 30 consistent w/ GI Ulceration



Endoscopy with Anesthesia (\$2300)

- Confirmed Gastric Ulceration



What's Missing?

A DIAGNOSIS

P: Minimum Data Base (MDB)

PCV	31	(37-55)
WBC	10.2×10^3	$(6-17 \times 10^3)$
Neut	4.9×10^3	$(3-11 \times 10^3)$
Lymph	5.0×10^3	$(1-4.8 \times 10^3)$
Mono	0.2×10^3	$(0.2-1.4 \times 10^3)$
Eos	0.9×10^3	$(0.1-1.2 \times 10^3)$
BUN	62	(7-28)
Cr	1.9	(1.6-2.5)
Chol	125	(130-300)
Gluc	69	(65-122)
Na	149	(145-158)
K	5.2	(4.1-5.5)

What do the MDB normalities tell you about your case?

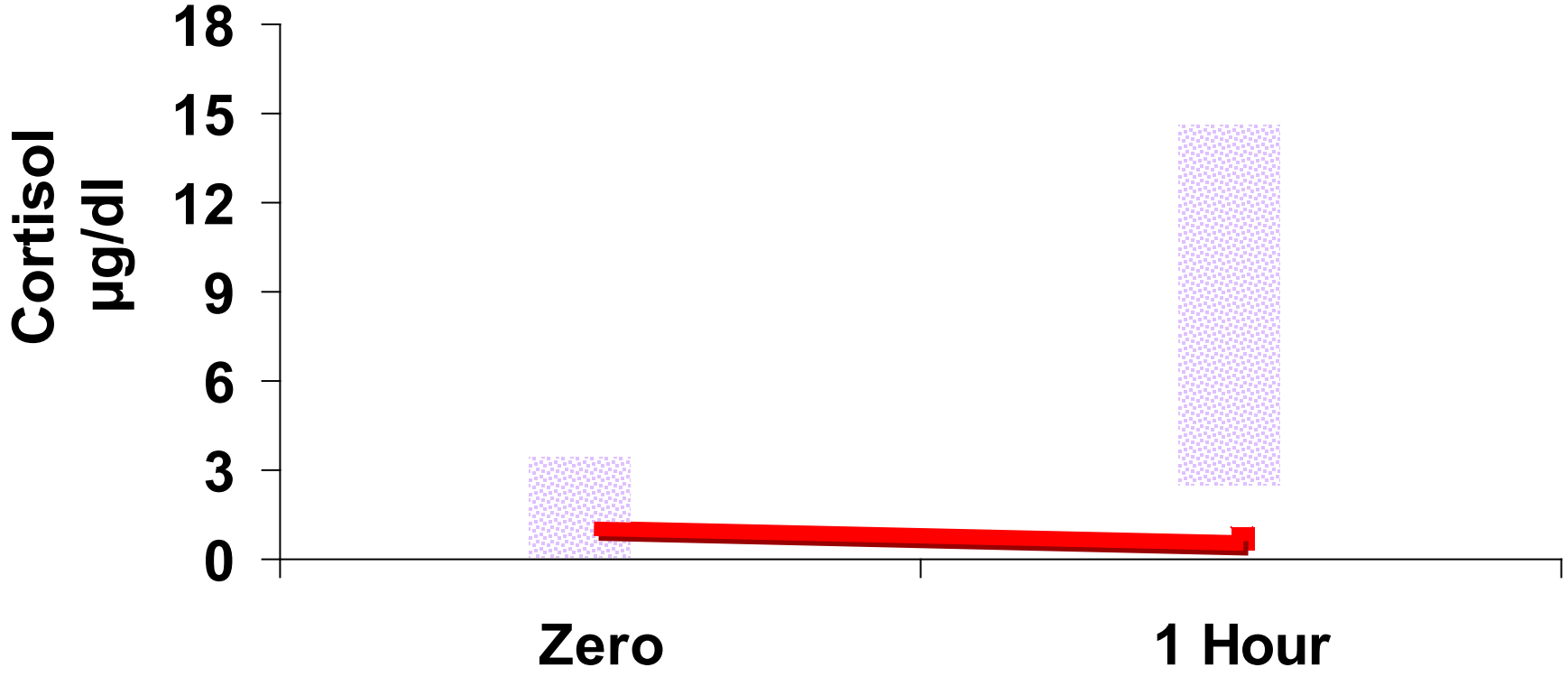
When Normal is not Normal

PCV	31	(37-55)
WBC	10.2 x 10 ³	(6-17 x 10 ³)
Neut	4.9 x 10 ³	(3-11 x 10 ³)
Lymph	5.0 x 10 ³	(1-4.8 x 10 ³)
Mono	0.2 x 10 ³	(0.2-1.4 x 10 ³)
Eos	0.9 x 10 ³	0.1-1.2 x 10 ³)
BUN	62	(7-28)
Cr	1.9	(1.6-2.5)
Chol	125	(130-300)
Gluc	69	(65-122)
Na	149	(145-158)
K	5.2	(4.1-5.5)

What's the next test you will order?

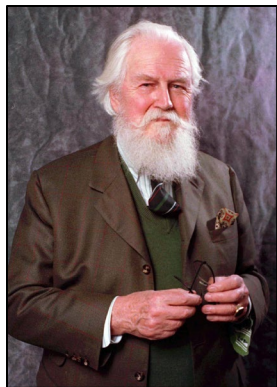
ACTH Stimulation Test (\$150)

ACTH Stimulation Test



“Lilly” 2 yr. F Chinese Crested

- Diagnosis:
 - “Atypical” Addison’s disease
- Treatment
 - Prednisone 0.2 mg/kg/day (\$0.15)
- Follow up



marked clinical improvement

**#6: The eye sees only
what the mind is prepared to comprehend.**

Robertson Davies

Sig: 1 yo MC Irish Terrier
CC: Vomiting





Rx

- CCU
- Fluids
- Cerenia
- Famotidine



Transfer to Med in the Morning

- Hx: Exp Laparotomy 1 month earlier
- Removal of GI FB (Rock)
- \$\$\$ Major Concern
- On The Clock
 - Either Go Home or Euthanize

Identify the Problem

- Define Problem
- Differentials
- Diagnostics
- Treatment Plan
- Assessment and Reassessment

Vomiting

- Primary GI
- Secondary GI
- Possible FB Obstruction

Radiographs - Equivocal

Fluids, Cerenia, Famotidine

Has not vomited since admission to CCU about 12 hours earlier



Identify the Problem

- Define Problem
- Differentials
- Diagnostics
- Treatment Plan
- Assessment and Reassessment

PICA

- Behavioral
- PSS
- EPI

Bile Acids, TLI

Fluids, Lactulose

Abdominal Ultrasound



Ursula K LeGuin

Obj #7: There are no right answers to wrong questions

“Alpo”



9 month old kitty-cat with diarrhea

Presentation

- Sig: 9mo FS Bengal
- CC: 2-3 months waxing & waning
Large Bowel Diarrhea
- Hx: acquired from Breeder/Cattery
- Dewormed (Fenbendazole)
- Treated for Giardia (Metronidazole)
- Several times to no effect







Which Box Would You Check?

PARASITOLOGY & PARASITOLOGY COMBINATIONS (if more than one test type is listed, **please circle desired test**)

General

- Fecal Flotation
- Fecal Screen - Includes float, direct, IFA
- Parasite Identification (Internal / External)
- Occult Blood
- Soil Analysis
- Trichinella* Digest
- Toxoplasma gondii* serology - non canine/feline

Ruminant/Camelid

- Baermann (Qualitative / Quantitative)
- Sedimentation (flukes)
- Cryptosporidium/Giardia* IFA
- Cryptosporidium* acid fast (bovine only)
- Toxoplasma gondii* PCR
- Neospora* ELISA
- T. foetus* (Culture - Diamond's / Culture - InPouch / PCR)

Equine

- Cryptosporidium/Giardia* IFA
- Pinworm (Cellophane Tape Technique)

Canine/Feline

- Heartworm serology
- Microfilaria (Knott's Test)
- Baermann (Qualitative / Quantitative)
- Cryptosporidium: IFA combined w/*Giardia*
- PCR
- Giardia*: IFA combined w/*Cryptosporidium*
- ELISA
- PCR
- Ehrlichia/Anaplasma/Neorickettsia* PCR
- RMSF IFA (titer)

(Canine/Feline continued)

- Ehrlichia/Lyme/Anaplasma/Heartworm* Screen with *Ehrlichia/Anaplasma/Neorickettsia* PCR
- Ehrlichia canis* IFA (titer) with *Ehrlichia/Anaplasma/Neorickettsia* PCR
- Bartonella* (PCR / ELISA - feline only) *Bartonella* PCR plus ELISA
- Haemoplasma* spp PCR
- Fever/Blood Donor Panel - *Ehrlichia/Bartonella/Haemoplasma* PCR
- Toxoplasma gondii* (IgG-IgM ELISA / PCR)
- Neospora caninum* (serology / PCR)
- T. foetus/Trichomonads* (Culture - Diamonds / Culture - InPouch / PCR)

Other (please specify test & species): _____

Presentation

- Sig: 9mo FS Bengal
- CC: 2-3 months waxing & waning
Large Bowel Diarrhea
- Hx: acquired from Breeder/Cattery
- Dewormed (Fenbendazole)
- Treated for Giardia (Metronidazole)
- *Several times to no effect*



Which Box Would You Check?

PARASITOLOGY & PARASITOLOGY COMBINATIONS (if more than one test type is listed, please circle desired test)

General

- Fecal Flotation
- Fecal Screen - Includes float, direct, IFA
- Parasite Identification (Internal / External)
- Occult Blood
- Soil Analysis
- Trichinella Digest
- Toxoplasma gondii serology - non canine/feline

Ruminant/Camelid

- Baermann (Qualitative / Quantitative)
- Sedimentation (flukes)
- Cryptosporidium/Giardia IFA
- Cryptosporidium acid fast (bovine only)
- Toxoplasma gondii PCR
- Neospora ELISA
- T. foetus (Culture - Diamond's / Culture - InPouch / PCR)

Equine

- Cryptosporidium/Giardia IFA
- Pinworm (Cellophane Tape Technique)

Canine/Feline

- Heartworm serology
- Microfilaria (Knott's Test)
- Baermann (Qualitative / Quantitative)
- Cryptosporidium: IFA combined w/Giardia
- PCR
- Giardia: IFA combined w/Cryptosporidium
- ELISA
- PCR
- Ehrlichia/Anaplasma/Neorickettsia PCR
- RMSF IFA (titer)



Tritrichomonas PCR

- Ehrlichia canis IFA (titer) with Ehrlichia/Anaplasma/Neorickettsia PCR
- Bartonella (PCR / ELISA - feline only) Bartonella PCR plus ELISA
- Haemoplasma spp PCR
- Fever/Blood Donor Panel - Ehrlichia/Bartonella/Haemoplasma PCR
- Toxoplasma gondii (IgG-IgM ELISA / PCR)
- Neospora caninum (serology / PCR)
- T. foetus/Trichomonads (Culture - Diamonds / Culture - InPouch / PCR)

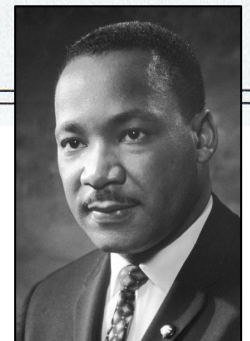
Other (please specify test & species): _____

ENDOCRINOLOGY

Feline

Feline

**Obj #8: We are not makers of history.
We are made by history**



MLK

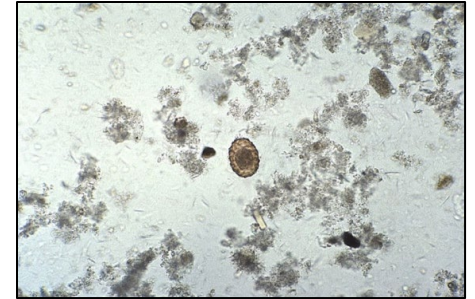
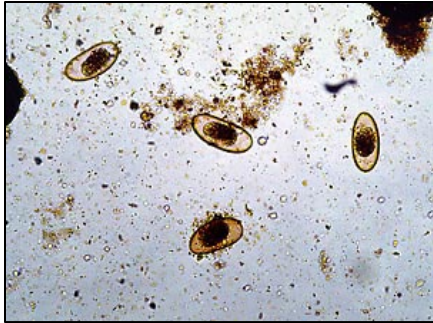
4 mo old FS Calico

CC: Diarrhea

Hx: adopted from the shelter 1 month prior



FeLV/FIV negative; Fecal Exam



Poll Question



NDC 50111-334-01

METRONIDAZOLE
Tablets USP
500 mg

Rx only

100 TABLETS

TEVA

Each tablet contains 500 mg metronidazole, USP.

Usual Dosage: See package insert for full prescribing information.

Store at 20° to 25°C (68° to 77°F) [See USP Controlled Room Temperature].

PROTECT FROM LIGHT

Dispense in a tight, light-resistant container as defined in the USP, with a child-resistant closure (as required).

KEEP THIS AND ALL MEDICATIONS OUT OF THE REACH OF CHILDREN.

Manufactured in Poland By:
PIVA Krakow Pharmaceutical Company S.A.
Krakow, Poland
Teva Pharmaceuticals USA
Sellersville, PA 18960

10002400 Iss. 9/2010

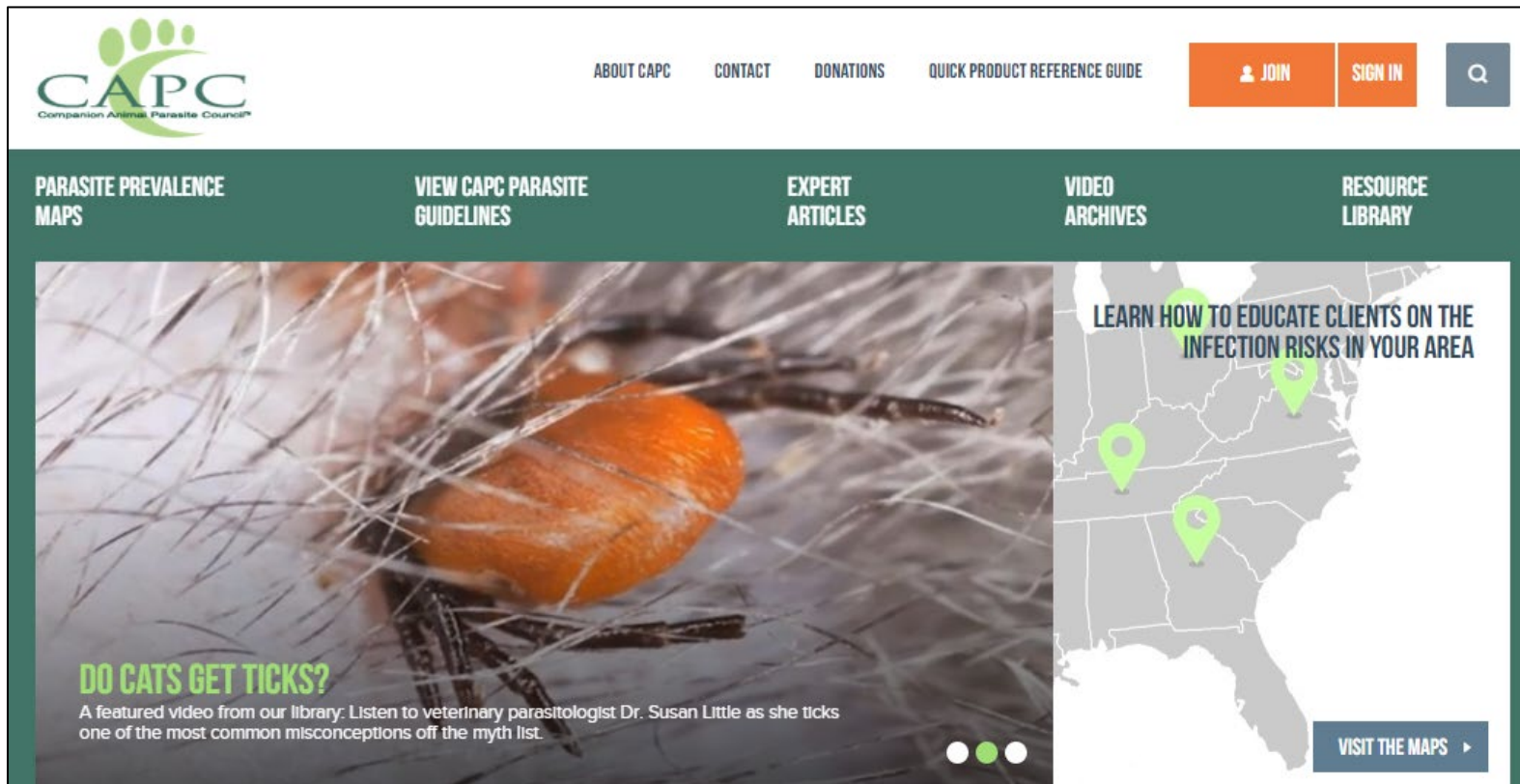
3 50111-334-01 4



CAPC

Companion Animal Parasite Council

- <https://capcvet.org>



The screenshot shows the CAPC website homepage. At the top left is the CAPC logo, which consists of a green paw print above the text "CAPC" and "Companion Animal Parasite Council®". To the right of the logo are navigation links: "ABOUT CAPC", "CONTACT", "DONATIONS", and "QUICK PRODUCT REFERENCE GUIDE". Further right are two orange buttons labeled "JOIN" and "SIGN IN", followed by a search icon in a grey box.

Below the navigation is a dark green horizontal bar with five white text links: "PARASITE PREVALENCE MAPS", "VIEW CAPC PARASITE GUIDELINES", "EXPERT ARTICLES", "VIDEO ARCHIVES", and "RESOURCE LIBRARY".

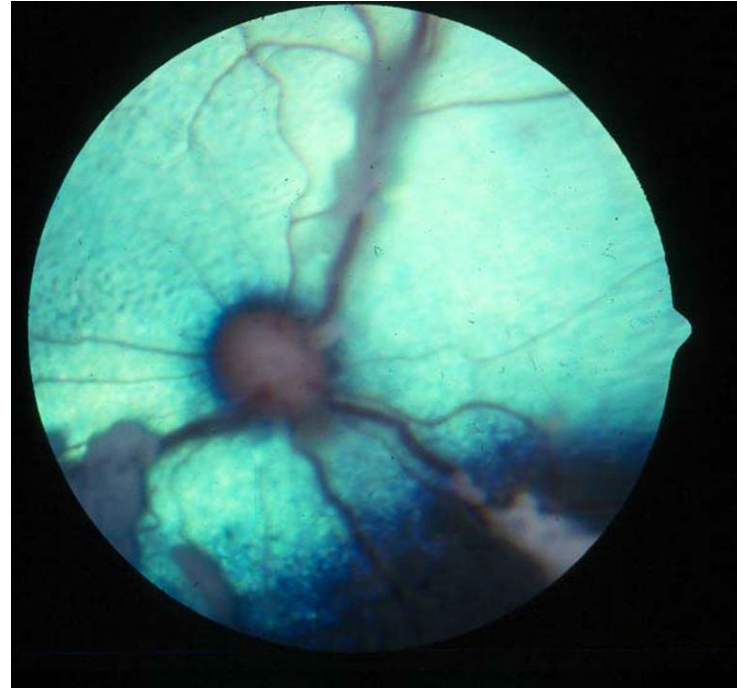
The main content area features a large image of a tick on a cat's fur. Overlaid on the bottom left of this image is the text "DO CATS GET TICKS?" in green, followed by a short paragraph: "A featured video from our library: Listen to veterinary parasitologist Dr. Susan Little as she ticks one of the most common misconceptions off the myth list." Below this text are three small circles, with the middle one being green.

On the right side of the main content area is a map of the United States with three green location pins. Above the map is the text "LEARN HOW TO EDUCATE CLIENTS ON THE INFECTION RISKS IN YOUR AREA". At the bottom right of the map is a blue button with the text "VISIT THE MAPS" and a right-pointing arrow.

Physical Exam



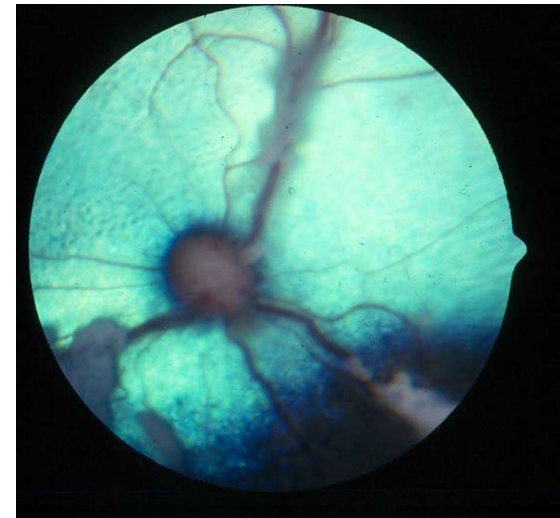
Physical Exam



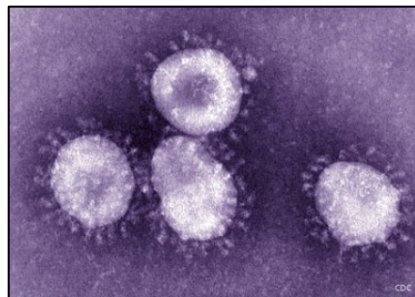
4 mo old MC Calico

CC: Diarrhea

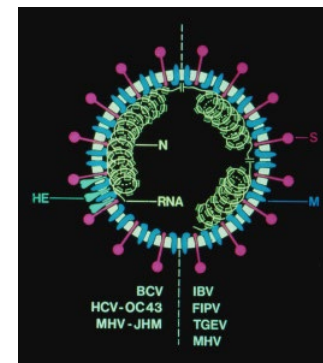
Hx: adopted from the shelter 1 month prior



INFECTIOUS - Coronavirus



MUTATION - FIP



Objective #9: One finger in the throat and one in the rectum makes a good diagnostician

Focused on Veterinary Diagnostics

RIVALTA FIP-VETube^{ad us. vet.}

Simple practical test to detect or exclude FIP infection

Determination or exclusion of exudate (abdominal and/or pleural effusion material) from cats suspected of FIP

Clinical suspicion of FIP infection

Routine check of cats with effusion symptoms

Practical test for discrimination of exudate (inflammable punctate) and transudate (non-inflammable punctate)

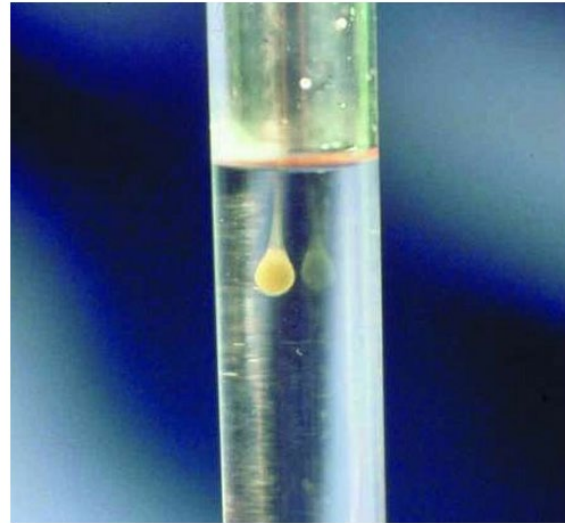
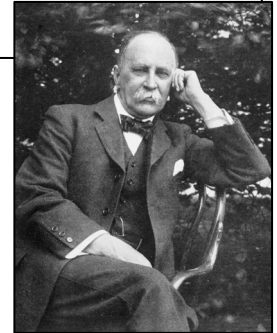


- Simple test procedure with punctate
- Fast test interpretation after a few seconds
- Reliable clinical diagnostics
- Sensitivity 98% & Specificity 80%
- Storage at room temperature (15-25°C)
- Long shelf life
- Compact test box with 10 tests

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DIAGNOSTIK
MEGACOR

Sir William Osler



FIP positive (86%)

J Feline Med Surg. 2016 Jul 18. pii: 1098612X16658925. [Epub ahead of print]

Usefulness of acute phase proteins in differentiating between feline infectious peritonitis and other diseases in cats with body cavity effusions.

Hazuchova K¹, Held S², Neiger R³.

Diagnostic Testing

VETERINARY
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CANINE PLAN

EQUINE PLAN

FELINE PLAN

OVINE PLAN

10 wk Choc Lab

Acute onset diarrhea, lethargy,
anorexia



10 wk Choc Lab

Parvo+



10 wk Choc Lab

Parvo+ Distemper IFA+/PCR-





Diagnostic Tests

- Sensitivity
 - The proportion of true positives that are correctly identified by the test
- Specificity
 - The proportion of true negatives that are correctly identified by the test

Positive Predictive Value

The probability that a person has the disease when a positive test result is observed

		Reference Test Gold Standard	
		Abnormal	Normal
Diagnostic Test	Abnormal	True Positive	False Positive
	Normal	False Negative	True Negative

A FUNCTION OF DISEASE PREVALENCE

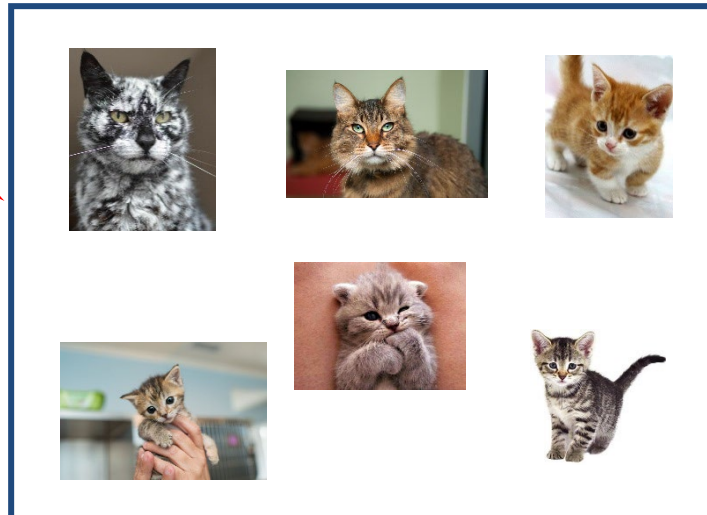
$$\frac{TP}{TP+FP}$$

Prevalence

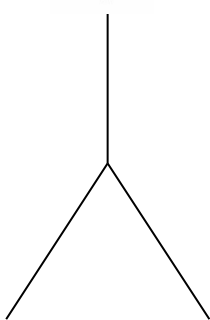
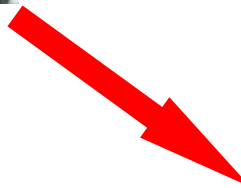
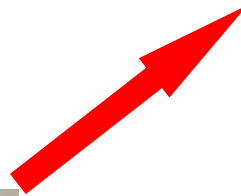
TESTING



NOT TESTING



Clinical Expertise



Objective #10: “Elementary, my dear Watson”

Diagnostic Testing



Your Test Results Are Only As Good As Y

- Start = Clinical Diagnosis
- Test to Support or Refute Clinical Diagnosis
 - Movement on Rank-Ordered Differential List



Thank You Nutramax Labs
Thank You CVM

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X LABORATORIES
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Most Importantly
Thank You to You