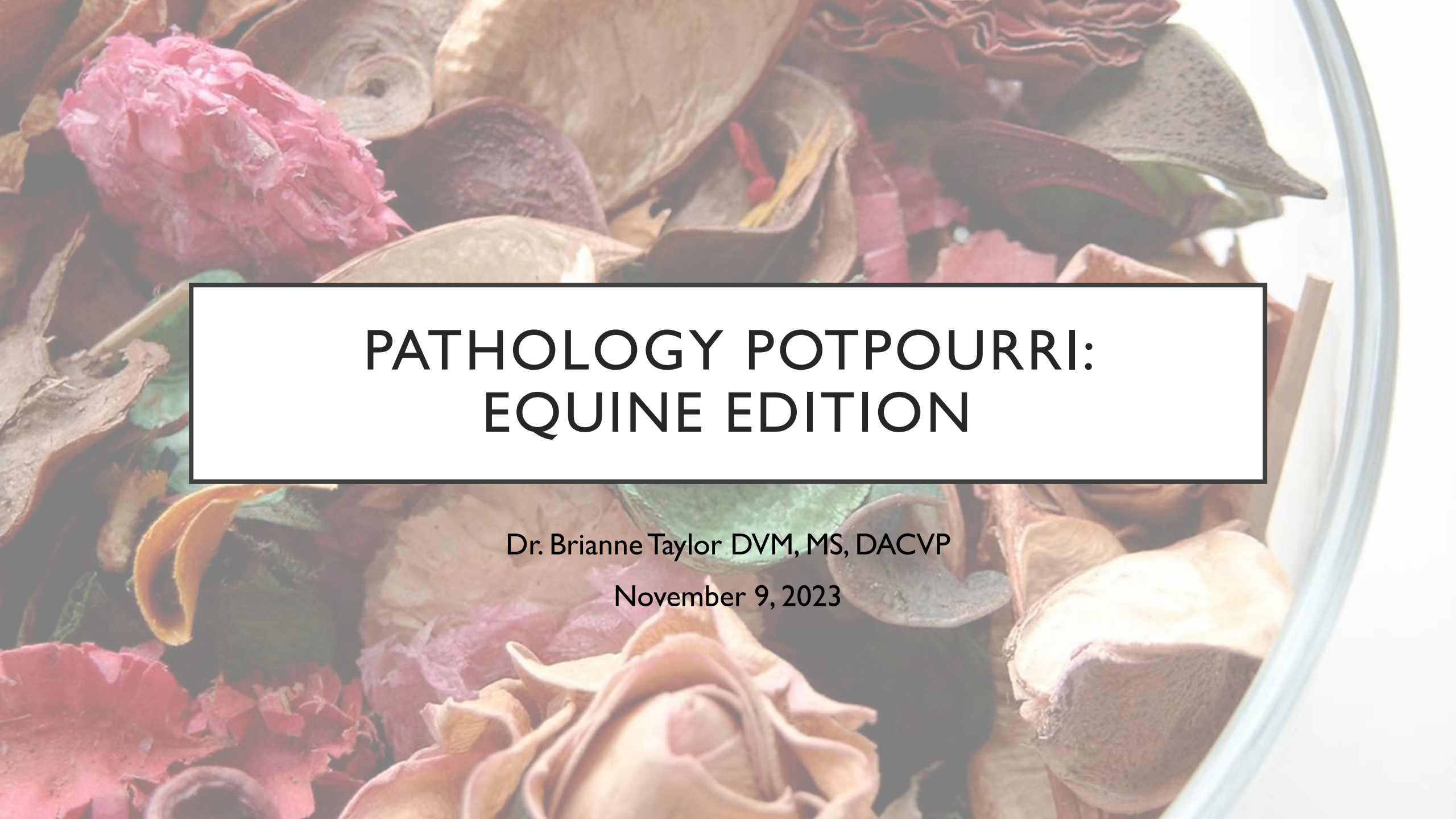


PATHOLOGY POTPOURRI: EQUINE EDITION

Dr. Brianne Taylor DVM, MS, DACVP

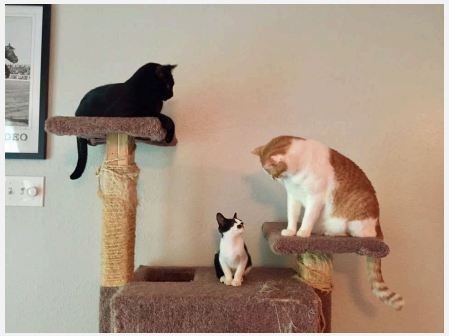
November 9, 2023

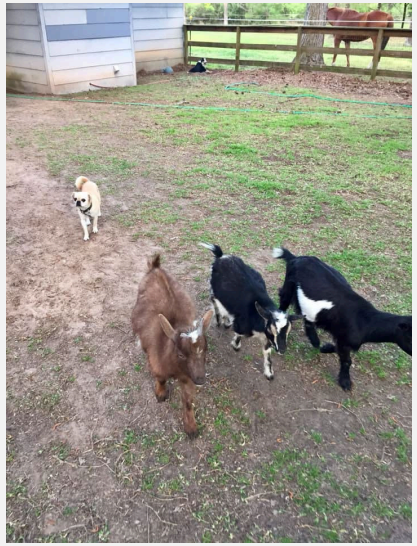
OUTLINE

- About me
- Submitting to a diagnostic lab
- Potpourri of cases

Dr. Tim Snider

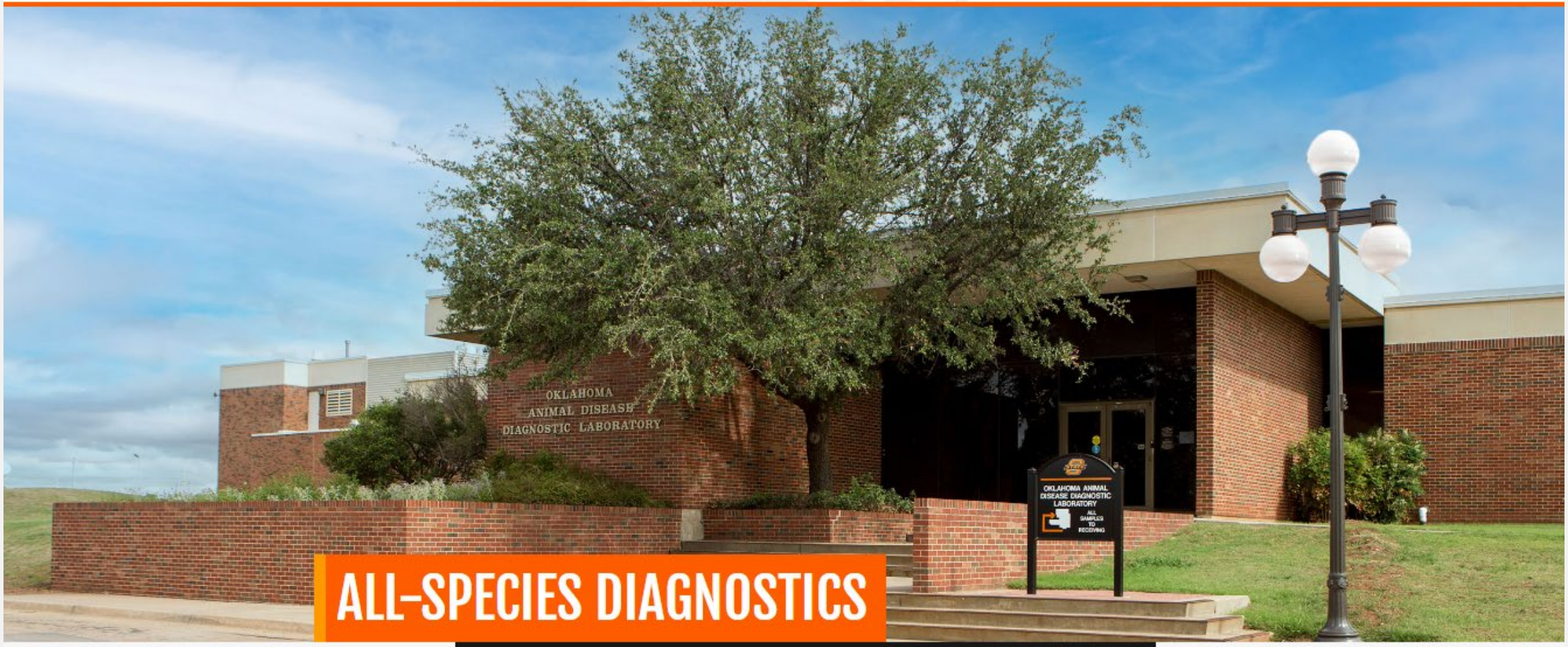
ABOUT ME





ABOUT ME

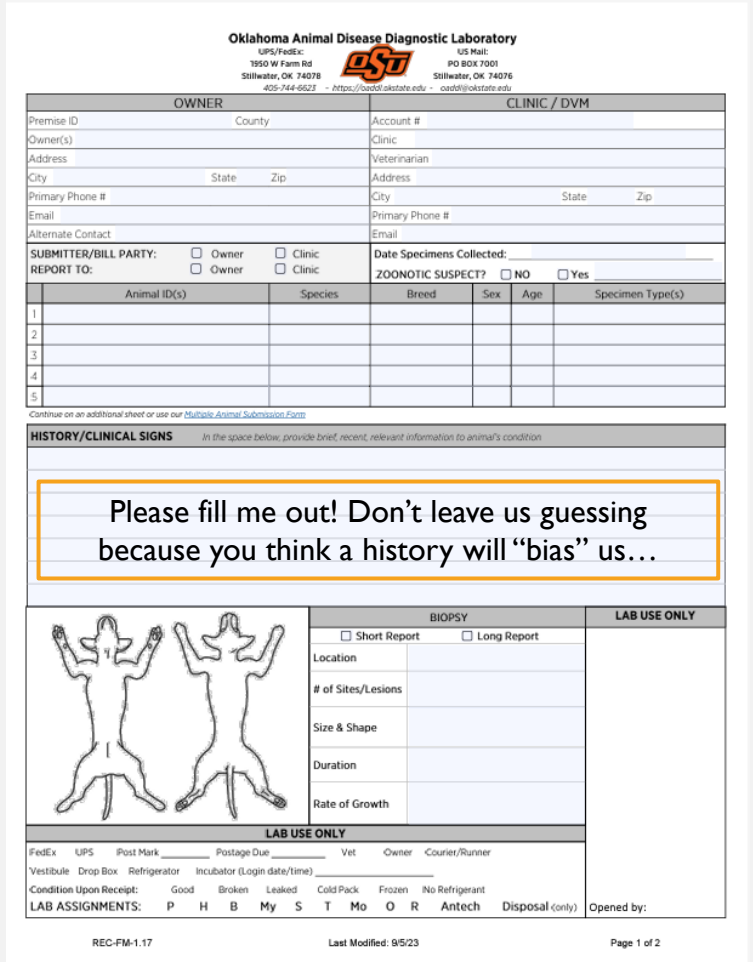
- I am NOT an equine practitioner
  - More of an "enthusiast"
- Serve as the liaison between OADDL and the Oklahoma Horse Racing Commission (OHRC)
- Also serve as OADDL's toxicology "consultant"
  - Again, I'm NOT a toxicologist but rather an enthusiast



ALL-SPECIES DIAGNOSTICS

Promoting the overall well-being of animal health through veterinary diagnostic testing, instruction of professional students, and research in diseases of economic importance to Oklahoma and beyond.

SUBMITTAL FORM



Oklahoma Animal Disease Diagnostic Laboratory

UPS/FedEx: 1950 W Farm Rd, Stillwater, OK 74078
US Mail: PO BOX 7001, Stillwater, OK 74076
405-744-6623 - https://oaddl.okstate.edu - oaddl@okstate.edu

OWNER	CLINIC / DVM
Premise ID / County	Account #
Owner(s)	Clinic
Address	Veterinarian
City / State / Zip	Address
Primary Phone #	City / State / Zip
Email	Primary Phone #
Alternate Contact	Email
SUBMITTER/BILL PARTY: ☐ Owner ☐ Clinic REPORT TO: ☐ Owner ☐ Clinic	Date Specimens Collected: ____ ZOONOTIC SUSPECT? ☐ NO ☐ Yes ____

	Animal ID(s)	Species	Breed	Sex	Age	Specimen Type(s)
1						
2						
3						
4						
5						

Continue on an additional sheet or use our Multiple Animal Submission Form

HISTORY/CLINICAL SIGNS *In the space below, provide brief, recent, relevant information to animal's condition*

Please fill me out! Don't leave us guessing because you think a history will "bias" us…

BIOPSY ☐ Short Report ☐ Long Report

Location	
# of Sites/Lesions	
Size & Shape	
Duration	
Rate of Growth	

LAB USE ONLY

FedEx UPS Post Mark _____ Postage Due _____ Vet Owner Courier/Runner
Vestibule Drop Box Refrigerator Incubator (Login date/time) _____
Condition Upon Receipt: Good Broken Leaked Cold Pack Frozen No Refrigerant
LAB ASSIGNMENTS: P H B My S T Mo O R Antech Disposal (only)

LAB USE ONLY Opened by:

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TEST(S) REQUESTED

For a complete list of tests and specimen requirements, see test catalog at https://oaddl.okstate.edu

BACTERIOLOGY / MYCOLOGY

- ☐ Aerobic Culture with up to 2 Susceptibility Profiles
- ☐ Anaerobic & Aerobic Culture with up to 2 Susceptibility Profile
- ☐ Fungal & Aerobic Culture with up to 2 Susceptibility Profiles
- ☐ Aerobic Culture only
- ☐ Anaerobic Culture only
- ☐ Antibiotic Susceptibility
- ☐ Bacterial Isolate ID by MALDI-TOF
- ☐ *Campylobacter fetus* Culture
- ☐ Clostridial Culture
- ☐ *Salmonella* Culture with Susceptibility Profile (serogrouping upon request)
- ☐ *Salmonella* Culture - Environmental (Stalls, barns, litter)
- ☐ Urine Culture with Susceptibility *(cystocentesis or catheter-collected only)*
- ☐ Fungal Culture
- ☐ Milk Culture & Susceptibility
- ☐ *Mycoplasma bovis* Culture

TOXICOLOGY

- ☐ Blue-Green Algae
- ☐ Prussic Acid/Cyanide

PARASITOLOGY

- ☐ Baermann
- ☐ Centrifugal Floatation & Direct Smear
- ☐ Coproculture (Larvae ID)
- ☐ Centrifugal Floation
- ☐ Fecal Egg Count
- ☐ McMasters
- ☐ Wisconsin
- ☐ Feline Heartworm Ag
- ☐ Giardia AG
- ☐ Gross Parasite ID
- ☐ Heartworm AG (Pre & Post Heat Treated)
- ☐ Hemoparasite Exam (Wright-Giemsa)
- ☐ Modified Knotts
- ☐ Sedimentation
- ☐ Tick ID

AVIAN

- ☐ Avian Influenza
  - ☐ AGID ☐ PCR
  - ☐ ELISA
- ☐ Exotic Newcastle Disease
  - ☐ IPCR
- ☐ *Mycoplasma gallisepticum/M synoviae*
  - ☐ ELISA
  - ☐ IPCR
- ☐ *Salmonella pullorum-typhoid*
  - ☐ Agglutination
  - ☐ Microagglutination Titer

BOVINE

- ☐ Diarrhea Panel – *Aerobic Culture with Susceptibilities, Clostridium perfringens Culture, Salmonella Culture, Rotavirus Group A, Coronavirus PCR, Fecal Float, Smear*
- ☐ Bovine Abortion (Serology) – *Leptospira, IBR, BVD SN, BVD ELISA, Brucella, Neospora*
- ☐ Bovine Respiratory SN Profile 1 – *IBR, BVD-1, PI3, BRSV*
- ☐ Bovine Respiratory Panel PCR "Basic – *BVD, IBR, BRSV*
- ☐ *Anaplasma marginale*
  - ☐ ELISA
  - ☐ PCR
- ☐ Bluetongue
  - ☐ ELISA
  - ☐ PCR
- ☐ Bovine Coronavirus PCR
- ☐ Bovine Leukemia Virus
  - ☐ ELISA
  - ☐ PCR
- ☐ Bovine ELISA Panel – *BVD, BLV, Johne's (Ti animal minimum)*
- ☐ Bovine Respiratory SN Profile 2 – *IBR, BVD-1, BVD-2, PI3, BRSV*
- ☐ Bovine Respiratory Panel PCR "Comprehensive – *BVD, IBR, BRSV, BCV, M Bovis*
- ☐ Bovine Respiratory Syncytial Virus
  - ☐ SN
  - ☐ IPCR
- ☐ *Brucella abortus / B. suis*
- ☐ Bovine Viral Diarrhea (BVD)
  - ☐ ELISA (PI)
  - ☐ Type 1 SN
  - ☐ Type 2 SN
  - ☐ IPCR
- ☐ General Herpes Virus PCR
  - ☐ Sequencing (if Positive)
- ☐ IBR
  - ☐ SN
  - ☐ PCR
- ☐ Johne's *(Submit individual samples)*
  - ☐ ELISA
  - ☐ PCR – Individual
  - ☐ PCR – Pooled in Lab
- ☐ *Leptospira spp.*
  - ☐ MAT – *5 serovers*
  - ☐ PCR
- ☐ *Mycoplasma bovis* PCR
- ☐ *Neospora spp* ELISA
- ☐ Parainfluenza 3 (PI3) Virus SN
- ☐ Pregnancy ELISA
- ☐ Rotavirus Group A Card
- ☐ *Tritrichomonas foetus* *(Submit Individual Samples)*
  - ☐ Culture (InPouch TF)
  - ☐ PCR (PBS or InPouch TF)
  - ☐ PCR – Pooled in Lab

CANINE

- ☐ Diarrhea Panel - *Aerobic Culture with Susceptibility, Clostridium perfringens Culture, Salmonella Culture, Campylobacter jejuni Culture, Parvovirus PCR, Fecal Float, Smear*
- ☐ *Brucella canis* IFA
- ☐ Canine Distemper PCR
- ☐ Canine Herpesvirus PCR
- ☐ Canine Influenza PCR
- ☐ Canine Parvovirus PCR
- ☐ *Ehrlichia* sp.
- ☐ *Leptospira spp.*
  - ☐ MAT – *5 serovers*
  - ☐ PCR
- ☐ Rocky Mountain Spotted Fever IFA
- ☐ Tick Profile (Serology) *Ehrlichia canis, RMSF, Lyme, Anaplasma*

CAPRINE / OVINE

- ☐ Diarrhea Panel – *Aerobic Culture with Susceptibility, Clostridium perfringens Culture, Salmonella Culture, Fecal Float, Smear*
- ☐ Biosecurity Panel – *CAE, CL, Johne's*
- ☐ Bluetongue
  - ☐ ELISA
  - ☐ PCR
- ☐ *Brucella abortus / B. suis*
- ☐ *Brucella melitensis*
- ☐ BVD PCR
- ☐ CAE/OPP/SRLV
- ☐ Johne's (Submit Individual Samples)
  - ☐ ELISA
  - ☐ PCR
  - ☐ PCR – Pooled in Lab
- ☐ *Leptospira spp.*
  - ☐ MAT – *5 serovers*
  - ☐ PCR
- ☐ Pregnancy ELISA

EQUINE

- ☐ Diarrhea Panel - *Aerobic Culture with Susceptibility, Clostridium perfringens Culture, Salmonella Culture, Rotavirus Group A, Coronavirus PCR, Fecal Float, Smear*
- ☐ Ehrlichia PCR
- ☐ EIA ELISA
- ☐ Equine Herpesvirus 1 PCR
- ☐ Equine Herpesvirus 4 PCR
- ☐ Equine Influenza PCR
- ☐ General Herpesvirus PCR
- ☐ Sequencing (if Positive)
- ☐ *Leptospira spp.*
  - ☐ MAT – 5 serovers
  - ☐ IPCR
- ☐ Piroplasmosis, *Babesia caballi*-ELISA
- ☐ Piroplasmosis, *Theileria equi*-ELISA
- ☐ Rotavirus Group A – *Immunocard Test*
- ☐ *Streptococcus equi* PCR
- ☐ Other:

FELINE

- ☐ Diarrhea Panel - *Aerobic Culture with Susceptibility, Clostridium perfringens Culture, Salmonella Culture, Campylobacter jejuni Culture, Parvovirus PCR, Fecal Float, Smear*
- ☐ *Cytauxzoon felis* PCR
- ☐ Feline Parvovirus/ Panleukopenia PCR
- ☐ *Francisella tularensis* "Tularemia" PCR

PORCINE

- ☐ Diarrhea Panel - Suckling/Nursery – *Aerobic Culture with Susceptibility, Rotavirus Group A, Coronavirus PCR (TGE, PEDV, SDCoV), Fecal Float, Smear*
- ☐ Diarrhea Panel - Grower/Finisher – *Aerobic Culture with Susceptibility, Salmonella Culture, Coronavirus PCR (TGE, PEDV, SDCoV), Fecal Float, Smear, Lawsonia & Brachyspira hyodysenteriae/ B. hampsonii PCR*
- ☐ *Brucella abortus* & Pseudorabies gB ELISA Panel
- ☐ *Brucella abortus / B. suis*
- ☐ Coronavirus Multiplex PCR – *PEDV, TGEV, SDCoV*
- ☐ *Leptospira spp.*
  - ☐ MAT – 5 serovers
  - ☐ PCR
- ☐ *Pseudorabies gB* ELISA
- ☐ PRRS Virus
  - ☐ ELISA
  - ☐ PCR – NA/EU
- ☐ Swine Influenza Virus PCR

Unless written agreements are in place prior to submission to OADDL, all submitted materials plus any biological or chemical material derived from the submission shall be the property of Oklahoma State University. Any use of such derived material is by permission of Oklahoma State University. OADDL reserves the right to forward samples to reference subcontractors for tests not currently available at OADDL.

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SUBMITTAL FORM

The list is somewhat short for horses!

EQUINE			
☐ Diarrhea Panel - *Aerobic Culture with Susceptibility, Clostridium perfringens Culture, Salmonella Culture, Rotavirus Group A, Coronavirus PCR, Fecal Float, Smear*			
☐ Ehrlichia PCR	☐ General Herpesvirus PCR	☐ Piroplasmosis, *Babesia caballi* c-ELISA	☐ Other:
☐ EIA ELISA	☐ Sequencing (if Positive)	☐ Piroplasmosis, *Theileria equi* c-ELISA	
☐ Equine Herpesvirus 1 PCR	☐ *Leptospira spp.*	☐ Rotavirus Group A – *Immunocard Test*	
☐ Equine Herpesvirus 4 PCR	☐ MAT – 5 serovers	☐ *Streptococcus equi* PCR	
☐ Equine Influenza PCR	☐ PCR		

Abortion panel

EQUINE	$250.00
Necropsy with disposal (whole fetus & placenta)	
Placenta examination	
Histopathology	
Bacteriology (pooled aerobic culture on lung & stomach fluid)	
Molecular Diagnostics / PCR (EHV on liver; EVA on lung – referral lab)	

Diarrhea panel

EQUINE	$185.00
Aerobic culture with antibiotic susceptibility	
Clostridium perfringens culture with toxin typing by PCR	
Salmonella culture with antibiotic susceptibility	
Rotavirus group A, Immunocard test (only performed on animals < 6 months)	
Centrifugal fecal flotation; direct fecal smear with staining	

FIELD NECROPSY

Fig. 1. Equipment.

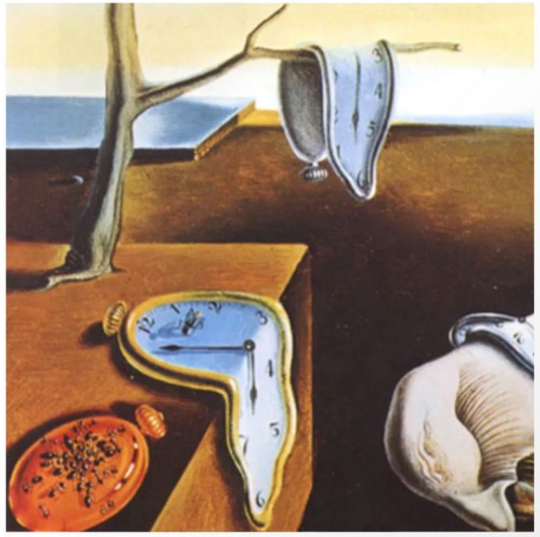
East Valley Equine Practitioners

Ok, so this is a rebreathing bag, but you get the idea…

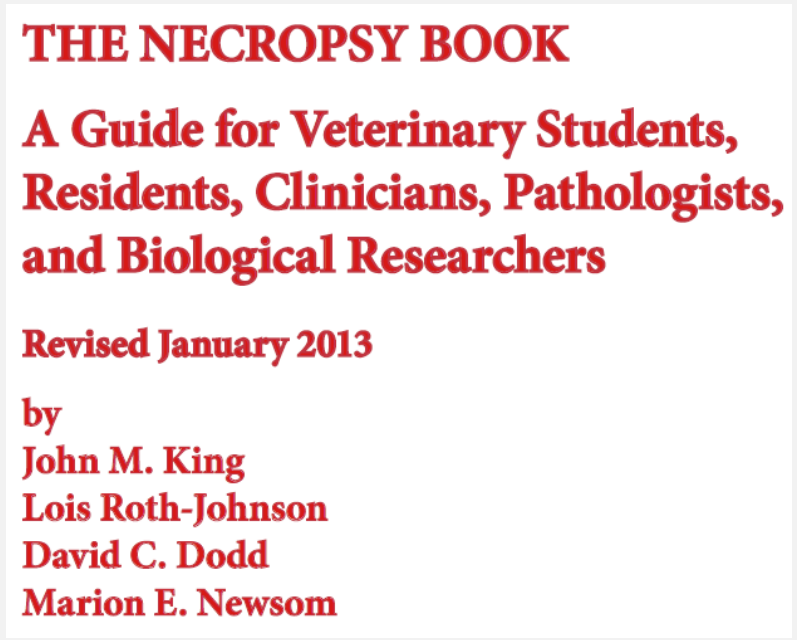
TIME IS OF THE ESSENCE

- Autolysis (rot) is our worst enemy!
  - Precludes gross/histologic evaluation
  - Infectious agents can degrade
  - Toxicants are often stable
    - Some are NOT (e.g., cyanide)

- Autolysis is accelerated by
  - Ambient temperature
  - Obese body condition
  - Fever and inflammation



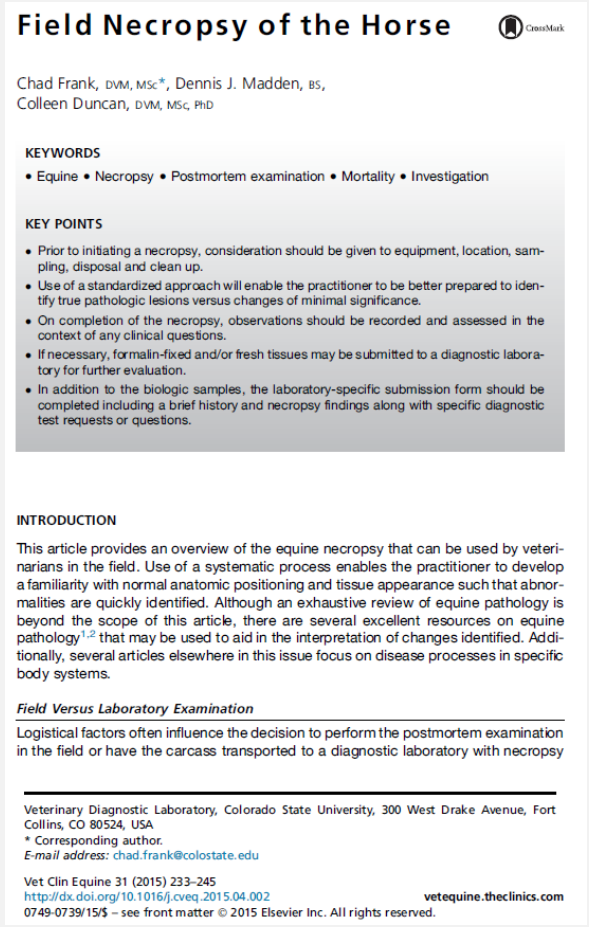
FIELD NECROPSY


THE NECROPSY BOOK

A Guide for Veterinary Students, Residents, Clinicians, Pathologists, and Biological Researchers

Revised January 2013

by
John M. King
Lois Roth-Johnson
David C. Dodd
Marion E. Newsom


Field Necropsy of the Horse

Chad Frank, DVM, MSc*, Dennis J. Madden, BS,
Colleen Duncan, DVM, MSc, PhD

KEYWORDS

• Equine • Necropsy • Postmortem examination • Mortality • Investigation

KEY POINTS

- Prior to initiating a necropsy, consideration should be given to equipment, location, sampling, disposal and clean up.
- Use of a standardized approach will enable the practitioner to be better prepared to identify true pathologic lesions versus changes of minimal significance.
- On completion of the necropsy, observations should be recorded and assessed in the context of any clinical questions.
- If necessary, formalin-fixed and/or fresh tissues may be submitted to a diagnostic laboratory for further evaluation.
- In addition to the biologic samples, the laboratory-specific submission form should be completed including a brief history and necropsy findings along with specific diagnostic test requests or questions.

INTRODUCTION

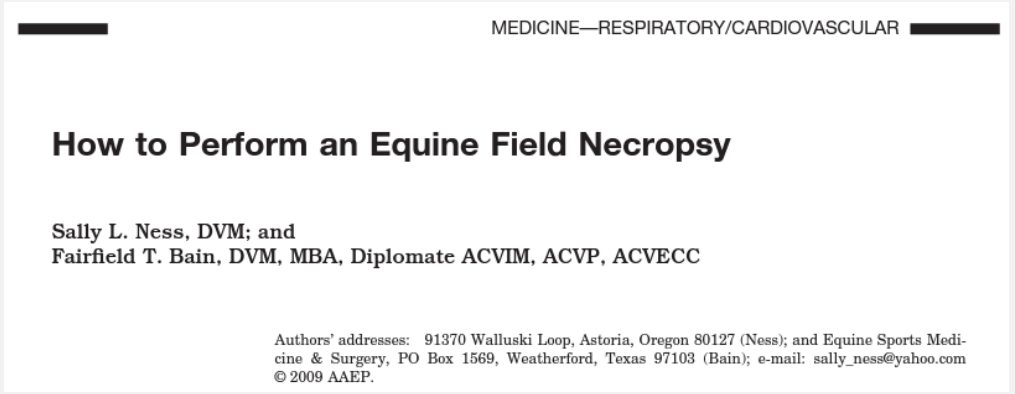
This article provides an overview of the equine necropsy that can be used by veterinarians in the field. Use of a systematic process enables the practitioner to develop a familiarity with normal anatomic positioning and tissue appearance such that abnormalities are quickly identified. Although an exhaustive review of equine pathology is beyond the scope of this article, there are several excellent resources on equine pathology[1,2] that may be used to aid in the interpretation of changes identified. Additionally, several articles elsewhere in this issue focus on disease processes in specific body systems.

Field Versus Laboratory Examination

Logistical factors often influence the decision to perform the postmortem examination in the field or have the carcass transported to a diagnostic laboratory with necropsy

Veterinary Diagnostic Laboratory, Colorado State University, 300 West Drake Avenue, Fort Collins, CO 80524, USA
* Corresponding author.
E-mail address: chad.frank@colostate.edu

Vet Clin Equine 31 (2015) 233–245
http://dx.doi.org/10.1016/j.cveq.2015.04.002 vetequine.theclinics.com



How to Perform an Equine Field Necropsy

Sally L. Ness, DVM; and
Fairfield T. Bain, DVM, MBA, Diplomate ACVIM, ACVP, ACVECC

Authors' addresses: 91370 Walluski Loop, Astoria, Oregon 80127 (Ness); and Equine Sports Medicine & Surgery, PO Box 1569, Weatherford, Texas 97103 (Bain); e-mail: sally_ness@yahoo.com

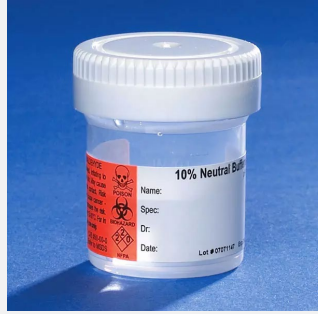
A WORD ON SAMPLE COLLECTION

BACTERIAL

- Culture
  - Aerobic → respiratory, *E. coli*
  - Anaerobic → *Clostridium* spp.
  - Others → what do you suspect?

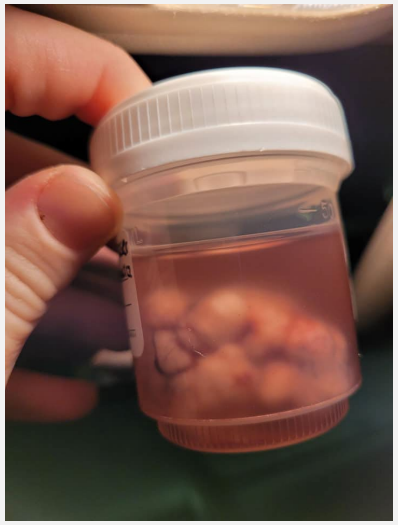
VIRAL (MOSTLY)

- Molecular (PCR)
  - NO media!
    - Swab +/- 0.5 ml saline
    - Fresh tissue

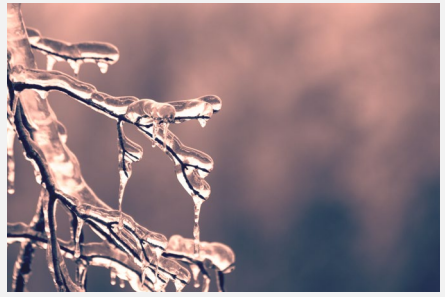


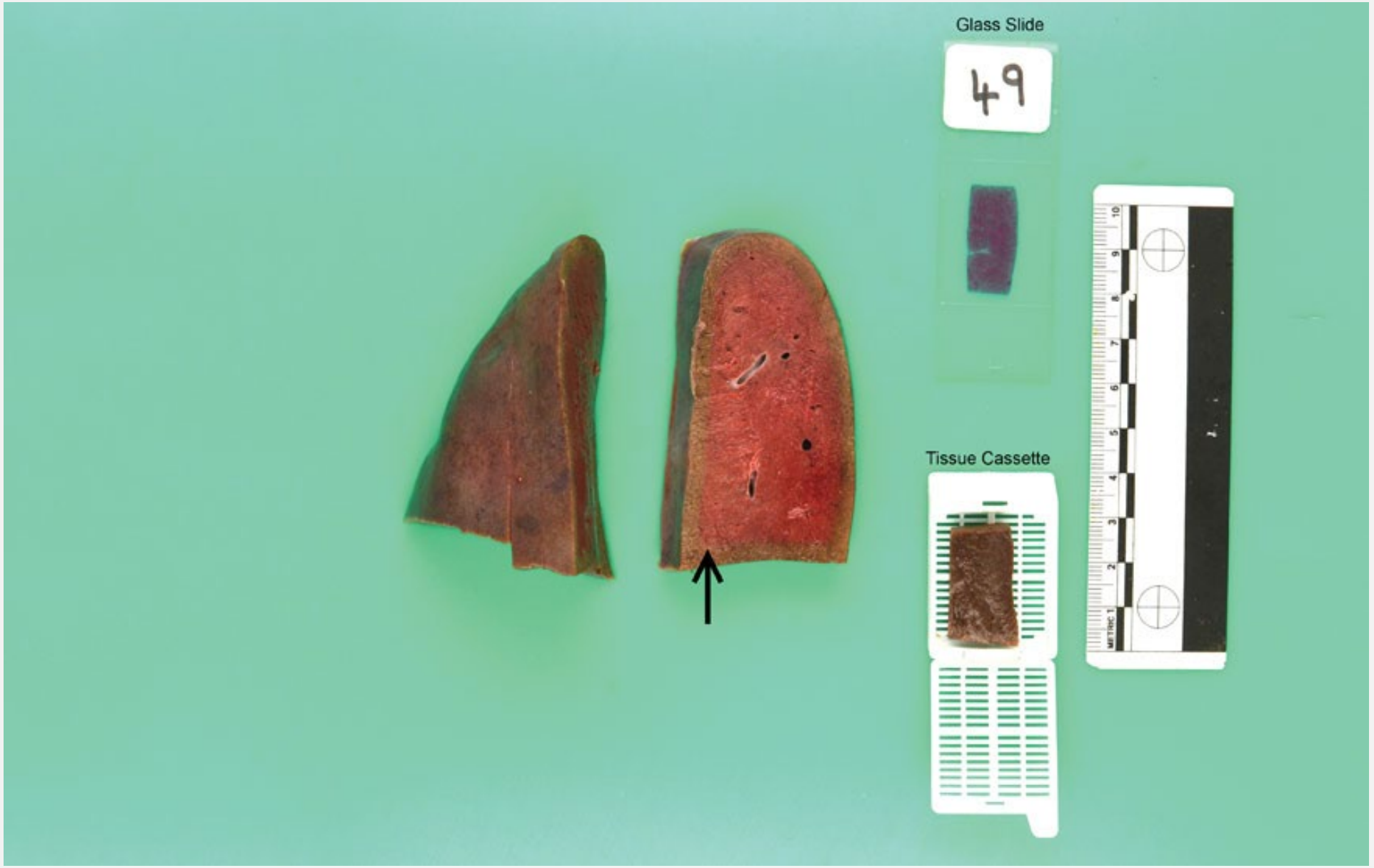
FORMALIN-FIXED SAMPLES

- 10% formalin
- 1:10 ratio tissue to formalin
- 1 cm^3



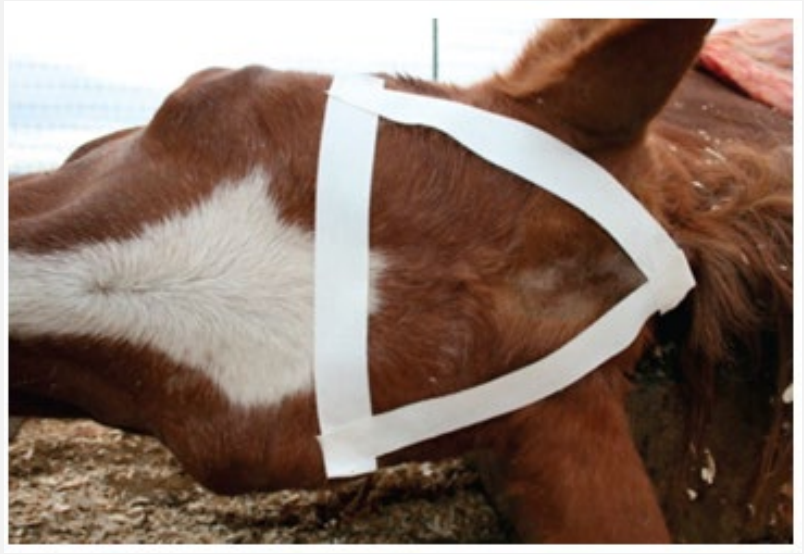
Note: in winter months, 1:10 ratio ethanol to formalin to prevent freezing!



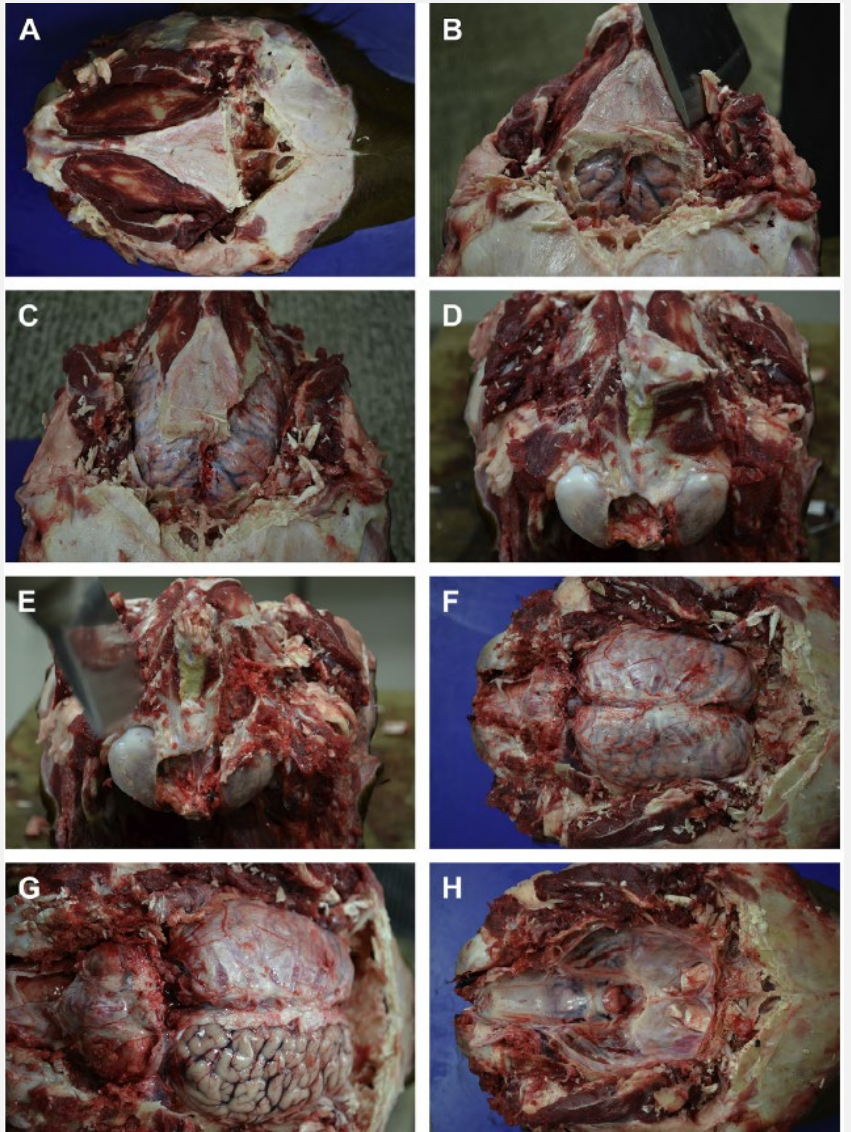


Royal Veterinary College

THERE'S MORE THAN ONE WAY TO ~~SKIN A CAT~~ GET THE BRAIN OUT

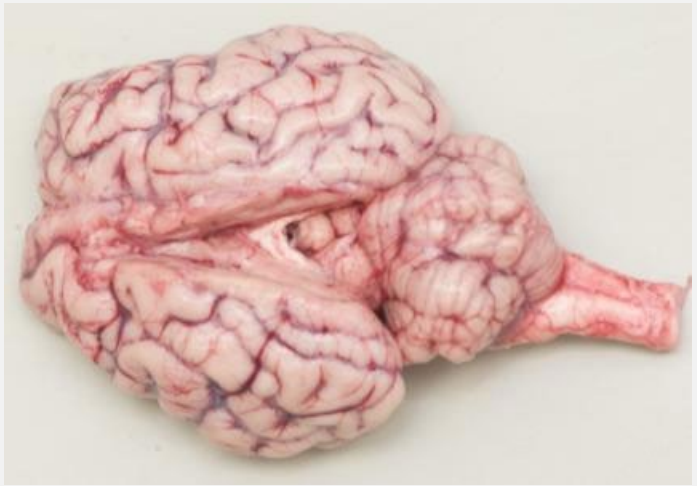


Ness SL, Bain FT (2009). How to perform an equine field necropsy. AAEP Proceedings Vol. 55.



Frank C, Madden DJ, Duncan C. Field Necropsy of the Horse. Vet Clin North Am Equine Pract. 2015 Aug;31(2):233-45.

Pretty please submit the WHOLE brain



ON THAT NOTE…

- You're called out to see an 8-year-old gelding who recently traveled to Florida for a competition
- Unknown vaccine status
- Temperature: 104.5
- Acute onset of severe neurologic deficits

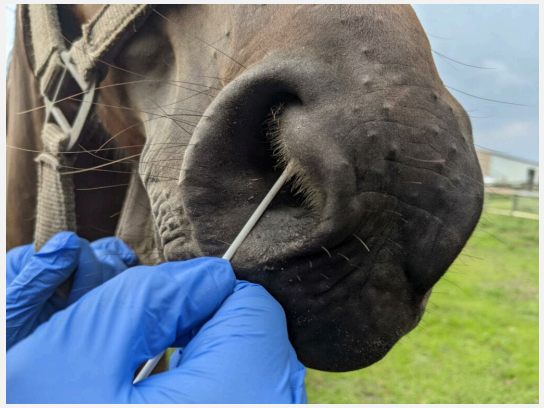
DIFFERENTIALS?

- Viral
  - Rabies (always at the top of the list, right?)
  - West Nile Virus
  - The encephalitides: EEE, WEE, VEE
  - EHV
- Bacterial
- Parasitic
  - EPM
  - Halicephalobus gingivalis
  - Others?
- Toxic
  - ELEM
  - NPE
  - Locoweed
  - Hepatic encephalopathy
- Degenerative
  - EDM
  - EMND
- Neoplastic

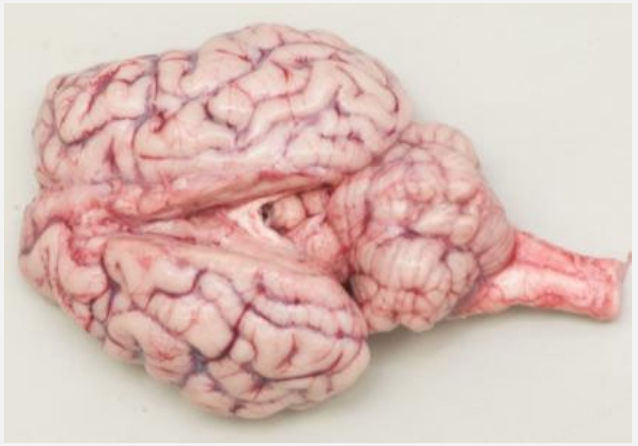
- Do your differentials change if this were more subacute or chronic onset…?
- Are any of these zoonotic?

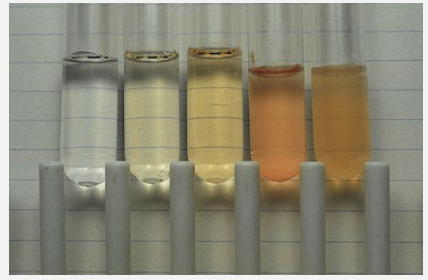
WHAT TO SUBMIT?

ANTEMORTEM

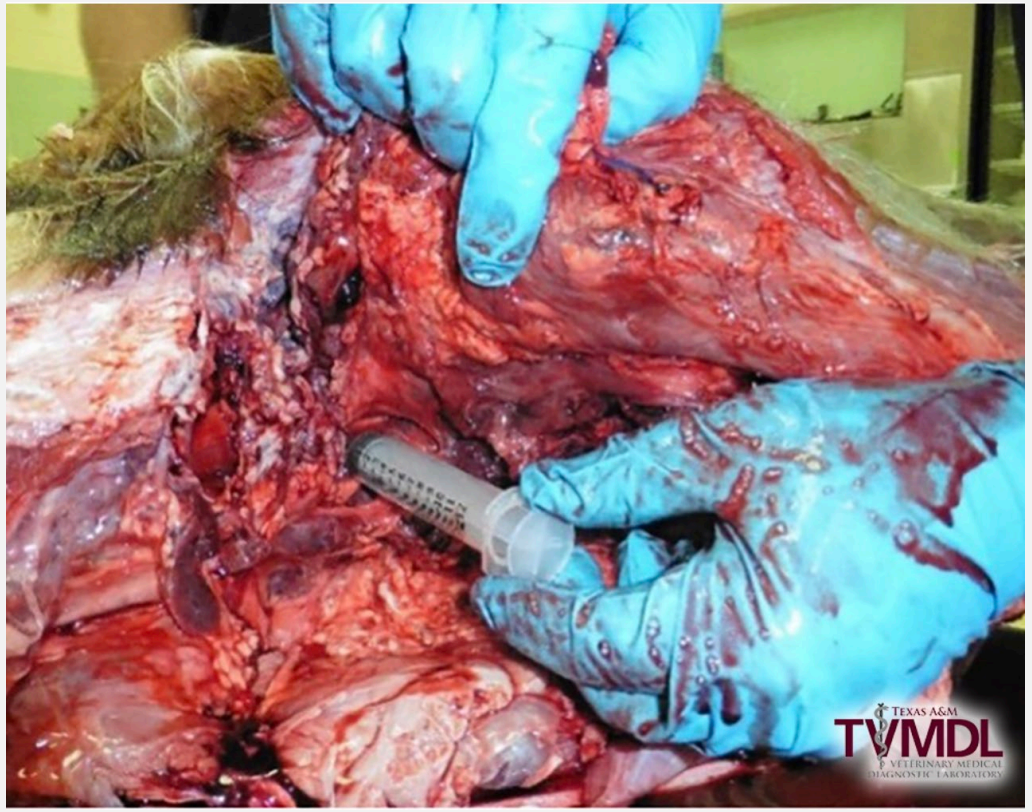


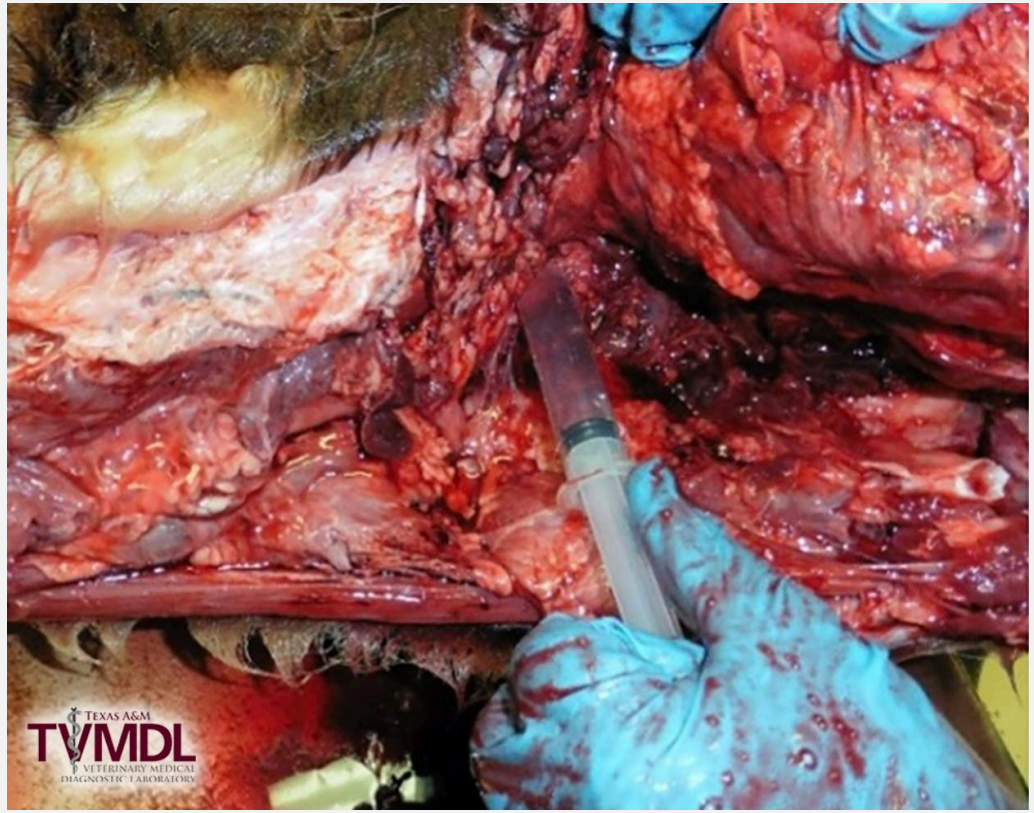
POSTMORTEM





CSF COLLECTION





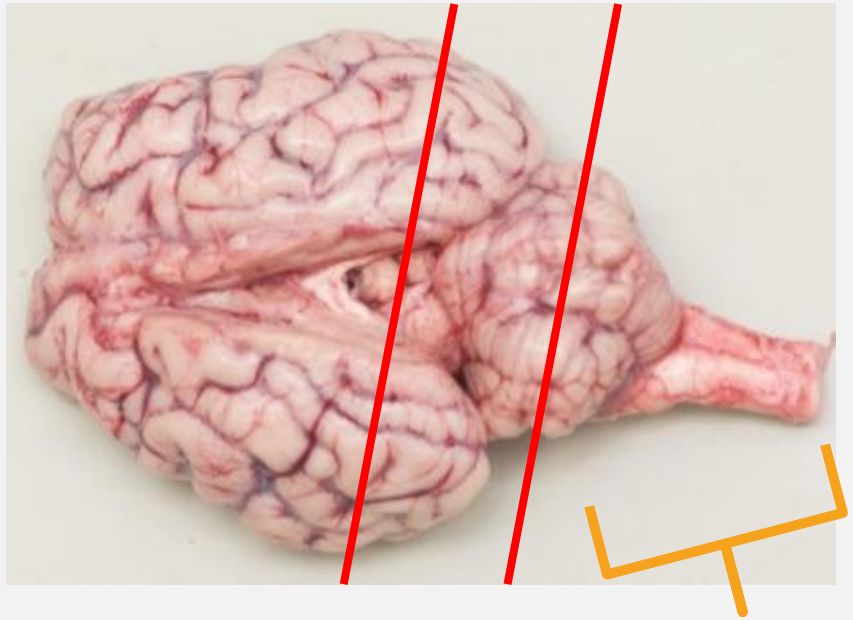
Drs. Jessie Monday and Will Sims

VIRAL ENCEPHALITIS

- Rabies
- West Nile Virus
- The encephalitides
  - WEE
  - EEE
  - VEE
- EHV

VIRAL ENCEPHALITIS

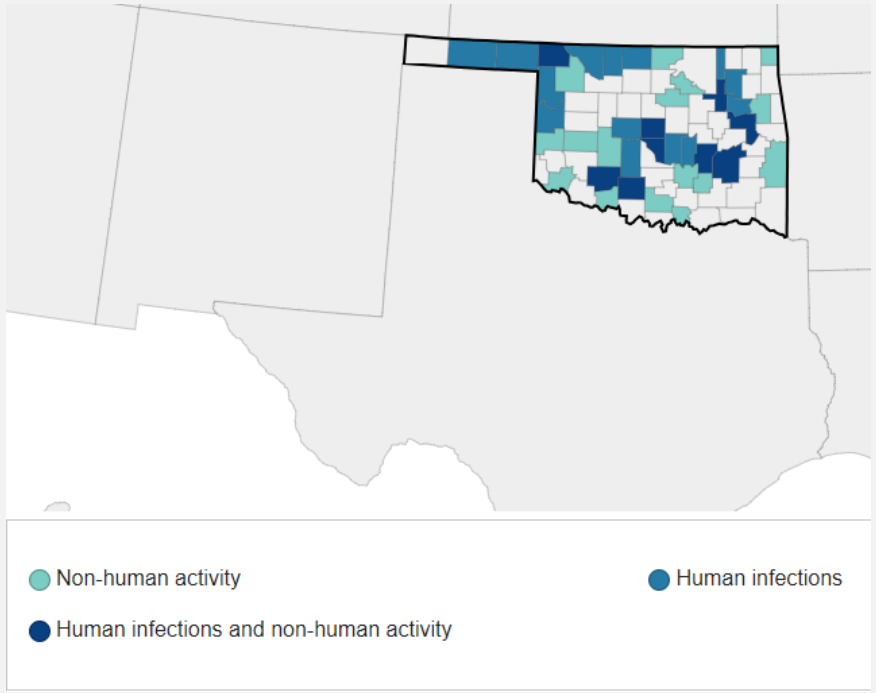
- **Rabies**
- West Nile Virus
- The encephalitides
  - WEE
  - EEE
  - VEE
- EHV



Where the magic happens in a lot of equine neuro ☺

VIRAL ENCEPHALITIS

- Rabies
- **West Nile Virus**
- The encephalitides
  - WEE
  - EEE
  - VEE
- EHV

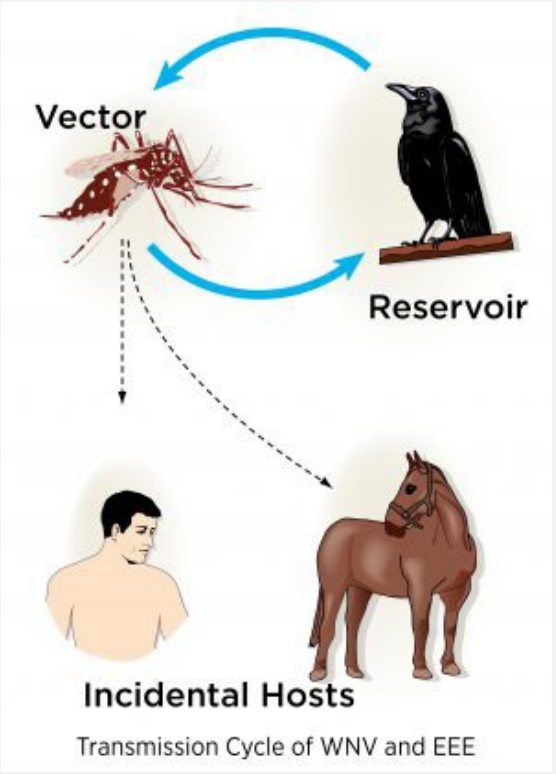


https://www.cdc.gov/westnile/statsmaps/current-season-data.html

WEST NILE VIRUS

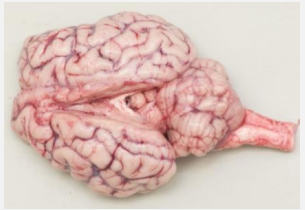
- Transmission
  - Mosquito-bird lifecycle
  - Humans and horses are dead-end hosts
    - Other species (e.g. dogs) can be infected
- Incubation period: 3-15 days
- Encephalitis, myocarditis

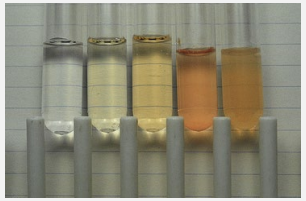
Ji-Hang Yin, Auburn University



Transmission Cycle of WNV and EEE

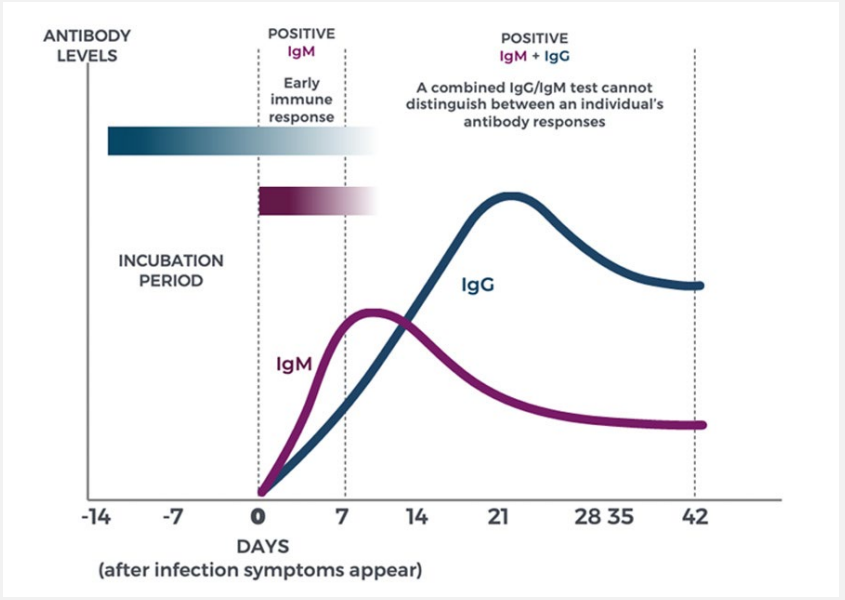
WEST NILE VIRUS





- At OADDL
  - PCR
    - 1 POSITIVE so far in 2023

  - Serology
    - 2022: 7 IgM POSITIVES out of 41 tested
    - So far in 2023: 10 IgM POSITIVES out of 35 tested



Small window of potential false negatives…

Data courtesy of Robin Madden and Amy Hoyt

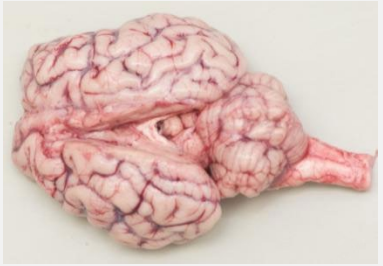
HOW TO DIAGNOSE

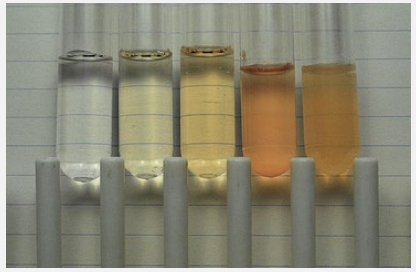
ANTEMORTEM

- Serum for IgM
- CSF for PCR

POSTMORTEM

- Brain or CSF for PCR





VIRAL ENCEPHALITIS

- Rabies
- West Nile Virus
- **The encephalitides**
  - WEE
  - EEE
  - VEE
- EHV

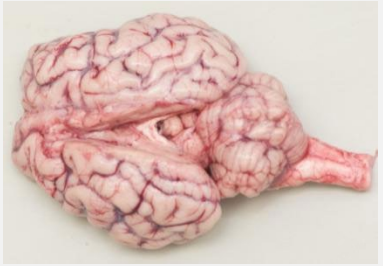
HOW TO DIAGNOSE

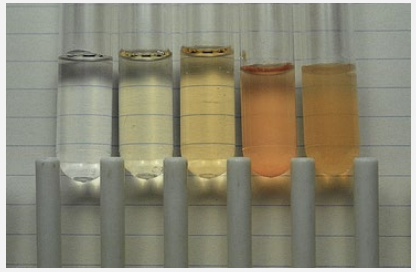
ANTEMORTEM

- Serum for IgM
- CSF for PCR

POSTMORTEM

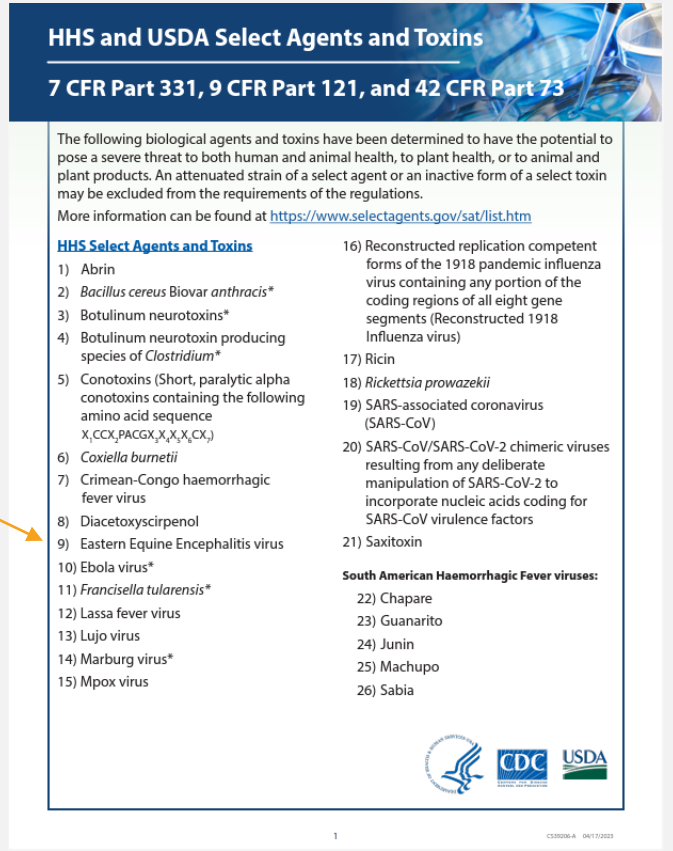
- Brain or CSF for PCR





SPOILER ALERT

- Remember that horse from Florida…?
- EEE positive



HHS and USDA Select Agents and Toxins

7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73

The following biological agents and toxins have been determined to have the potential to pose a severe threat to both human and animal health, to plant health, or to animal and plant products. An attenuated strain of a select agent or an inactive form of a select toxin may be excluded from the requirements of the regulations.

More information can be found at https://www.selectagents.gov/sat/list.htm

HHS Select Agents and Toxins

1) Abrin
2) *Bacillus cereus* Biovar *anthracis**
3) Botulinum neurotoxins*
4) Botulinum neurotoxin producing species of *Clostridium**
5) Conotoxins (Short, paralytic alpha conotoxins containing the following amino acid sequence $X_1CCX_2PACGX_3X_4X_5X_6CX_7$)
6) *Coxiella burnetii*
7) Crimean-Congo haemorrhagic fever virus
8) Diacetoxyscirpenol
9) Eastern Equine Encephalitis virus
10) Ebola virus*
11) *Francisella tularensis**
12) Lassa fever virus
13) Lujo virus
14) Marburg virus*
15) Mpox virus
16) Reconstructed replication competent forms of the 1918 pandemic influenza virus containing any portion of the coding regions of all eight gene segments (Reconstructed 1918 Influenza virus)
17) Ricin
18) *Rickettsia prowazekii*
19) SARS-associated coronavirus (SARS-CoV)
20) SARS-CoV/SARS-CoV-2 chimeric viruses resulting from any deliberate manipulation of SARS-CoV-2 to incorporate nucleic acids coding for SARS-CoV virulence factors
21) Saxitoxin

South American Haemorrhagic Fever viruses:

22) Chapare
23) Guanarito
24) Junin
25) Machupo
26) Sabia

CDC USDA

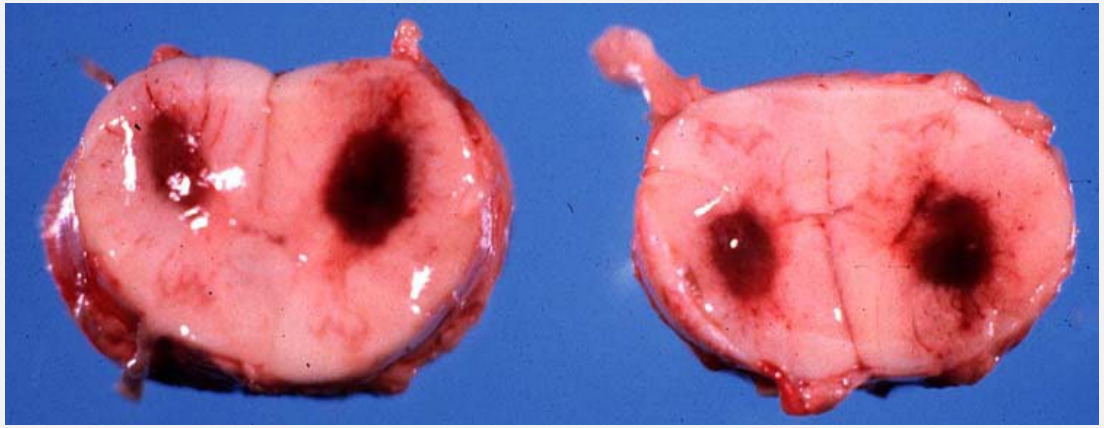
1

VIRAL ENCEPHALITIS

- Rabies
- West Nile Virus
- The encephalitides
  - WEE
  - EEE
  - VEE
- **EHV**

EHV

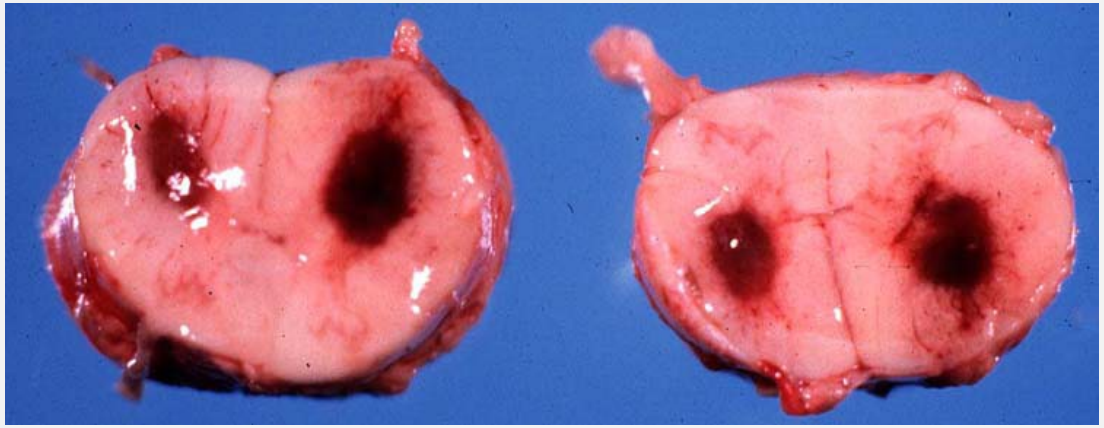
- EHV-1 >>>> EHV-4
  - Endotheliotropic, epitheliotropic, neurotropic
- Different strains
  - Neuropathic: G2254/D752
  - Non-neuropathic: A2254/N752
  - New variant: H752
- Incubation period is variable
  - Average 4-7 days



Not piggy snouts…

EHV

- EHM: Equine Herpesviral Myeloencephalopathy
  - 85% of cases due to mutated EHV-1
  - Unknown reason for mutation
  - Vaccination does *not* prevent EHM but does reduce nasal shedding of virus
    - Shedding may last up to 1 month!
    - Unvaccinated horses with EHM shed LOADS of virus in nasal/pharyngeal secretions



Not piggy snouts…

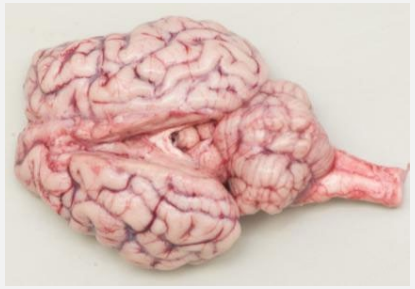
EHV DIAGNOSIS

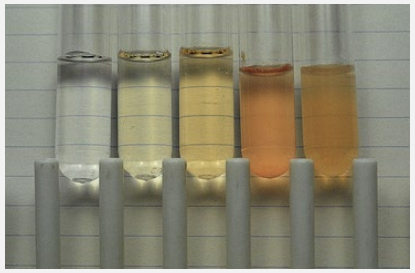
ANTEMORTEM

- Nasal swab for PCR
- EDTA blood for PCR
- CSF for PCR
- Serum for IgM

POSTMORTEM

- Brain or CSF for PCR





OADDL: 0 positives so far in 2023…

HERPESVIRUSES

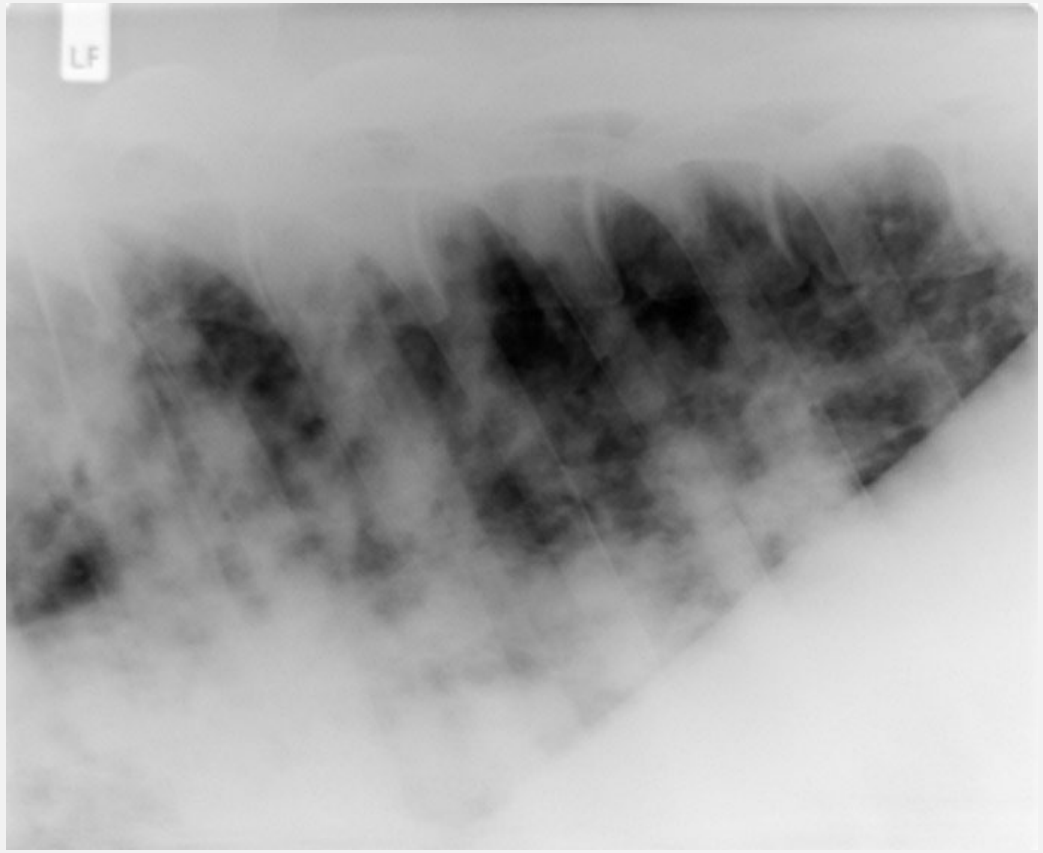
- EHV-1
  - Neurologic disease
  - Abortion
  - Respiratory disease
- EHV-2
  - Mild pathogen?
- EHV-3
  - Equine coital exanthema
- EHV-4
  - Similar to EHV-1, but not as bad
  - Respiratory >>>>> neuro or abortion
- EHV-5 and beyond…

CASE WORK-UP

- A 14-year-old TB mare presents for chronic weight loss

- Clinical signs:
  - Mild fever
  - Mild nasal discharge
  - Increased respiratory rate and effort
    - "heave line"

CASE WORK-UP



Spelta CW, Axon JE, Begg A, Diallo IS, Carrick JB, Russell CM, Collins NM. Equine multinodular pulmonary fibrosis in three horses in Australia. Aust Vet J. 2013 Jul;91(7):274-80.

DIFFERENTIALS

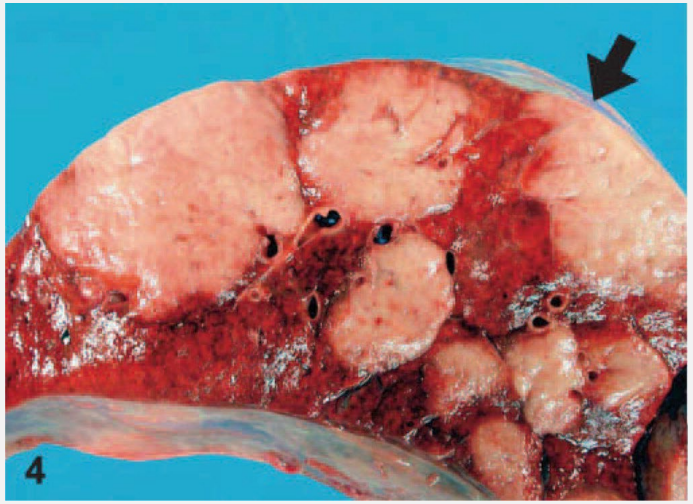
- Infectious
  - Viral
  - Bacterial
  - Fungal
  - Other?
- Immune-mediated
  - Asthma
    - Aka heaves aka COPD aka RAO
- Neoplastic
- Other?

EHV-5

- Equine Multinodular Pulmonary Fibrosis (EMPF)
- Gammaherpesvirus
  - Proliferative rather than necrotizing (like EHV-1)
- Progressive histiocytic pneumonia and fibrosis

EHV-5

Dr. Raquel Rech, my wonderful mentor at TAMU

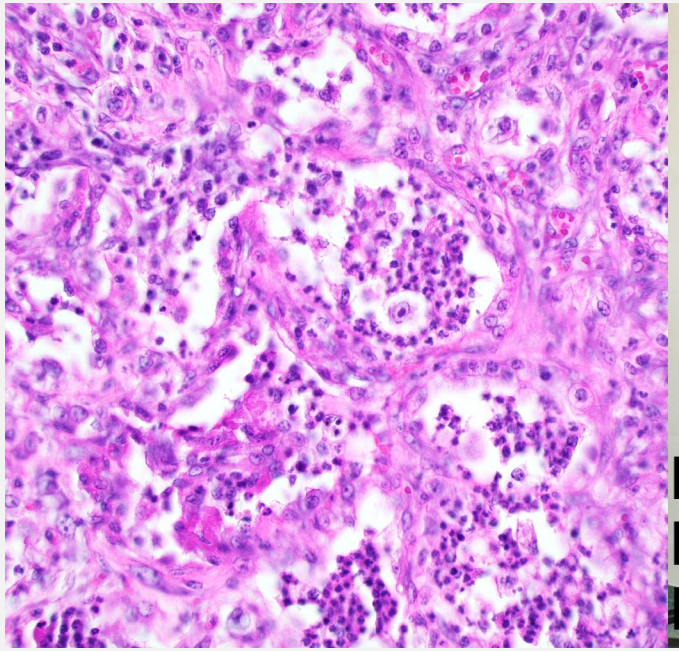


Williams KJ, et al. Equine multinodular pulmonary fibrosis: a newly recognized herpesvirus-associated fibrotic lung disease. Vet Pathol. 2007 Nov;44(6):849-62.

Multifocal to coalescing regions of chronic inflammation and fibrosis

EHV-5

- Diagnosis
  - Histopathology (gold standard)
  - PCR
    - Antemortem
      - Blood
      - Nasal swab
      - BAL
    - Postmortem
      - Fresh lung tissue



Dr. Alex Ford

EHV-5

- Diagnosis
  - Histopathology (gold standard)
  - PCR
    - Antemortem
      - Blood
      - Nasal swab
      - BAL
    - Postmortem
      - Fresh lung tissue

BAL or combo of blood and nasal secretions (Pusterla et al., 2015) shows high sensitivity and specificity

So far in 2023 at OADDL:
- 2 horses (postmortem histopath)
- "2 horses" (antemortem nasal swab)*

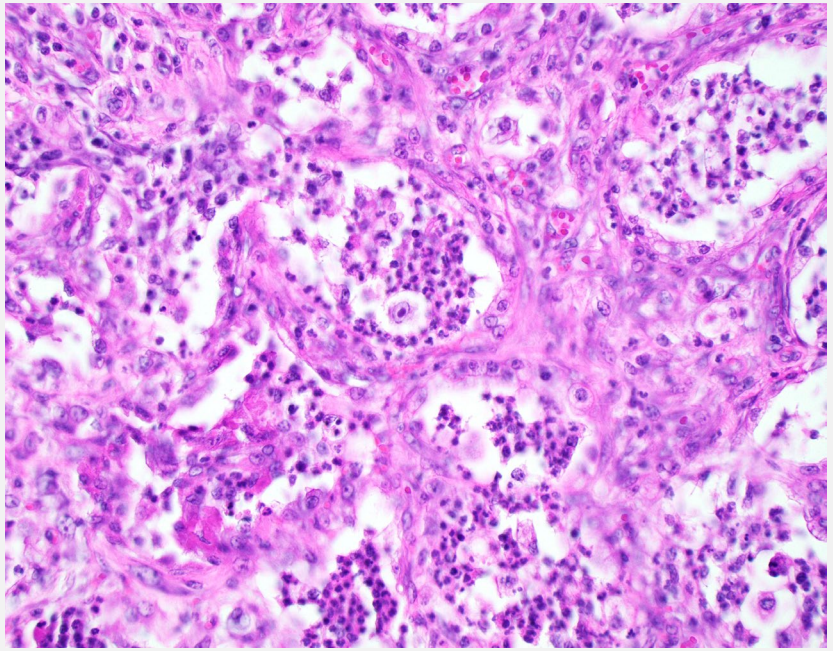
Pusterla N, et al. Assessment of quantitative polymerase chain reaction for equine herpesvirus-5 in blood, nasal secretions and bronchoalveolar lavage fluid for the laboratory diagnosis of equine multinodular pulmonary fibrosis. Equine Vet J. 2017 Jan;49(1):34-38.

*Asinine herpesvirus-5 and EHV-2

EHV-5

- Prognosis is fair to poor ☹

- Treatment:
  - Vancyclovir
  - +/- corticosteroids
    - Steroids alone are contraindicated**
  - Supportive care



BACK TO BRAIN

- Viral
  - Rabies (always at the top of the list, right?)
  - West Nile Virus
  - The encephalitides: EEE, WEE, VEE
  - EHV
- Bacterial
- Parasitic
  - EPM
  - Halicephalobus gingivalis
  - Others?
- Toxic?
  - ELEM
  - NPE
  - Locoweed
  - Hepatic encephalopathy
- Degenerative
  - EDM
  - EMND
- Neoplastic

BACK TO BRAIN

- Viral
  - Rabies (always at the top of the list, right?)
  - West Nile Virus
  - The encephalitides: EEE, WEE, VEE
  - EHV
- Bacterial
- Parasitic
  - **EPM**
  - Halicephalobus gingivalis
  - Others?
- Toxic?
  - ELEM
  - NPE
  - Locoweed
  - Hepatic encephalopathy
- Degenerative
  - EDM
  - EMND
- Neoplastic

EPM

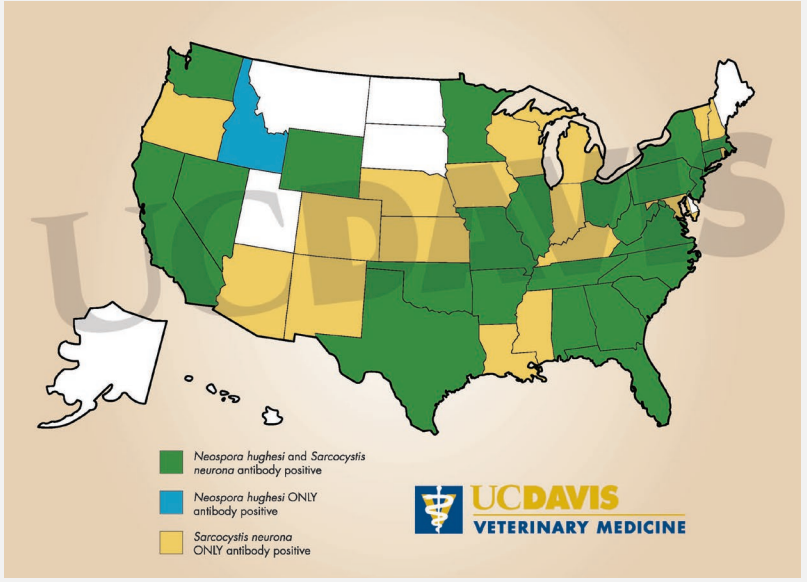
- Equine Protozoal Myeloencephalitis
- *Sarcocystis neurona*
  - Protozoa
  - Definitive host: opossum
- *Neospora hughesi*
  - Nearly identical protozoa
  - Unknown DH

The 3 A's

1. Asymmetry
2. Ataxia
3. Atrophy

EPM

- Over 90% of horses in the US are seropositive for *S. neurona* and/or *N. hughesi*
  - Only a small subset of horses will develop EPM
- Widely variable time of onset, clinical signs, severity
  - Most cases show progression over time
  - Uncommon to be acute onset, but can happen
- Lots of differentials
  - CVSM (spinal cord involvement)



EPM

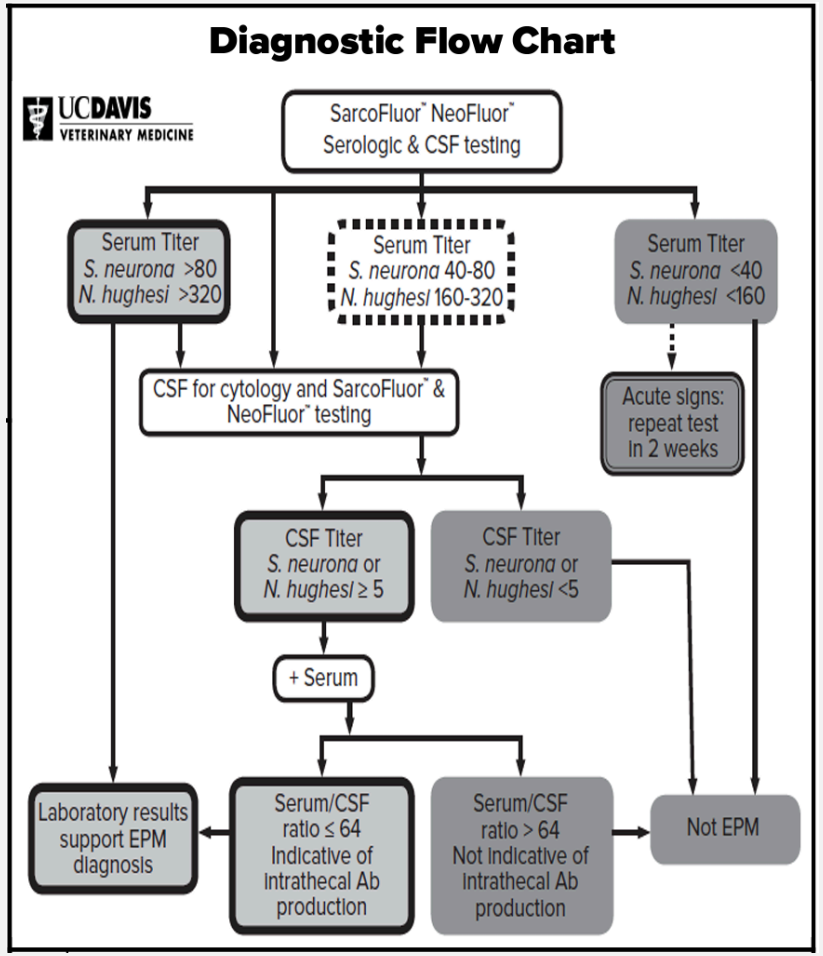
- But how to diagnose…?

1

SarcoFluor™ Interpretation (*Sarcocystis neurona* IFAT)

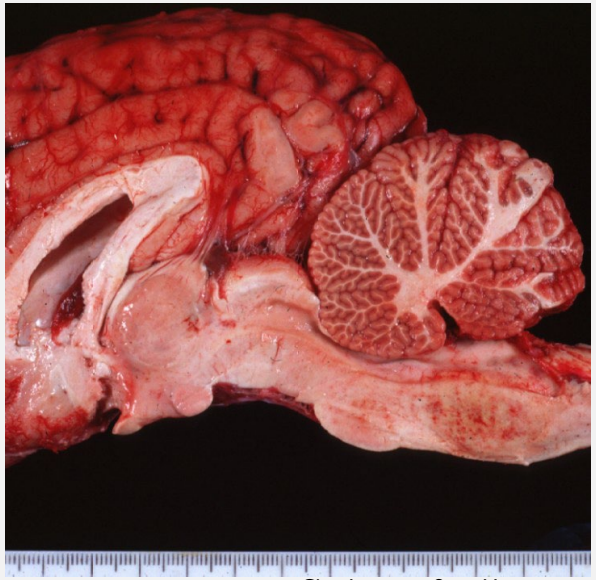
Serum titer result	Estimated probability of EPM due to *S. neurona* given the test result **
40	33%
80	55%
160	76%
320	89%
≥640	95%

CSF titer result	Estimated probability of EPM due to *S. neurona* given the test results
<5	<1%
≥5	92%

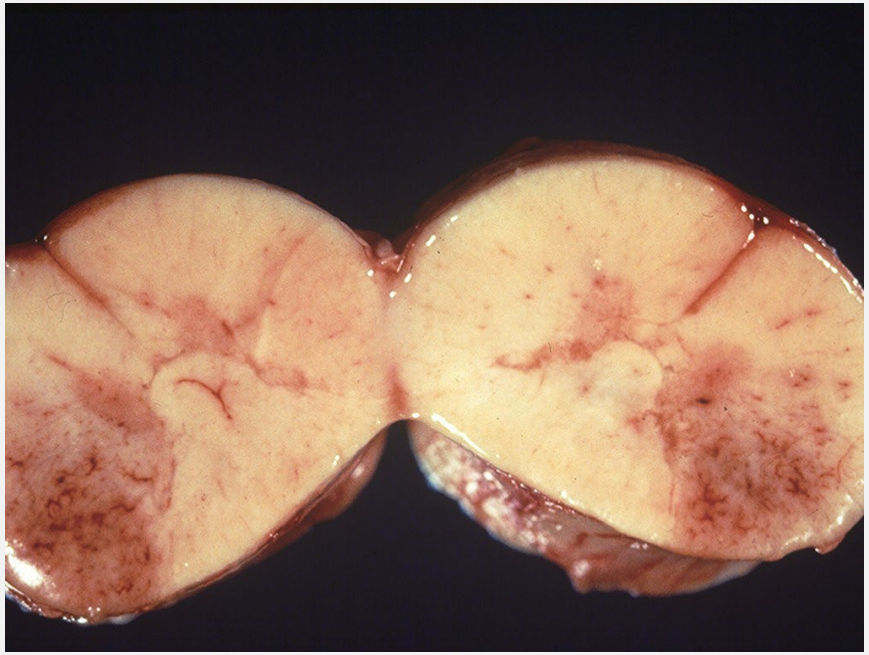


EPM

- Definitive diagnosis is postmortem only



Cho, Louisiana State University



Giles, University of Kentucky

Can you imagine why this might be asymmetric…?

ANY QUESTIONS?