Madison

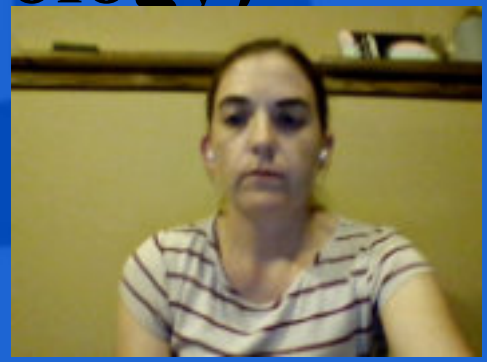
Veterinary Specialists

Neurodiagnoses for under $1000:

mystery cases that
didn't need an MRI
CE Symposium

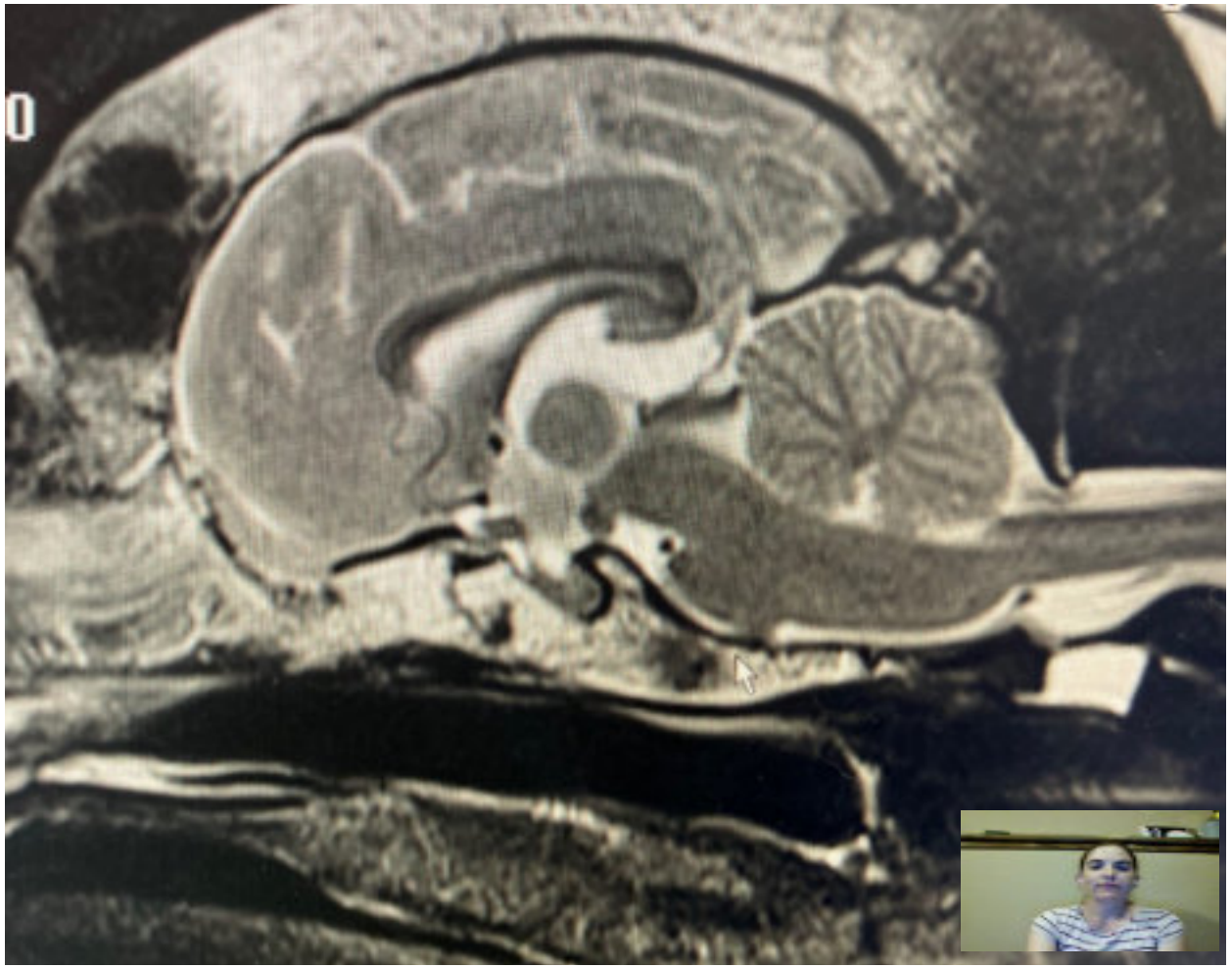
Presented by Joy Delamaide,
DVM, DACVIM (Neurology)

Fall 2021



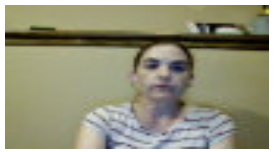
Update about MVS Neurology and MRI

- Neurology consultations in person mainly Tuesday-Friday
- Work closely with ER to try to accommodate as many fit ins as feasible
- Alternate appt and procedure days, so same day MRI is not standard although we try to accommodate this if requested.
- I'm on call 50% of the evenings/weekends, surgeon should be on call for down back dogs the other 50%



Update about MVS Neurology and MRI

- MRI is a useful diagnostic tool
- Can answer the question where is the problem, what is the problem more (or less) likely to be?
- Not a cellular diagnosis (biopsy)
- Expensive
- Anesthesia 25 min to 3 hours



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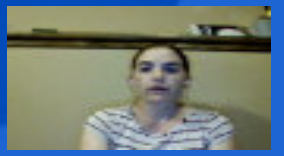


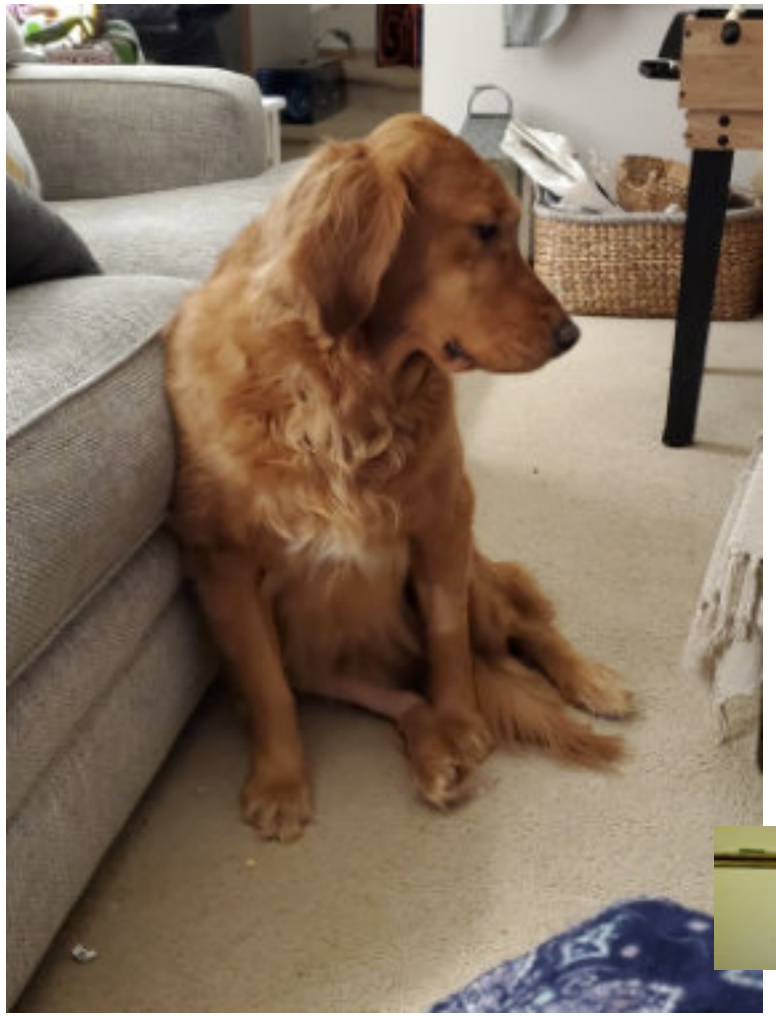
Value of send out CBC/chemistry and T4

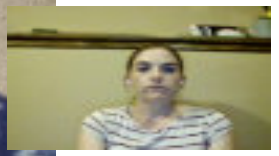
- In-house blood work lab sets tend to have fewer chemistry tests that send out
- Send out general blood panel for the benefit of a CK/AST
  - This would catch a myopathy
- Cholesterol
- Total T4

2 y FS Golden Retriever

History

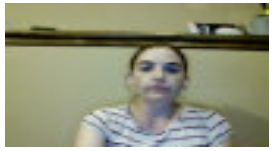
- Since about 10 mo old, 5-6 times per year, periods where she acts stiff, sore, decreased activity, decreased appetite
- In-house blood work with pcDVM five times – neutrophilia a few of the times, otherwise normal.
- Would improve with steroidal anti-inflammatory, doxycycline, and time
- Physical examination
  Mass in ventral neck
- Abnormal fat deposition in brisket region
- Minimal hair regrowth since abdominal ultrasound 2 months ago
- Quiet, sad, alert
- Otherwise normal neuro exam except patient seemed generally uncomfortable





2 y FS Golden Retriever

- Neuroanatomic diagnosis: normal neurological examination
- Differential diagnoses: metabolic, neuromuscular, neoplasia, inflammatory/infectious
- Other problem list: bilobed enlargement of tissue amongst fat in her brisket – goiter or lymphadenopathy
- Recommended repeating blood work with CBC/chemistry/T4 (Senior Health Profile to Idexx). Also baseline cortisol and fine needle aspirate of 'mass under neck'.
- Exam: $174
- Health Check Plus $91
- Phlebotomy $28
- Cortisol-add on $59
- FNA $32
- Total $384



2 y FS Golden Retriever

	Conjugated Cholesterol		
H	Cholesterol	993	(131 - 345) mg/dL
	Creatine Kinase	97	(10 - 200) U/L
	Hemolysis Index [b]	N	
	Lipemia Index [c]	N	

ENDOCRINOLOGY

TEST	RESULT	REF.RANGE/UNITS
L Total T4 [d]	0.5	(1.0 - 4.0) ug/dL
L Cortisol	1.7	(2.0 - 6.0) ug/dL

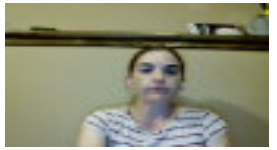
MSU thyroid panel $226
Spoke with pcDVM: relayed results, discussed odd history/presentation, talked with her about being able/willing to start levothyroxine 0.4 mg q12h
Patient responded well, continued to have fluctuation

Endocrine Results

Collected Date/Time (If Provided)	08/05/2021 15:18:00		
Procedure		Ref Range	Units
Total Thyroxine (TT4) (CLIA)	**0 L**	[9-45]	nmol/L
Total Triiodothyronine (TT3) (RIA)	**0.0 L**	[0.8-2.1]	nmol/L
Free Thyroxine (FT4) (RIA)	**3 L**	[9-39]	pmol/L
T4 Autoantibody (RIA)	20	[0-20]	%
T3 Autoantibody (RIA)	**37 H**	[0-10]	%
Thyroid Stimulating Hormone (CLIA)	0.43	[0.00-0.58]	ng/mL
Thyroglobulin Autoantibody (ELISA) *	**54 H**	[0-35]	%
Specific Binding TgAA (ELISA) *	56		%
Endocrinology Comment	See Below		

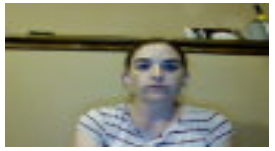
8/5/2021 3:18:00 PM Thyroglobulin Autoantibody (ELISA):
< 20% Negative
20 - 35 % Inconclusive
> 35% Positive

8/5/2021 3:18:00 PM Specific Binding TgAA (ELISA):
< 10% Negative
10 - 25 % Inconclusive
> 25% Positive



Clinical signs of hypothyroidism

- Lethargy, mental dullness, inactivity, weight gain
- Dry, brittle hair coat, poor hair regrowth, seborrhea, etc
- Weakness, knuckling, ataxia, circling, vestibular signs, facial nerve paralysis, seizures
- Also ocular, reproductive, behavioral changes
- Anemia, hyperlipidemia, coagulopathy

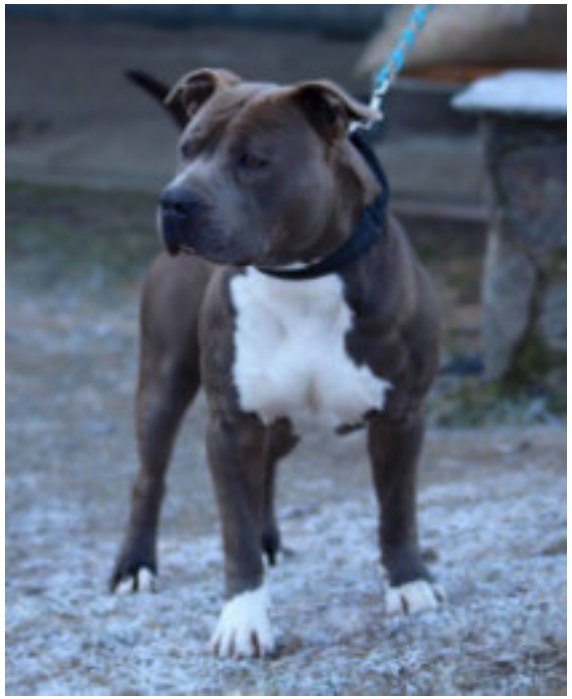


Take home message about hypothyroidism

- The advantage I have in these cases is more time has passed.
- Hypothyroidism is not just for old dogs
- Sometimes repeat blood work should be send out
- Can present primarily with neuro signs
- Can present primarily with lameness
- Can take a long time to regulate
- In my earlier days, I have MRI'd 3 dogs with hypothyroidism before thinking of or believing it could be hypothyroidism… their brain MRIs are normal…

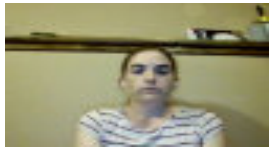
Unique genetic disorders

- Cerebellar ataxia of American Staffordshire Terrier
- Abiotrophy in the cerebellum – loss of the purkinje cell layer
- Progressive cerebellar ataxia over months to years
- Neurology consultation $174
- EDTA genetic blood test $300



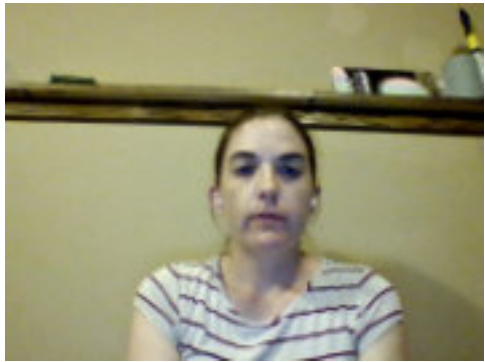
Infectious disease testing

- Certain cases are more suspicious for infectious disease testing
- Animals with fever, elevated white blood cell counts, high globulins
- Cats: FeLV/FIV/cryptococcus/toxoplasma I always prefer to test for these prior to advanced imaging
- Dogs: I’ve been using Idexx Neurological infectious disease panel
  - Includes CBC/chemistry/UA/T4, cryptococcus latex agglutination, coccidioidomycosis, Neospora, toxoplasma, Ehrlichia.
- +/- blastomycosis urine antigen



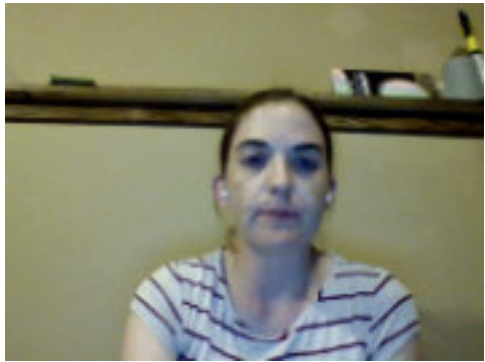
10 y FS barn cat

- History: 2-year progressive hind end weakness and ataxia
- Cat has never seemed painful, but more recently has been hyperesthetic along spine anywhere behind shoulder blades
- General blood work was normal.
- Has been seen by 6 vets, 2 of which considered bilateral medial patellar luxation surgery and then cancelled.
  - Please note I only had records from one vet based on the client saying it was the most recent and most relevant, so I cannot report what was previously recommended/declined by the client.
- Obtained from a barn in WI, FeLV NEGATIVE at time of adoption 12/13/11 (single test)
- Reportedly indoor only now
- Has been treated with gabapentin, no improvement



10 y FS barn cat

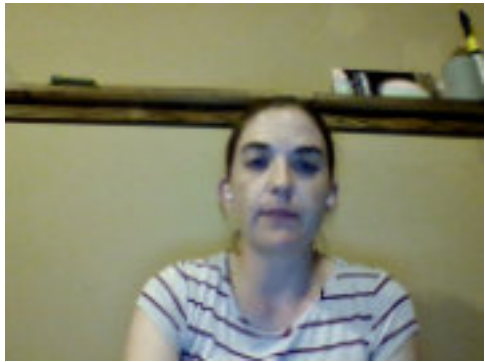
- Exam: fractious
- Ambulatory with moderate paraparesis and proprioceptive ataxia
- Was observed standing with hind feet knuckled
- Plantigrade bilaterally
- Patellar reflexes attempted but not able to test, others were not attempted



10 y FS barn cat

- Localization???

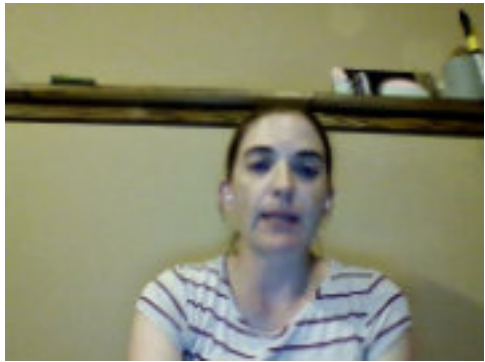
T3-L3 myelopathy most likely (due to commonality)
Could be neuromuscular (myasthenia gravis, polyneuropathy, polymyopathy) although the cat was more ataxic than I would expect for neuromuscular disease.



10 y FS barn cat

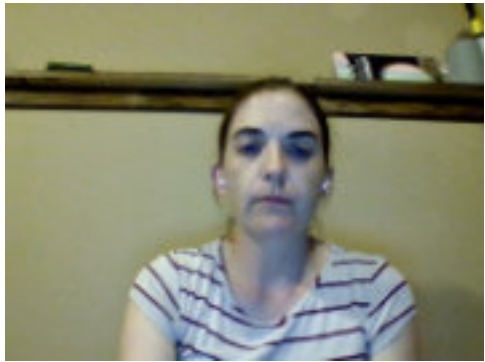
- Differential diagnoses?

infectious –FeLV, FIV, FIP (a little young, less likely given normal blood work), toxoplasma (seems like a long history), cryptococcus (seems like a long history),
Immune-mediated –
genetic / idiopathic,
neoplasia (seems less likely given long history)



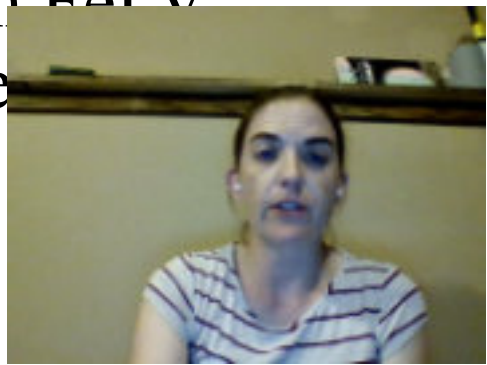
10 y FS barn cat

- Recommendations
- Feline infectious disease panel
- Here, we ran Idexx panel #3323 that has FeLV/FIV/cryptococcus/toxoplasma IgG
  - Discussed MRI/spinal tap as a possible future step, and client was open that MRI would not be performed due to cost.
  - Exam neurology = $174
  - Phlebotomy = $28
  - Neurologic Panel-Feline: $206



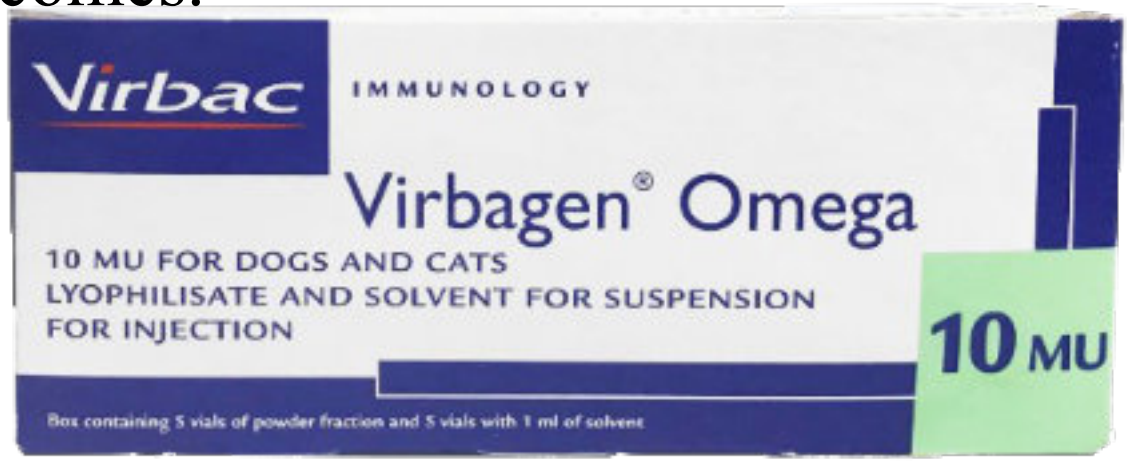
10 y FS barn cat

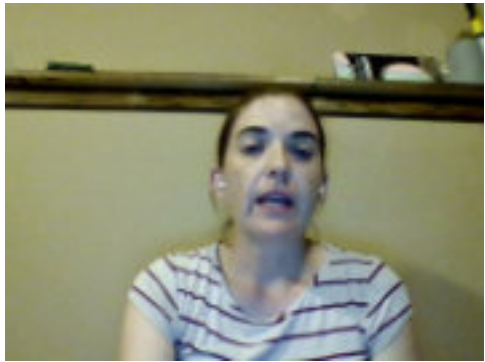
- FeLV Antigen by ELISA – POSITIVE
- FIV Antibody by ELISA – NEGATIVE
- Cryptococcus Antigen by Latex Agglutination – NEGATIVE
- Toxoplasma IgG Antibody by IFA-– Positive @ >/= 1:12800
- Discussed and recommended follow- up tests
- Recommended more recent CBC/chemistry
- In my opinion based on previous cases that have come in with FeLV positive test (including quantitative) one of these two positive not the combination) explains the cats progressive disease



10 y FS barn cat

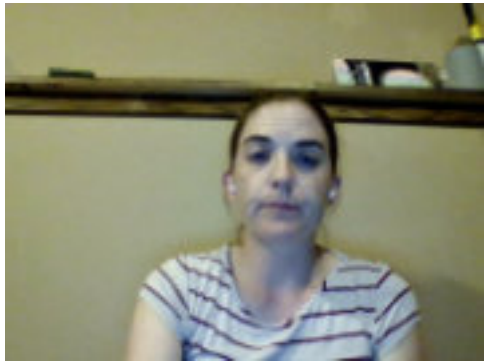
- Treatment:
- Clindamycin course 4 weeks
- Prednisolone, starting this about 2 weeks after clindamycin
- Advised client that some owners seek anti-viral treatments that have equivocal outcomes.





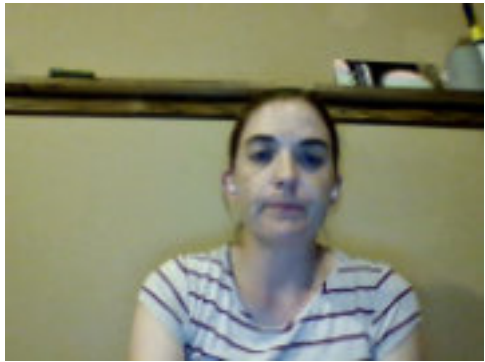
10 y FS barn cat

- Client questions: How would the add- on tests change what I do?
- Both problems can be hard to treat:
- FeLV, no proven treatments
- Toxoplasma, acute disease can sometimes improve drastically with treatment, although I'm not sure this would work as well in this chronic situation
- Client relieved to have more information without having to 1) come back another visit 2) do an MRI.



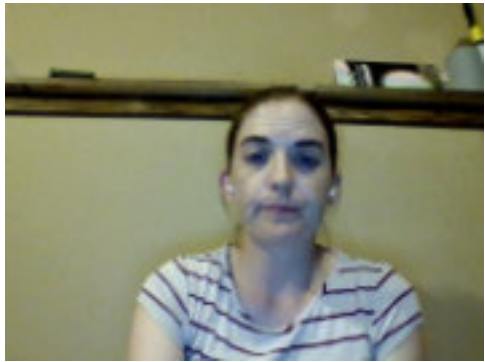
10 y FS barn cat

- FeLV and toxoplasma infections are alive and well in this area.
- In this case, I'm concerned the FeLV is a progressive infection, meaning they can become clinical and can be contagious



10 y FS barn cat

- FeLV can either cause lymphoma, which could result in neuro signs from brain or spinal cord compression
- OR
- Direct neurotoxic effects of FeLV envelope glycoprotein
  - T3-L3 myelopathy, Anisocoria, mydriasis, central blindness, Horner's syndrome



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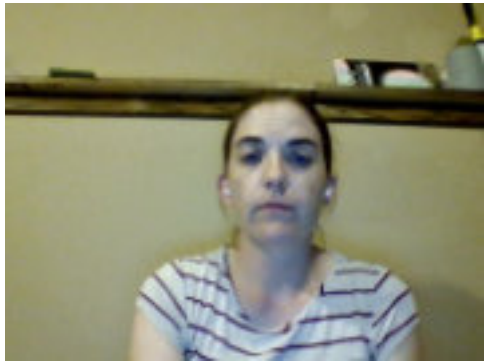
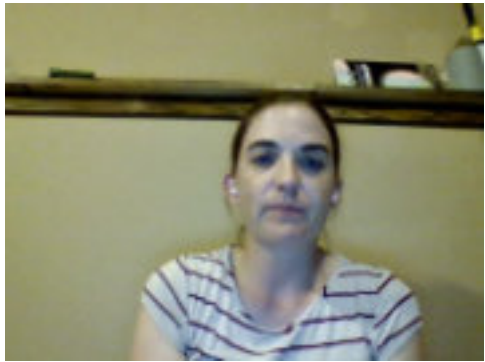
- +/- blastomycosis urine antigen
- +/- aspergillus urine antigen



Nasal Aspergillosis in dogs

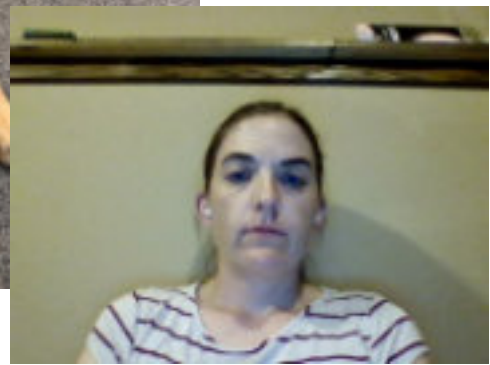
- Typically localized to nasal cavity or paranasal sinuses
- Infection with A. fumigatus
- Topical treatment
- This would be a talk for an IM specialist to review



Disseminated Aspergillosis in GSD

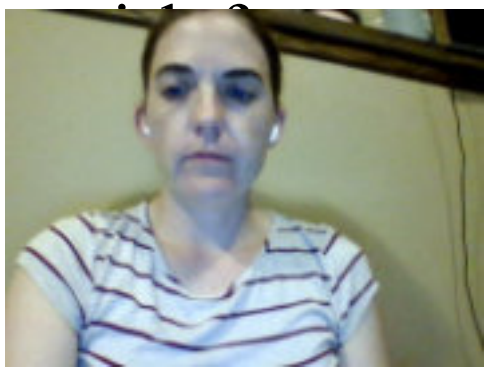
Three cases in the last year at MVS

- Head tilt
- Normal CPs (initially)
- +/- uveitis
- +/- kidney disease and elevated globulins
- +/- discospondylitis



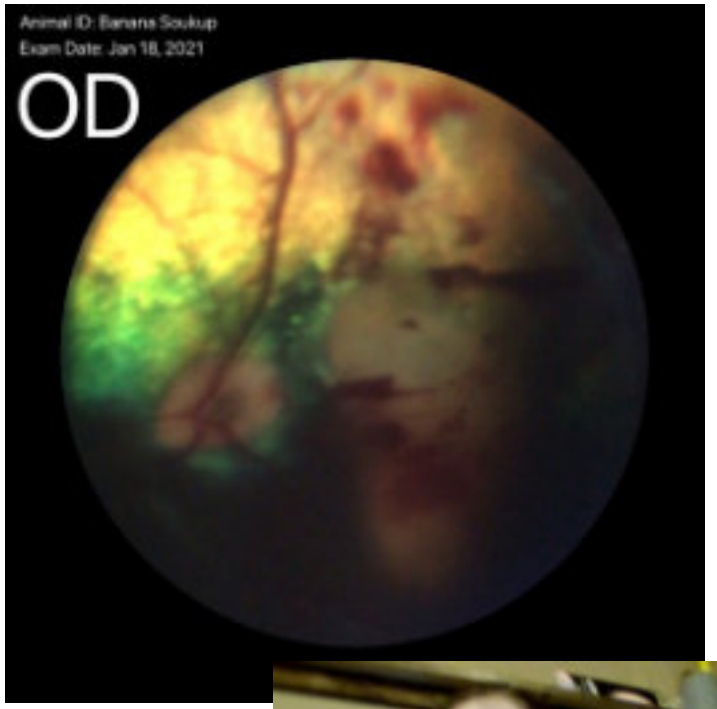
Pathogenesis

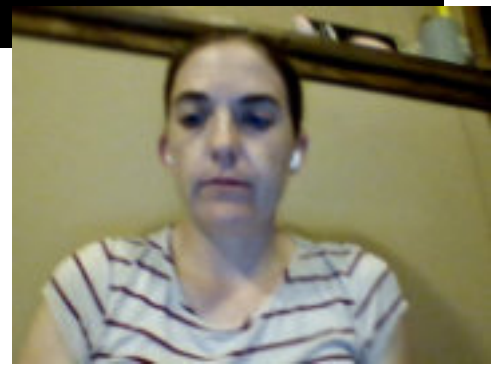
- Aspergillus organisms produce small hydrophobic conidia (asexual spores) that disperse into the air.
- The conidia are inhaled and deposited in the bronchioles and alveolar spaces.
- Healthy individuals clear conidia by mucociliary defenses or macrophages eat them up
- Or a second line is that neutrophils can destroy fungal hyphae.
- Neutropenic and otherwise immunocompromised patients are [illegible] pulmonary colonization, leading to tissue injury, uncontrolled growth and potential dissemination by angioinvasion.



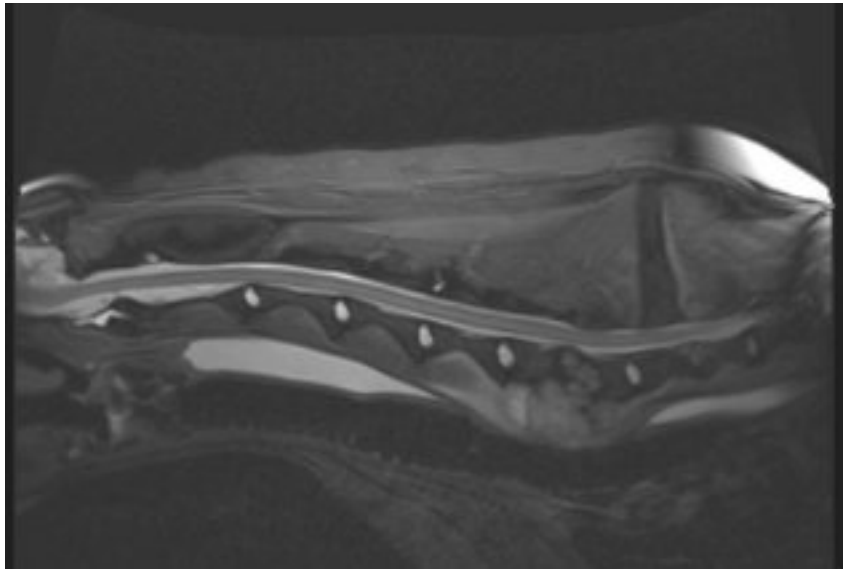
Disseminated aspergillosis

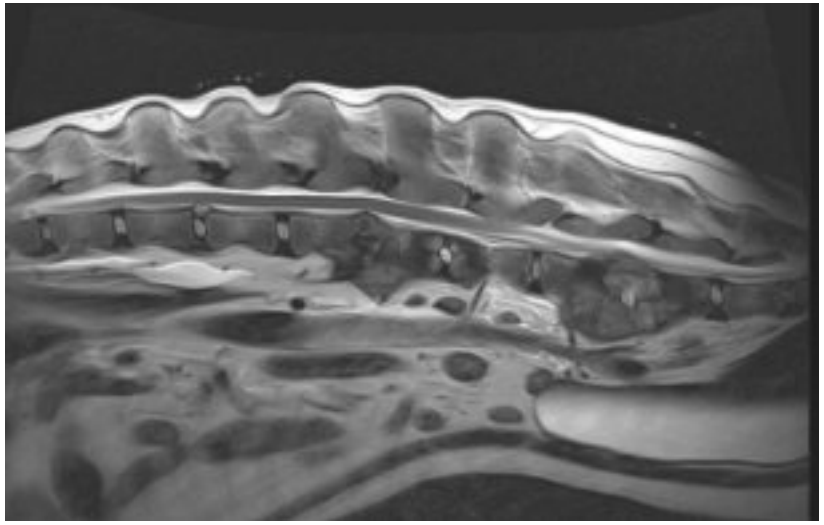
- Middle-age, female GSD
- A. terreus, A. deflectus, and A niger.
- Clinical signs: lethargy, lameness, anorexia, weight loss, muscle wasting, pyrexia, hematuria, urinary incontinence, generalized lymphadenopathy, uveitis and neurologic deficits.
- Discospondylitis is common.
- Can also affect bone, lymph nodes, lung, renal pelvis

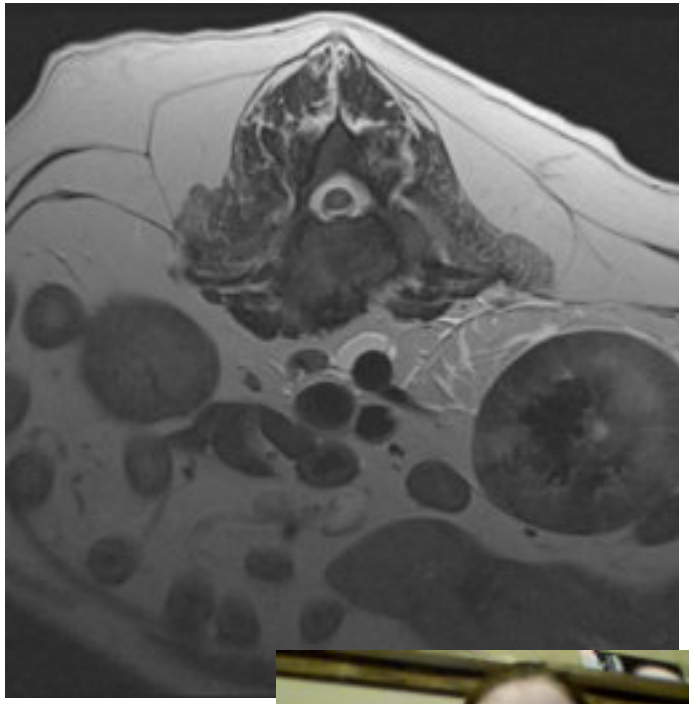




Discospondylitis from aspergillosis

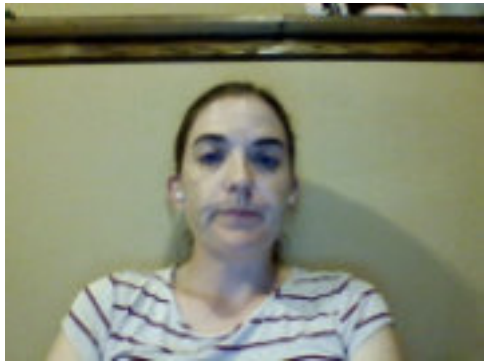






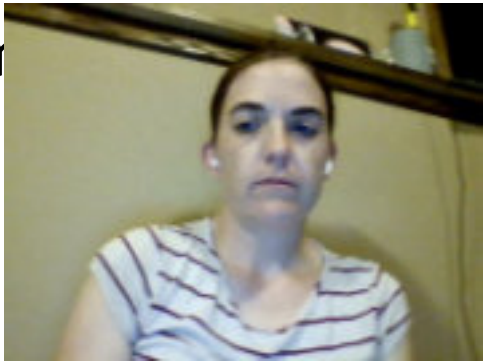
Predisposing factors

- Optimal climatic conditions
- Access to particular strains of Aspergillus
- Defect in mucosal immunity (IgA deficiency)
- Serum IgA levels are known to be lower in GSD than other breeds potentially compromising their innate immunity and increasing their risk of acquiring this infection.



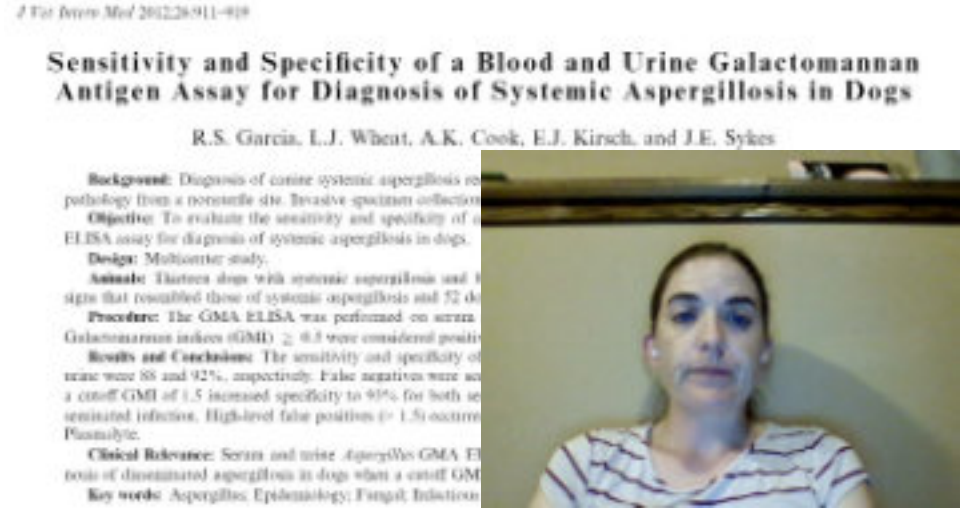
Diagnosis: urine antigen to Miravista

- The agar-gel double diffusion test for serum antibody is unreliable.
  - If affected dog is immunodeficient, may not mount an adequate antibody response.
- CBC: neutrophilia with left shift, non-regenerative anemia
- Chem: azotemia, hyperglobulinemia, hypoalbuminemia, hypercalcemia.
- Ultrasound: lymphadenopathy, renal lesions
- Urine (or blood) galactomannan antigen assay for diagnosis m
  sensitivity and specificity



Diagnosis: More on the urine antigen

- Platelia *Aspergillus* antigen assay is an EIA for detection of Aspergillus galactomannan antigen in body fluids. Sensitivity of 92% in serum and specificity 88% in urine (variable, and not perfect). Specificity was 84% in serum and 92% in urine.
- For disseminated disease, sensitivity may be higher (100%)
- False positive can occur due to cross reactivity to other fungi, or previous administration of amoxi/clav
- Blastomycosis urine antigen $150



J Vet Intern Med 2012;26:911–919

Sensitivity and Specificity of a Blood and Urine Galactomannan Antigen Assay for Diagnosis of Systemic Aspergillosis in Dogs

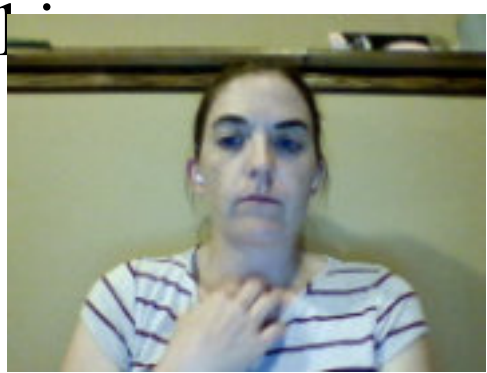
R.S. Garcia, L.J. Wheat, A.K. Cook, E.J. Kirsch, and J.E. Sykes

Treatment

- Positive > 0.5
- Case 1: 11.48
- Case 2: run at pcDVM
- Case 3: 9.67

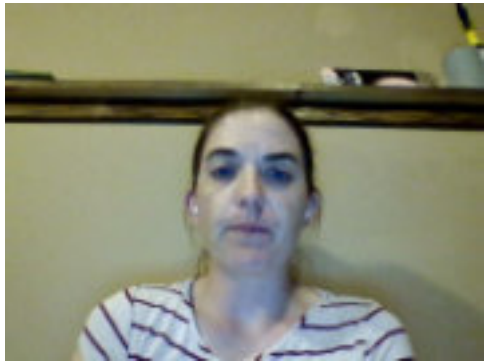
- Itraconazole 5-10 mg/kg/day
- Fluconazole 2.5-10 mg/kg, BID
- Voriconazole 3-6 mg/kg, BID
- Posaconazole

- Prognosis is poor, and all 3 of the patients we diagnosed with th died related to this disease.



Take home messages:

- There are many neurodiagnoses that can be made without MRI.
- Send out CBC/chemistry/T4 to Idexx to get complete chemistry and rule out hypothyroidism.
- Check cats with neurological signs for FeLV due to the lymphoma/neurotoxicity that can occur.
- German Shepherds should be checked for aspergillosis with urine antigen testing available at MiraVista.



Resources

- Taboada, J. Aspergillosis in Merck Veterinary Manual 2018
- Garcia et al 2012. Sensitivity and Specificity of a Blood and Urine Galactomannan Antigen Assay for Diagnosis of Systemic Aspergillosis in Dogs. 26: 911-919.

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