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## Equine Nervous System

- **Very Complex!**
- Autonomic Nervous System
- Central Nervous System
- Peripheral Nervous System
- **\*\*Brain, spinal cord & nerves\*\***



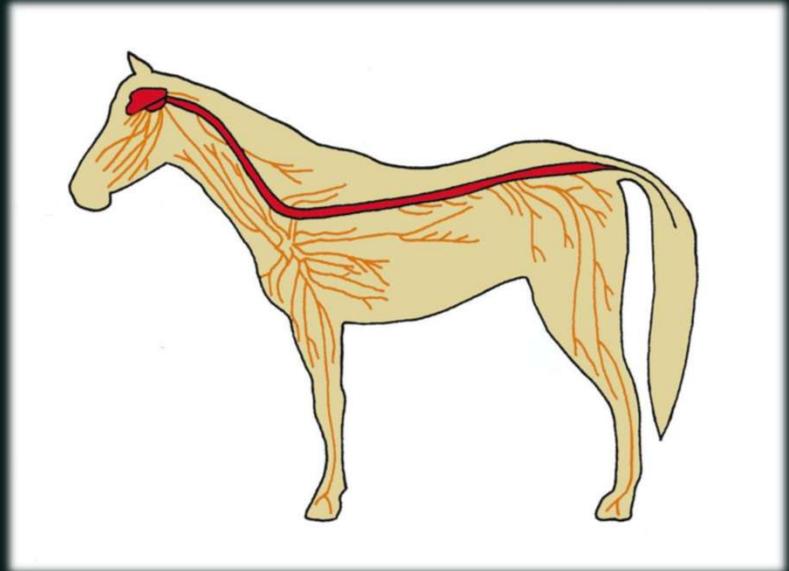
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What does term  
“neurologic” mean?

Something affecting the  
nerves or the nervous  
system



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What do you  
look for?

- Can be a challenge!
- Clinical Signs are VARIABLE
- Behavior changes, lameness, facial changes



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## What will your vet do?

- Perform series of tests (neurologic exam) to try to localize lesion
- Safety is key!
- Detailed history
- Performed in 2 parts
  - Static Exam
  - Dynamic Exam

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## Part 1 – Static Exam

- Observation – Behavior & mentation
- Cranial Nerve Exam
- Muscle mass/asymmetry
- Segmental reflexes
- Posture



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## Conscious Proprioception



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## Part 2 – Dynamic Exam

Observe at the walk

- Straight line
- Zig-zag
- Circles
- Up/down hill or curb
- Blindfolded
- Tail pull

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Video courtesy of Dr. Taylor

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## Part 2 – Dynamic Exam

Observe at the walk

- Straight line
- Zig-zag
- Circles
- Up/down hill or curb
- Blindfolded
- Tail pull

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Video courtesy of Dr. Taylor

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## Part 2 – Dynamic Exam

Observe at the walk

- Straight line
- Zig-zag
- Circles
- Up/down hill or curb
- Blindfolded
- Tail pull

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## Part 2 – Dynamic Exam

Observe at the walk

- Straight line
- Zig-zag
- Circles
- Up/down hill or curb
- Blindfolded
- Tail pull

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## Grading System

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- Grade 0: No gait deficits, normal
- Grade 1: Deficit barely detectable at a walk or trot, but present with special tests
- Grade 2: Mild deficits detected at all gaits/times
- Grade 3: Moderate deficits at all times/gaits that are obvious to all viewers
- Grade 4: Severe deficits, may buckle, stumble, trip & fall
- Grade 5 Recumbent, unable to stand

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## Other Diagnostics:

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- Radiographs
- Bloodwork (EPM testing, Vitamin E/Selenium, etc.)
- Advanced imaging (cervical myelogram)

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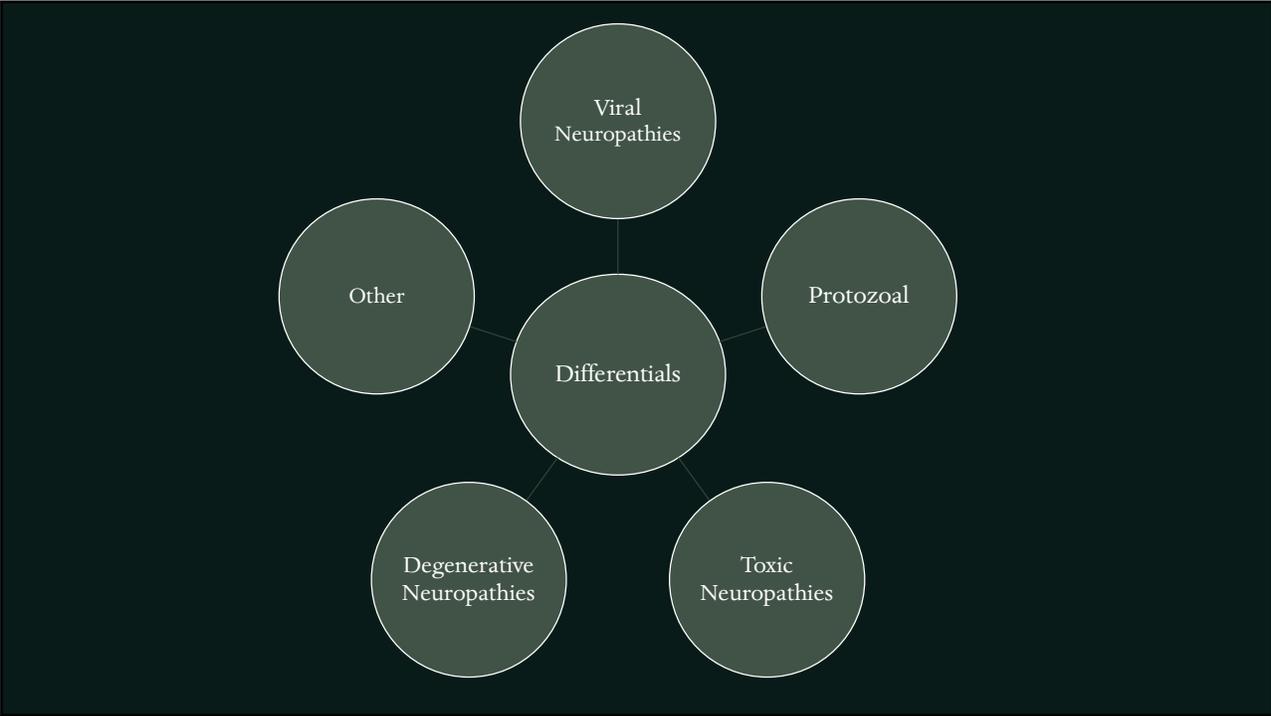
# Put it all together...

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HISTORY      CLINICAL SIGNS      STATIC & DYNAMIC EXAM      OTHER DIAGNOSTICS

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- Rabies
- EHV-1
- EEE/WEE
- WNV

**Viral Neuropathies**



- Equine Protozoal Myeloencephalopathy

**Protozoal**



- Nigropallidal Encephalomalacia
- Leukoencephalomalacia
- Tetanus
- Botulism

**Toxic Neuropathies**



- Equine Degenerative Myeloencephalopathy
- Equine Motor Neuron Disease

**Degenerative Neuropathies**



- Cervical Vertebral Stenotic Myelopathy
- Cauda equina
- Neoplasia
- Head trauma
- Temporohyoid osteoarthropathy

**Other**



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## Viral Neuropathies

- Rabies
- Equine Herpes virus (EHV-1)
- Eastern/Western/Venezuelan Encephalomyelitis
- West Nile Virus





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# Rabies

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PERTINENT INFO

- Wildlife
- Transmitted through bite with infected saliva
- **ZOONOTIC**



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# Rabies

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<p>PERTINENT INFO</p> <ul style="list-style-type: none"> <li>• Wildlife</li> <li>• Transmitted through bite with infected saliva</li> <li>• <b>ZOONOTIC</b></li> </ul>	<p>CLINICAL SIGNS</p> <ul style="list-style-type: none"> <li>• Hindlimb ataxia</li> <li>• Lameness</li> <li>• Recumbency</li> <li>• Dysphagia</li> <li>• +/- behavioral changes           <ul style="list-style-type: none"> <li>• Aggression</li> <li>• Stuporous</li> </ul> </li> </ul>	<p>DIAGNOSIS</p> <ul style="list-style-type: none"> <li>• No antemortem test</li> <li>• Postmortem test           <ul style="list-style-type: none"> <li>• Brain sample</li> </ul> </li> </ul>
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# Rabies

TREATMENT



PREVENTION



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# Equine Herpesvirus (EHV-1)

- Younger horses
- Respiratory transmission
- Can be reactivated with stress



Photo courtesy of Dr. Taylor

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# EHV-1

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CLINICAL SIGNS

- Ataxia, worse hindlimbs
- Coughing
- Nasal Discharge
- Urinary incontinence
- Flaccid tail

DIAGNOSIS

- Nasal Swab



Video courtesy of Dr. Taylor

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# EHV-1

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TREATMENT



PREVENTION



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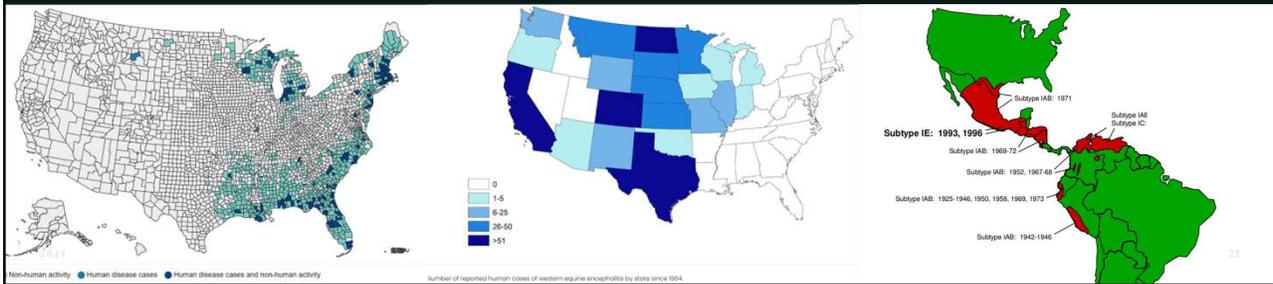
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# Equine Encephalomyelitis

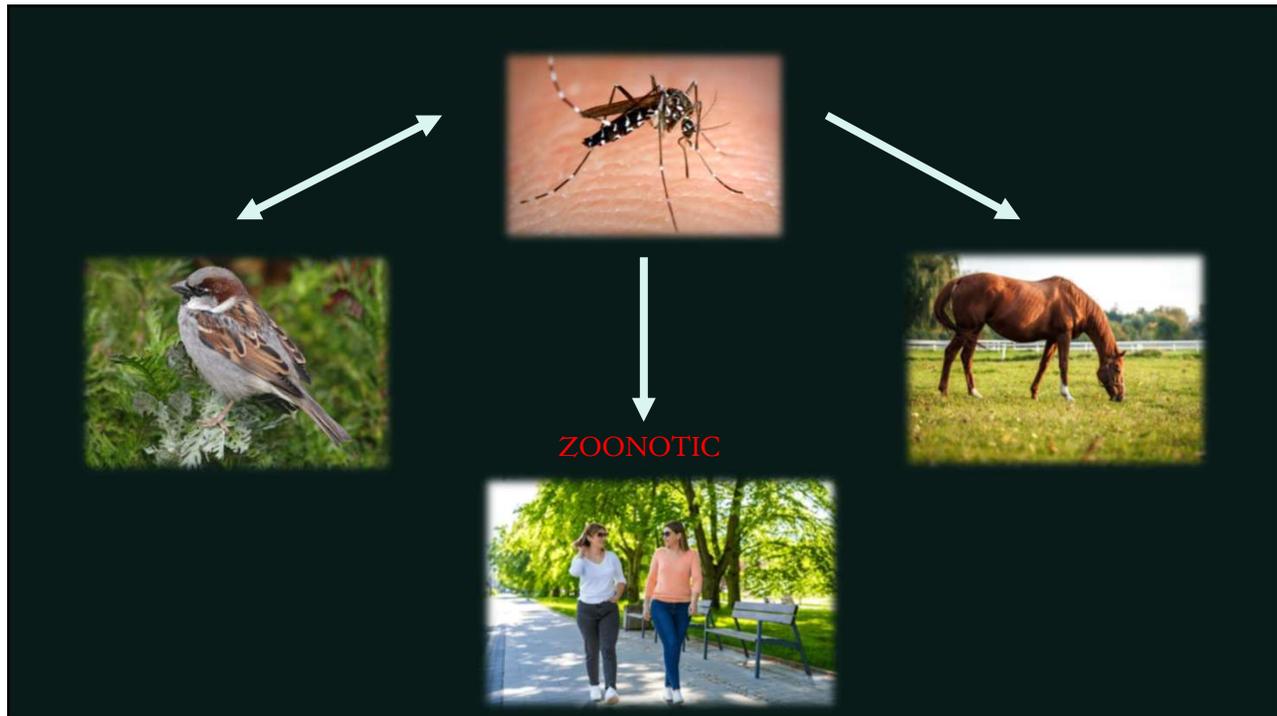
EEE: Found in SE & Midwest

WEE: E & W U.S.

VEE: Mexico & South America



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## EEE/WEE

### CLINICAL SIGNS

- Fever = 1st sign
- Neurologic signs
  - Depression, ataxia, paralysis, circling, staggering, blindness, seizures



Video courtesy of Dr. Fenger

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## EEE/WEE

### CLINICAL SIGNS

- Fever = 1st sign
- Neurologic signs
  - Depression, ataxia, paralysis, circling, staggering, blindness, seizures

### DIAGNOSIS

- NO VACCINE HISTORY
- CSF Tap
- Bloodwork
- Postmortem

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# EEE/WEE

TREATMENT



PROGNOSIS



PREVENTION

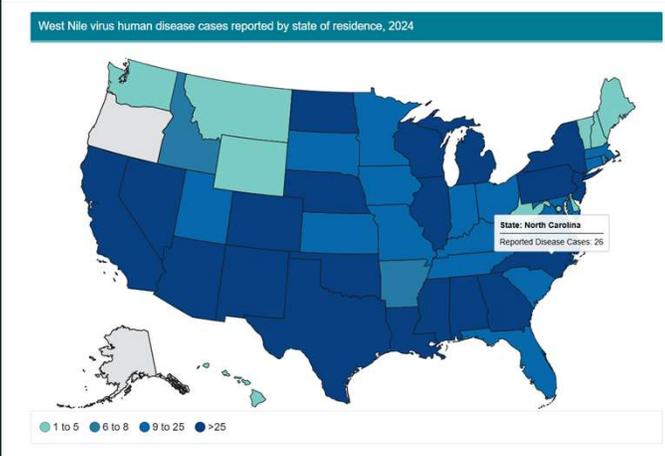


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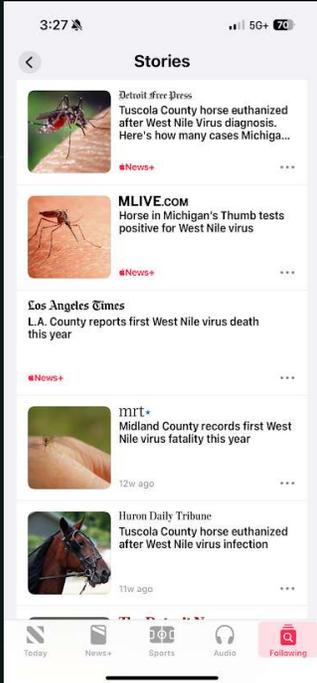
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# WEST NILE VIRUS

West Nile virus human disease cases reported by state of residence, 2024

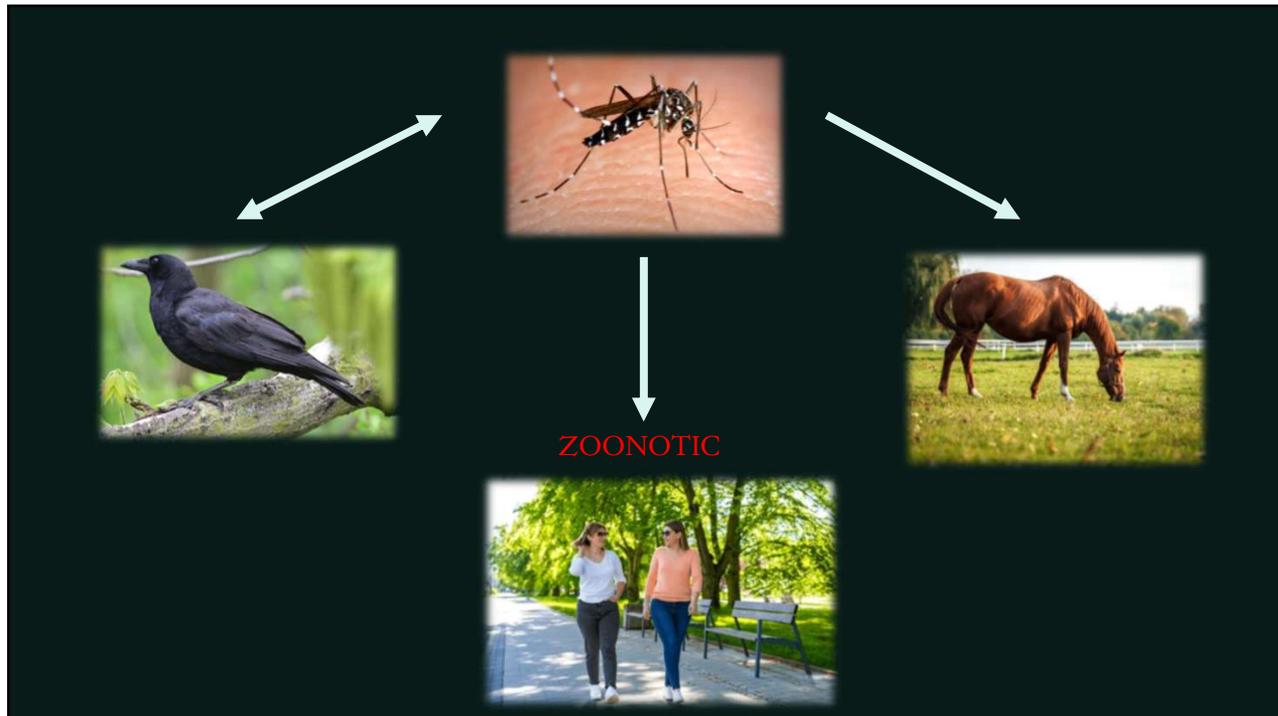


Legend: 1 to 5, 6 to 8, 9 to 25, >25



2025 30

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## WNV

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### CLINICAL SIGNS

- Fever = 1st sign
- Abnormal mentation
- Loss of fine motor skills
- Cranial nerve deficits
- Ataxia
- Paralysis




Videos courtesy of Dr. Poisson

2023

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# WNV

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## DIAGNOSIS

- NO vaccine history OR overdue
- CSF Tap
- Bloodwork
- Postmortem

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# WNV

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TREATMENT	PROGNOSIS	PREVENTION
		

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## Equine Protozoal Myeloencephalopathy

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## EPM

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### PARASITES

- *Sarcocystis neurona*
- *Neospora hughesi*

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# EPM

## CLINICAL SIGNS

- 3 A's
  - Ataxia
  - Asymmetry
  - Atrophy
- Any neurological signs
- Multifocal lesions



Video courtesy of Dr. Fenger

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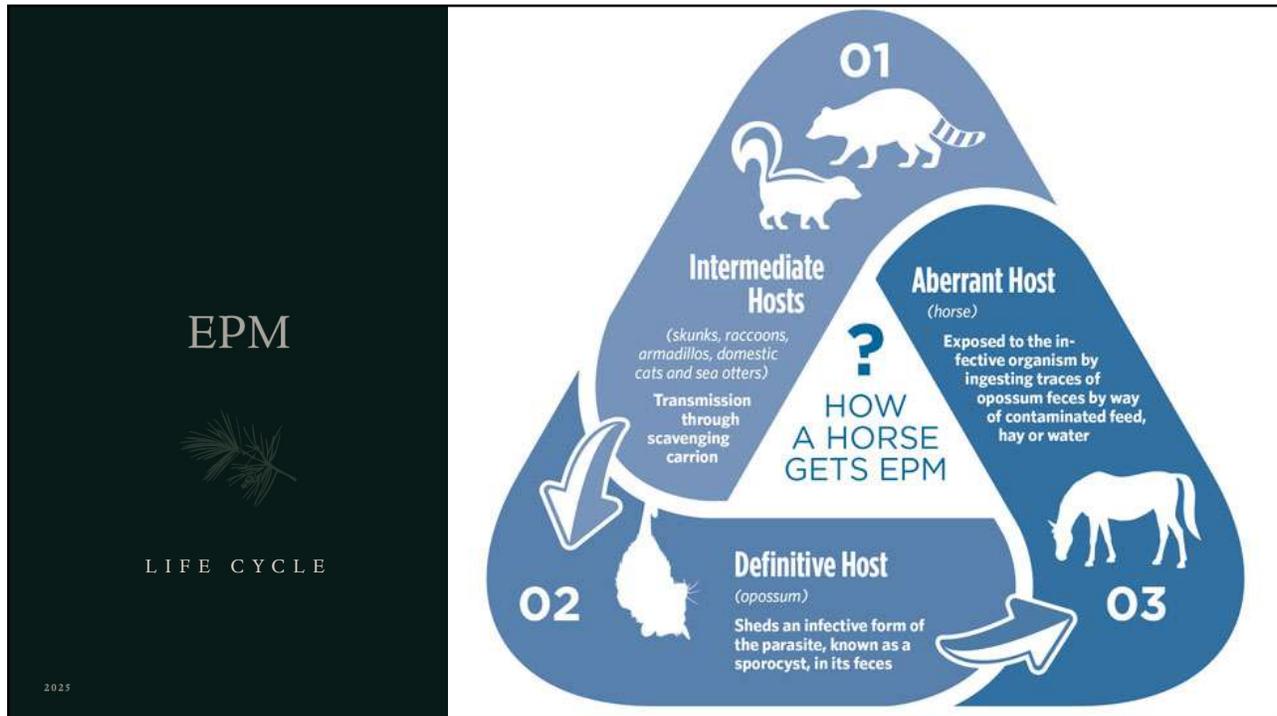
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# EPM



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**EPM**

<p><b>DIAGNOSIS</b></p> <ul style="list-style-type: none"> <li>• Bloodwork</li> <li>• CSF tap</li> <li>• Postmortem</li> </ul>	<p><b>TREATMENT</b></p> <ul style="list-style-type: none"> <li>• Anti-protozoal drugs</li> <li>• Vitamin E supplementation</li> </ul>	<p><b>PREVENTION</b></p> <ul style="list-style-type: none"> <li>• No effective vaccine</li> <li>• Wildlife/rodent control</li> </ul>
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## Toxic Neuropathies

Nigropallidal Encephalomalacia

Leukoencephalomalacia

Tetanus

Botulism



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## Tetanus



*Clostridium tetani*



All animals & humans  
susceptible



Higher prevalence in  
young, **unvaccinated** horses

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# Tetanus

## CLINICAL SIGNS

- Increased muscle rigidity
- Muscle spasms
- "Sawhorse" stance
- 3rd eyelid prolapse
- Elevated tailhead
- Facial grimace



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# Tetanus

## CLINICAL SIGNS

- Increased muscle rigidity
- Muscle spasms
- "Sawhorse" stance
- 3rd eyelid prolapse
- Elevated tailhead
- Facial grimace



Photo courtesy of Dr. Carroll

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# Tetanus

## CLINICAL SIGNS

- Increased muscle rigidity
- Muscle spasms
- "Sawhorse" stance
- 3rd eyelid prolapse
- Elevated tailhead
- Facial grimace



Video courtesy of Dr. Nicole

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# Tetanus

DIAGNOSIS

TREATMENT

PROGNOSIS

PREVENTION



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# Botulism

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*Clostridium botulinum*



Wet winter



Routes of infection

2025

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# Botulism

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## CLINICAL SIGNS

- Flaccid paralysis
- Dysphagia
- Weak eyelid, tongue, tail
- Paresis
- Recumbency
- Respiratory paralysis



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## Botulism

### CLINICAL SIGNS

- Flaccid paralysis
- Dysphagia
- Weak eyelid, tongue, tail
- Paresis
- Recumbency
- Respiratory paralysis



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## Botulism

### CLINICAL SIGNS

- Flaccid paralysis
- Dysphagia
- Weak eyelid, tongue, tail
- Paresis
- Recumbency
- Respiratory paralysis



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Videos courtesy of Dr. Taylor

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# Botulism

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DIAGNOSIS                      TREATMENT                      PREVENTION



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## Degenerative Neuropathies

Equine Degenerative Myeloencephalopathy (EDM)

Equine Motor Neuron Disease (EMND)

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## EDM



CAUSE

Genetic Predisposition

Vitamin E deficiency within first year of life



AGE

Young horses

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## EDM

### CLINICAL SIGNS

- Wide-based stance\*\*\*
- Ataxia
- Knuckling
- Circumduction
- CP deficits



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## EDM

### CLINICAL SIGNS

- Wide-based stance\*\*\*
- Ataxia
- Knuckling
- Circumduction
- CP deficits

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Video courtesy of Dr. Taylor

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## EDM

### CLINICAL SIGNS

- Wide-based stance\*\*\*
- Ataxia
- Knuckling
- Circumduction
- CP deficits

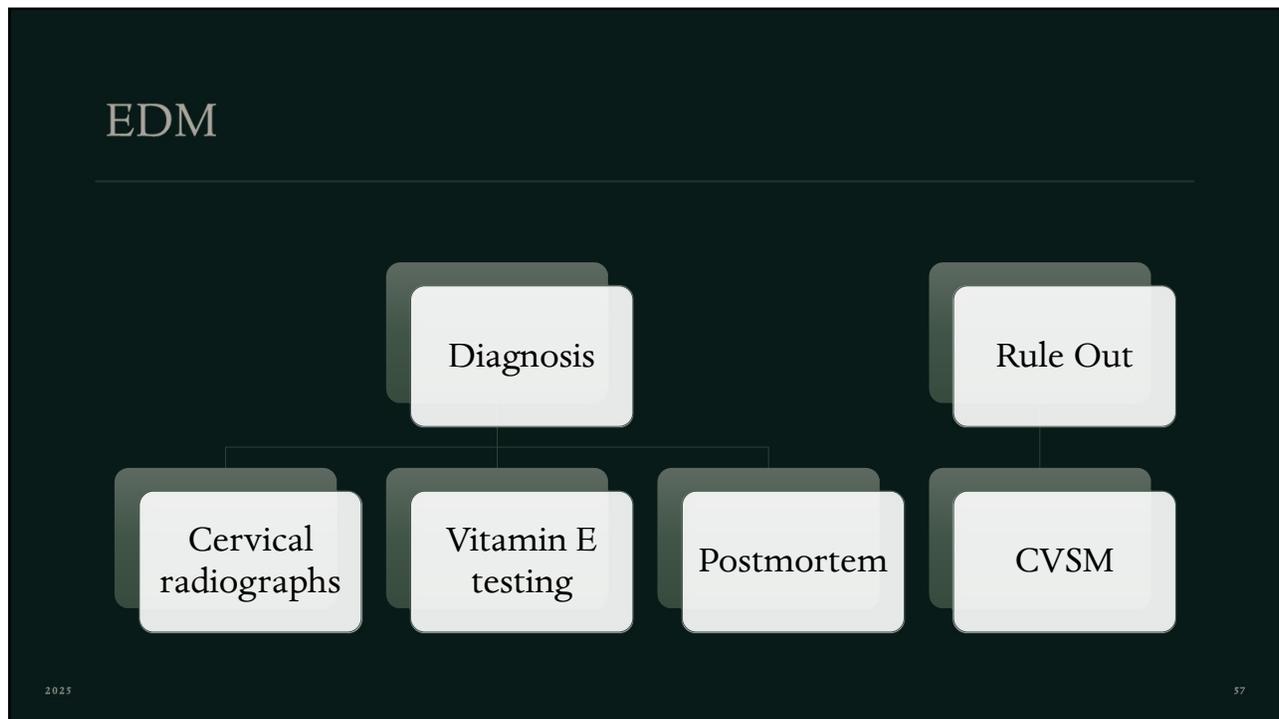
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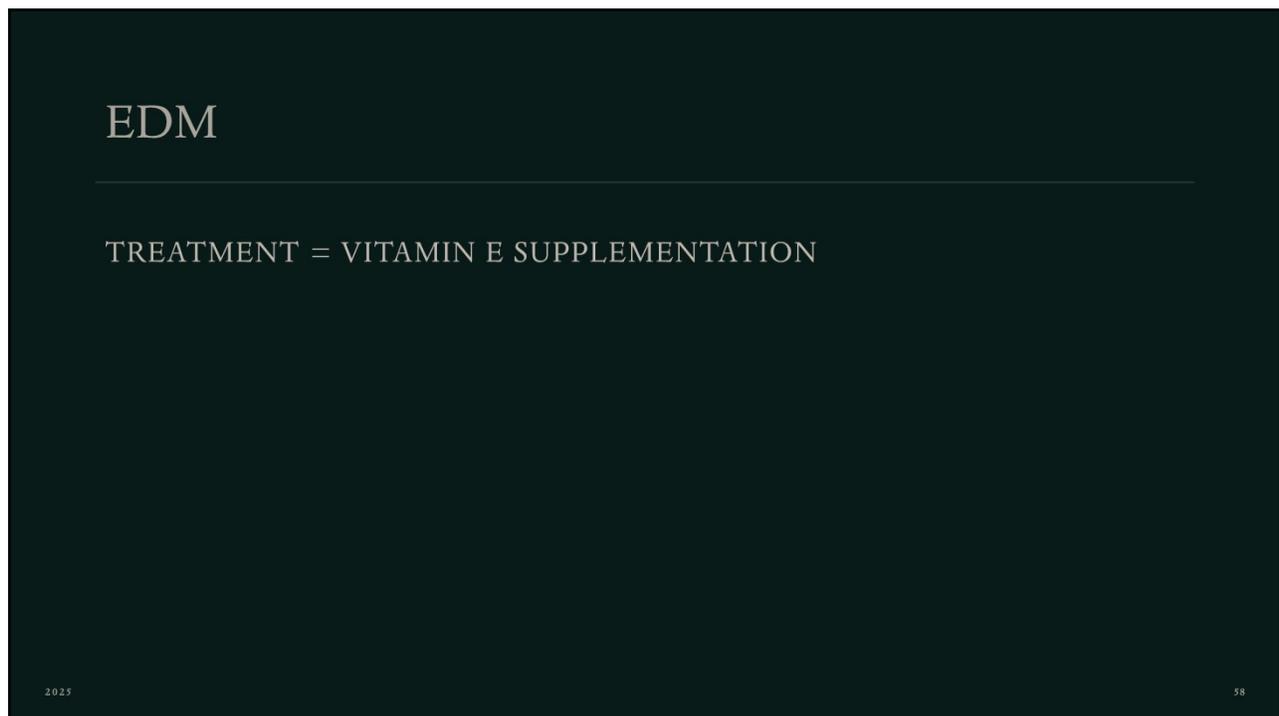
Video courtesy of Dr. Taylor

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## Equine Motor Neuron Disease (EMND)



### CAUSE

Oxidative damage  
Vitamin E deficiency



### AGE

Mean age: 9 years  
Similar to ALS (Lou Gehrig's disease)

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## EMND

### CLINICAL SIGNS

- Elephant on a ball
- Weakness
- Trembling
- Muscle fasciculations
- Recumbency
- Weight loss
- Ravenous appetite



Photos courtesy of Dr. Taylor

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## EMND

### CLINICAL SIGNS

- Elephant on a ball
- Weakness
- Trembling
- Muscle fasciculations
- Recumbency
- Weight loss
- Ravenous appetite

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Video courtesy of Dr. Taylor

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## EMND

### CLINICAL SIGNS

- Elephant on a ball
- Weakness
- Trembling
- Muscle fasciculations
- Recumbency
- Weight loss
- Ravenous appetite

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Video courtesy of Dr. Taylor

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## EMND

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CLINICAL SIGNS

- Elephant on a ball
- Weakness
- Trembling
- Muscle fasciculations
- Recumbency
- Weight loss
- Ravenous appetite

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Photo courtesy of Dr. Taylor



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## EMND

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DIAGNOSIS

- Bloodwork
- CSF tap
- Biopsy

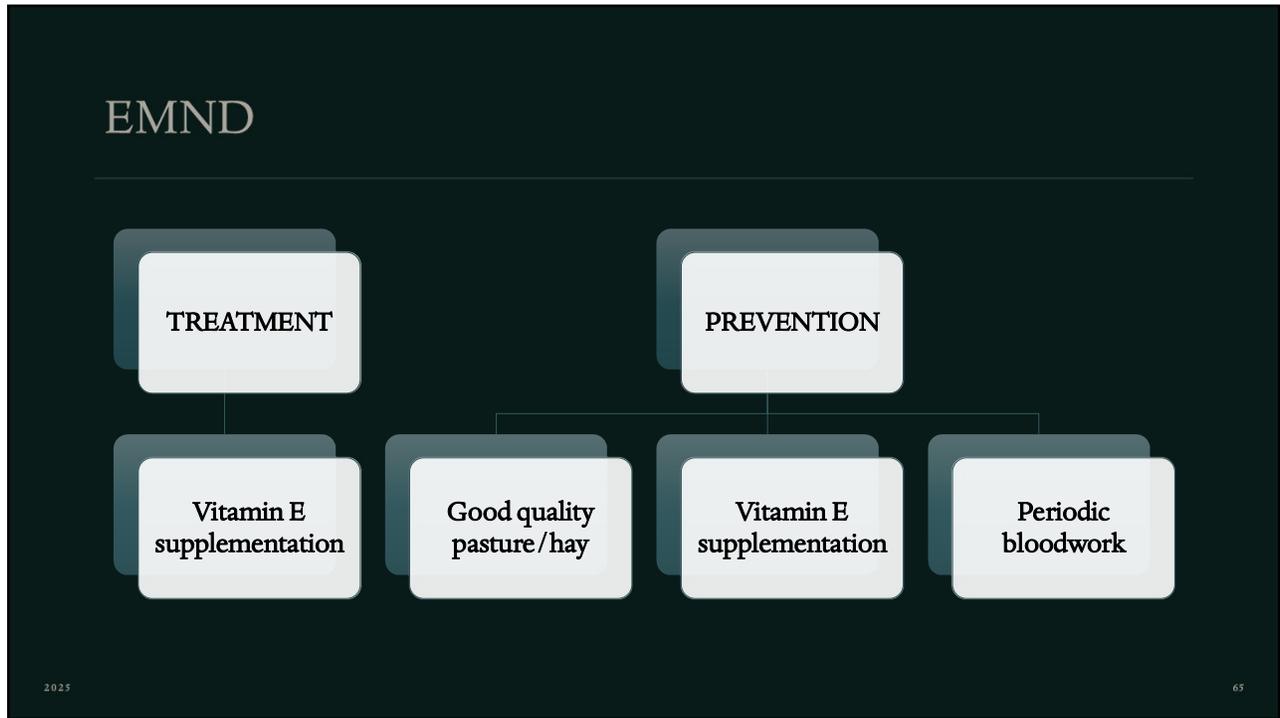


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Photos courtesy of Dr. Taylor

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## Other

Cervical Vertebral Stenotic Myelopathy (CVSM)	Cauda Equine	Trauma	Neoplasia	Temporohyoid Osteopathy
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## Cervical Vertebral Stenotic Myelopathy (CVSM)

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- Wobbler's Syndrome
- Cervical Vertebral Malformation
- Cervical Vertebral Malarticulation
- Cervical Vertebral Compressive Myelopathy
- Cervical Vertebral Myelopathy

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## CVSM

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### TYPE 1 - DEVELOPMENTAL

- Younger horses (6m-3y)
- Genetics
- High plane of nutrition & rapid growth
- Trauma

### TYPE 2 - ARTHRITIS

- Older horses (8+ yrs)
- Lesions often caudal

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## CVSM

### CLINICAL SIGNS

- Ataxia
- CP deficits
- Toe dragging
- Stiff, spastic gait
- Hindlimbs usually worse than front limbs



Video courtesy of Dr. Fenger

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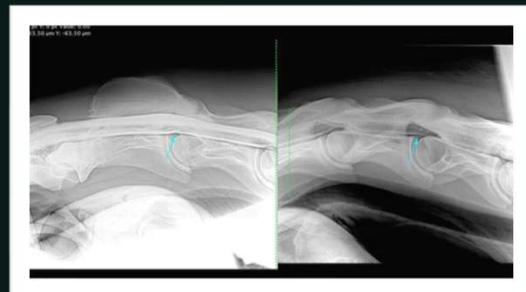
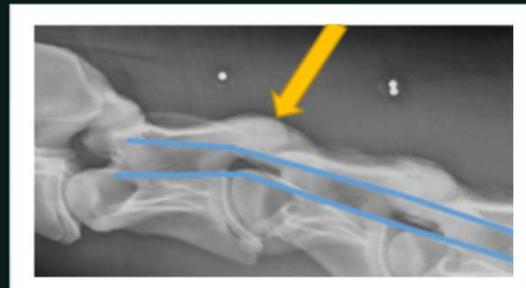
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## CVSM

### DIAGNOSIS

- Cervical radiographs
- Advanced imaging – myelogram



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## CVSM - Treatment

### CONSERVATIVE

- NSAIDs
- Restricted exercise
- Eliminate concentrates in diet
- IA steroid injections

### SURGICAL

- Expect 1-2 improvement in neuro grade
- ~60% horses euthanized

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## OTHER

1

TRAUMA  
• LOOK FOR FRACTURES

2

CAUDA EQUINA  
• POLYNEURITIS EQUI

3

TEMPOROHYOID  
OSTEOARTHROPATHY  
• THICKENING/FUSION  
BONES IN SKULL

4

NEOPLASIA

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## Takeaways

- Equine Neurology is **COMPLEX**
- Many clinical signs overlap & look the same
- Diagnosis can be challenging
- **PREVENTION VS. TREATMENT**
  - **VACCINATION!!**
  - Treatment is **EXPENSIVE**



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## SPECIAL THANKS

- **SANDY TAYLOR, DVM, PhD, DACVIM-LAIM**
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- CLARA FENGER, DVM
- LAUREN NICOLE, DVM
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- <https://www.youtube.com/watch?v=uimFMqQSyXU>
- <https://youtu.be/vBYQ01gV58A?si=r7QITv-pJ77QS77d>

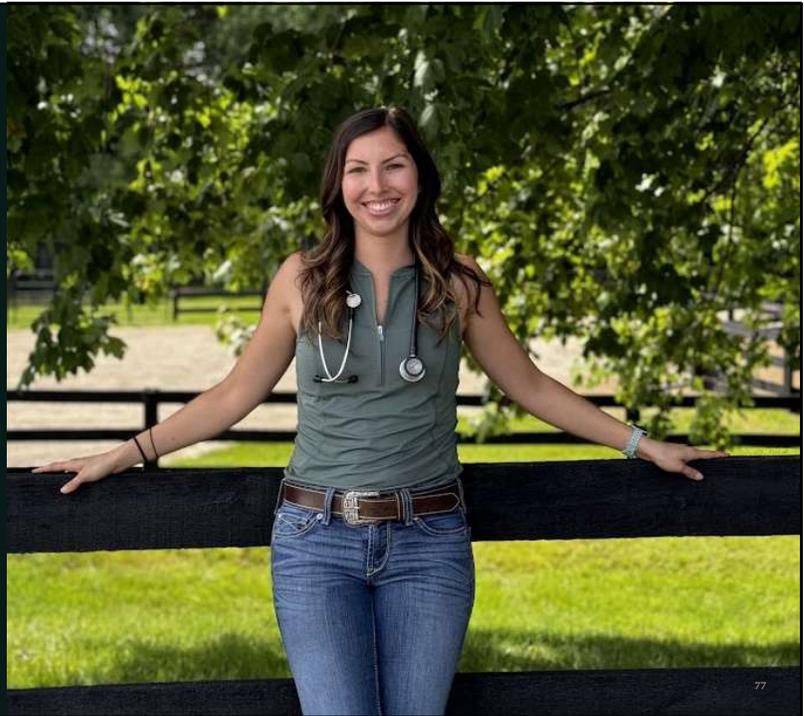
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Thank you

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