Tick Borne Equine Diseases: An Evolving Peril

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Overview

- Understanding Lyme Disease in Horses
  - Transmission & Important Information
  - Signs & Symptoms
  - Clinical Diagnosis & Diagnostic Testing
  - Treatment & Management
  - Prevention & Long Term Care

- Additional Tick Borne Diseases
  - Granulocytic Ehrlichiosis (Anaplasma)
  - Piroplasmosis (rare in North East)
Disease Nomenclature

- Lyme Disease: Borellia burgdorferi
- Piroplasmosis (Babesia and Theileria)
- Equine Granulocytic Ehrlichioses (old terminology): Anaplasma Phagocytophilum
- Ehrlichiosis (old terminology) is now: Neorickettsia ristii (formerly Ehrlichia risticii)

Confused Yet???

- Potomac Horse Fever aka Equine Monocytic
  - Did you know? PHF is not actually tick borne disease, but instead carried by aquatic bugs
Lyme Disease: The Most Prevalent of the Tick Borne Diseases

Transmission & General Information
Most Common Mode of Transmission

Ixodes type tick also known as the black legged tick pictured below

Most Common Tick Borne Disease

- Lyme Disease: Borrelia burgdorferi
- Also the most confusing to treat and manage
- Originated in Lyme, CT in the late 1980s, now prevalent across US
- Spirochete bacterial agent is Borrelia and it causes disease in humans, dogs and horses
Reported Cases of Lyme Disease—United States, 2014

One dot is placed randomly within the county of residence for each confirmed case. Though Lyme disease cases have been reported in nearly every state, cases are reported based on the county of residence, not necessarily the county of infection.
94% of equine cases reported from 12 states (2010 Data):

- Pennsylvania: 3298 confirmed/ 507 probable (3805 total)
- New York: 2385 confirmed/ 1040 probable (3425 total)
- New Jersey: 3320 confirmed/ 392 probable (3712 total)
- Other status include: CT, DE, ME, MD, MA, MN, NH, VA, WI
Life Cycle of Lyme Disease in Ticks

- Eggs
- Nymph
- Eggs
- Larva
- Adults

Risk of human infection greatest in late spring and summer.
Lyme Disease

Signs & Symptoms
Lyme Disease (Borrellia burgdorferi) Signs and Symptoms

- Bacteria causes disease in horses, dogs and humans
- Evidence of exposure can sometimes be found (a bullseye bite mark)
- Muscle wasting over topline from neural damage
- Small number has multiple joint swelling
- Intermittent lameness
- Can be hard to diagnose from physical symptoms
Specific Lyme Disease Symptoms

- Fever (not a common clinical sign)
- Stiffness
- Multi-limb tenderness
- Hyperesthesia
- Behavioral changes
- Uveitis (sometimes)

Neurological Signs
- Rule out EPM
- Can sometimes come hand in hand with EPM so testing for both may be recommended

- Nodular skin masses
Lyme Disease

Clinical Diagnosis & Diagnostic Testing
Lyme Disease Diagnosis

- Clinical examination: presence of signs in endemic area
- Rule out other tick-borne disease
- Enzyme-linked Immunosorbent Assay (ELISA)
- Western Blot
- 4DX Snap Test, New Idexx test
- Tissue sampling (synovial fluid, aspirate biopsy)
ELISA Test

- ELISA - numerical value that measures antibody response against an organism
- Organism stays in skin for 9 months (even after treatment)
  - Antibodies persist for a long time
- High percentage of horses have strong ELISA with a negative western blot
- ELISA has very little correlation to active infection in body
- **Conclusion:** ELISA has a poor diagnostic value alone
Western Blot Test

- Measures several antibody ‘bands’ that the horse produces
- Results are reported as strong, moderate, or low levels in terms of exposure
- Most specific test (gold standard)
- Will differentiate if horse received commercial canine vaccine
- **Conclusion:** difficult to interpret moderate response
4DX Snap Test

- Quick and easy stall-side screening test
- Good sensitivity
- 67% determination or true positives (some false negative results)
- Excellent specificity (% of true negatives)
- Anaplasmosis false positives
- Not licensed for horses!

**Conclusion:** unreliable for conclusive results in equines
Cornell University Multiplex Assay

- Quantitative analysis that tells you how long the horse has had Lyme and response to treatment using the 3 outer surface proteins (Osp A C and F)
- Osp A is first to go up, then C 3-5 weeks and finally Osp F to 5 months
- Conclusion: Most accurate test and gives treatment direction
Diagnosis Challenges

- Serological tests do not distinguish between active infection and previous exposure.
- Many horses are infected for a long duration even after treatment, even life.
- There is no protective immunity so horses can become re-infected repeatedly.
  - Canine lyme vaccine is being used off label
  - Merial vaccine recommended as it will only raise OspA value and not mask OspC or OspF in case of actual infection (other brands may give false positive for OspC values)
- We do not recommend treating horses based solely upon positive test. Most conclusive tests is biopsy or tissue fluid analysis
Additional Diagnostic Considerations

- Lyme (along with other tick-borne diseases) can run down the immune system opening the door for other diseases.

- When testing for Lyme, consider testing for EPM as well as other diseases through tests such as RAL full screening (next slide).

- If a horse is treatment-resistant or still shows clinical symptoms despite reduced test values, reconsider EPM and re-test, even if ruled out before.

- EPM caused by Sarcocystis neurona is highly opportunistic and will capitalize on a compromised immune system.
  - More than 50% of horses in the US are exposed to this protozoan, but only 1% of exposed horses become clinical.
  - Risk increases in equines with compromised immunity.
RAL Testing Option

- Full spectrum, low cost testing
- Can test on DNA, RNA as well as tick panel
- Tick panel just $75 cost (plus drawing blood and processing fees)
- Highly accurate and reliable while also very affordable in determining what disease(s) are affecting the horse

### EQUINE SUBMISSION FORM

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<th>Acct #</th>
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<th>Specimen Source (Please Circle)</th>
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<td>Blood</td>
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<tr>
<th>Specimen Requirements:</th>
<th>Blood - 0.1 ml whole blood</th>
<th>Swab - Dry sterile swab</th>
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### DNA TESTS $18.00 each

- Amycolatopsis<br>
  - Dwarf Tapeworm (H. nana)<br>
  - Listeria monocytogenes
- Anaplasma<br>
  - E. coli<br>
  - Lyme Disease
- Aspergilus fumigatus<br>
  - E. canis<br>
  - M.R.S.A.
- Aspergilus Genus<br>
  - Encephalitozoon sp.<br>
  - Mycobacterium TB
- Babesia<br>
  - Encephalitozoon sp.<br>
  - Mycobacterium non-TB
- Blastocystis<br>
  - Equine Adenovirus<br>
  - Neospora caninum
- Blastomycosis<br>
  - Equine Herpesvirus I<br>
  - Neospora caninum
- Bovine<br>
  - Equine Herpesvirus II<br>
  - Neospora caninum
- Brucella<br>
  - Equine Herpesvirus III<br>
  - Neospora caninum
- Campylobacter coli<br>
  - Equine Herpesvirus IV<br>
  - Neospora caninum
- Campylobacter Genus<br>
  - Equine Herpesvirus V<br>
  - Neospora caninum
- Campylobacter jejuni<br>
  - Francisella tularensis<br>
  - Neospora caninum
- Candida albicans<br>
  - Fusarium Pathogens (Medically relevant)<br>
  - Salmonella
- Candida Genus<br>
  - Giardia<br>
  - Salmonella typhimurium
- Chlamydia pneumoniae<br>
  - Helicobacter Genus<br>
  - Salmonella typhimurium
- Clostridium difficile<br>
  - Helicobacter Genus<br>
  - Salmonella typhimurium
- Clostridium Genus<br>
  - Helicobacter Genus<br>
  - Salmonella typhimurium
- Clostridium perfringens<br>
  - Helicobacter Genus<br>
  - Salmonella typhimurium
- Clostridium pliciformis<br>
  - Helicobacter Genus<br>
  - Salmonella typhimurium
- Coccioides immitis<br>
  - Legionella Genus<br>
  - Salmonella typhimurium
- Cryptococcus<br>
  - Legionella pneumophila<br>
  - Yersinia pestis (Plague)
- Cryptosporidium<br>
  - Leptospira<br>
  - Other

### PANELS $75.00 each | RNA TESTS $25.00 each

- Tick Panel<br>
  - Equine Arteritis Virus<br>
  - Equine Arteritis Virus<br>
  - Equine Rotavirus
- Anaplasma, Babesia, Borrelia, Ehrlichia, Lyme, Neospora<br>
  - Equine Coronavirus<br>
  - Equine Influenza Virus (H3N8)<br>
  - Equine Influenza Virus A<br>
  - Rabies Virus
- Rickettsia rickettsii, Tularemia<br>
  - Equine Rhinitis Virus A<br>
  - Equine Rhinitis Virus B<br>
  - West Nile Virus

For additional species and tests please visit online at [http://www.veral.com](http://www.veral.com)
Lyme Disease Treatment & Management

Short and Long Term Treatment Options for Optimal Recovery and Disease Management
Oral Antibiotic Treatment Options

Doxycycline
- Less expensive
- Easily mixed in feed
- Increasingly less effective as Lyme bacteria becomes resistant
- Often requires longer treatment duration to be effective

Minocycline
- More expensive
- Easily mixed in feed
- Highly effective against bacteria that causes Lyme disease
- Can require short to moderate duration of treatment for maximum effect
Intravenous Antibiotic Treatment
Option: Oxytetracycline

- Most expensive
- Challenging to administer: hospitalization of animal or daily vet visits recommended due to risk of thrombosis
- Very highly effective
- Incredibly useful in severe cases and cases that have not responded well to oral antibiotics
- Can be followed up with oral antibiotics after completion of IV treatment
- Must monitor horse’s kidney values due to strength of antibiotic
Antibiotic Treatment Recommendations

Using Cornell Multiplex Assay for detailed treatment direction:

- Cases with indicators for early onset of infection can be treated with Doxy for 30 - 60 days or Mino for 30 days depending on history of horse and severity of symptoms and OspC values.
- Cases with indicators of long term/chronic infection (OspC low, OspF high), treatment with Mino for 30 – 60 days recommended.
- In extreme, severe cases as well as cases where other treatment options have been unsuccessful, Oxytet is recommended.
Supportive Treatment & Long Term Care

- GI support during treatment
  - Antibiotics can be hard on the stomach
  - Ranitidine offers relief and support for more sensitive horses
  - Ulcer supplements also can be used to reduce gut irritation from antibiotics

- Immune support is recommended throughout and after treatment
  - Can be long term – lifetime support to help prevent or reduce the severity of flare-ups
  - SmartPak’s SmartImmune and SmartAntioxidant can work well together or either/or depending on how your horse responds to the supplements
Lyme Disease Prevention

Short and Long Term Treatment Options for Optimal Recovery and Disease Management
Preventative Care

- Inspect horses regularly & remove any ticks
- Rodent control and pasture Management can reduce ticks in the environment
- White tailed deer management
- Guinea fowl can help control ticks
- Premise sprays around landscape
- Fine toothed brushing, tick-off tool
- Ultra Boss by Merck
- Clip tall grasses year-round, clip long hair coats and feathers, etc.
Prevention: Tick Repellents

- Tick repellents (Swat and Herbal) and pesticides (Spot-On) specific for horses can reduce risk of tick bites.
- Many products used in canines can be used off-label safely on equines:
  - Vectra 3D: One dose on mane near root and two additional doses split on inside legs on all 4 legs.
  - Frontline spray can also be very effective in preventing ticks.
- Due to the size of horses vs. dogs, it can sometimes be cost prohibitive.
Tick Removal

- Remove tick with tweezers at the head
- Remove with tick removal tool
Additional Equine Tick Borne Diseases
Anaplasmosis, Piroplasmosis
Granulocytic Ehrlichiosis (EGE)

- Causative agent is anaplasma phagocytophilum
- Transmitted by Ixodes ticks
- Intermediate hosts: mice, chipmunks, deer
- Signs and symptoms: fever, depression, anemia
- Diagnosis based on ruling out other sources of fever
  - Can use Idexx test, PCR, other antibody tests
  - Take into account geographic location, seasons
- Treatment: oxytetracycline, doxycycline, minocycline
- May resolve without treatment
- Prevention: No vaccine available!
Equine Piroplasmosis

- Designated as a ‘dangerous transmissible disease’
- Highly endemic in the tropics and subtropics
- Quarantine period and testing required for horses originating from endemic country into the US
- Has been identified in 12 states since 2009
  - Index case from Texas
  - PA has mandatory testing requirements for horses from Texas
- Most important for horses traveling from Florida
Equine Piroplasmosis
Equine Piroplasmosis: Signs and Symptoms

- Clinical signs are variable and non-specific
- Presents as an acute infection
- Fever, labored/rapid respiration, anemia, jaundice, weight loss, posterior weakness/swaying
- Infected mares may abort or pass to their offspring
- Most infected horses develop resistance and exhibit few signs
- Will become lifelong carriers of the disease
Equine Piroplasmosis: Treatment

- If an infected animal is discovered in a piroplasmosis-free region, the animal must be quarantined and kept from all contact with ticks.
- Treatment with tetracyclines can suppress clinical signs, but currently available treatments are ineffective in clearing T. equi from carriers.
Interesting Tick Borne Disease Cases

Notable Cases In Review
Spinous Ear Ticks - Western USA

- A quarter horse colt showing symptoms of colic in southern California
- Symptoms included rolling, sweating, lying down, circling and pawing
- Pulse was increased and despite treatment the horse was shipped
- Differentials included: HyPP, encephalitis, tetanus, West nile, twist
- Upon careful inspection, spinous ear ticks were found deep in ear canal
- Ticks were removed and the horse made a full recovery
- Goes to show us that a complete physical exam is so important
Spinous Ear Ticks - Western USA
Dakota 12 year old paint gelding showed skin issues with hives for over 4 years. Allergy tested with elimination diet and treated with dexamethasone. Would always relapse after treatment. Tested for Lyme and results came back positive. Treating for 30d with minocycline and will retest after treatment – expecting full recovery!
Kitten, a 9 year old Quarterhorse mare presented with a shifting leg lameness in October of 2014. After a full lameness exam, a western blot showed high titers to Lyme. She was treated with minocycline for 60 days and made a full recovery.

On January 28 this year she showed similar signs.

A 4dx C6 test was positive and Cornell Multiplex was high

She is undergoing treatment now after OspF was still elevated after 30 days post therapy.
Questions?