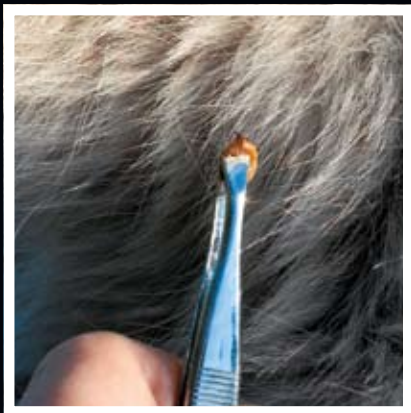


Facts and Fallacies of **LYME** DISEASE



The crooked little bacterium that causes Lyme disease is causing quite a stir in the equine community

BY STACEY OKE, DVM, MSC

Lyme disease is caused by a spiral-shaped bacterium called *Borrelia burgdorferi* that is spread to some mammals via the bite of specific hard-bodied ticks. Also known as borreliosis, it is widely considered the most important insect-borne bacterial infection in North America, and the question remains: Do ticks transmit the bacterium to horses and cause disease, as they do to humans and dogs, or is this a disease presumed also to affect horses simply because they coexist in the same environments as the ticks?

Many adult horses in specific geographic areas are seropositive for Lyme disease (i.e., have antibodies in their blood against the bacterium), indicating they are either currently infected or have been infected with *Borrelia*, according to clinicians and researchers such as Thomas

J. Divers, DVM, Dipl. ACVIM, Dipl. ACVECC, professor of medicine and chief of Large Animal Medicine at Cornell University's College of Veterinary Medicine.

Here we'll review the key advances that have been made over the past 10 years and whether equine

DUSTY PERIN PHOTOS

borreliosis is a real threat to horses or if, as some researchers contest, Lyme disease poses no threat to horses at all.

What is Lyme Disease?

Biting ticks of the genus *Ixodes* can spread Lyme disease to a variety of mammals. Researchers think humans, dogs, cats, and, presumably, horses are the most commonly infected mammals.

Lyme disease only occurs in areas of the world where both the ticks and reservoir mammalian hosts (typically small rodents) coexist. In North America domestic animals and humans are most commonly diagnosed with Lyme disease along the Eastern Seaboard, upper Midwest, Texas, and on the Pacific coast (California).

Ticks hatch uninfected from eggs as larvae. The larvae or nymphs feed on infected reservoir hosts and become infected with *B. burgdorferi*. The bacteria reside in the midgut of infected ticks and are subsequently transmitted back to mammals when any life stage of the infected ticks feeds on animals. Many infections are acquired in the spring and fall, when juvenile or adult ticks feed on mammals the most.

Once an infected tick transmits *B. burgdorferi* to a susceptible mammal, the bacteria multiply and migrate through the mammal's body. The bacteria appear to prefer traveling and residing in the skin, fascia (bands of fibrous connective tissue that bind muscles and organs), and perineural (surrounding nerves) tissues, often winding up in synovial (joint) membranes, where the host's immune system is least likely to recognize and neutralize them. The sneaky spirochete bacteria can also, although less frequently, wiggle their way into the heart, kidneys, and meninges—the thin tissue that covers the brain.

There is currently no approved Lyme vaccine for use in horses, although laboratory testing indicates the canine Lyme vaccine is used in some horses, says Divers.

Signs of the Lyme

Lyme disease can affect any body system, but in horses the musculoskeletal system and possibly the nervous system appear to be favorite target sites for *B. burgdorferi*. The most common clinical signs include:

- Stiffness;
- Mild to moderate lameness in multiple limbs;
- Muscle or nerve pain; and
- Behavioral changes (e.g., dullness).

Other signs of equine borreliosis include chronic weight loss, skin hypersensitivity



Once an infected tick transmits *B. burgdorferi* to a susceptible mammal, the bacteria multiply and begin to migrate through the mammal's body.

and resentment to being touched, uveitis (inflammation in the interior of the eye), and, rarely, joint swelling.

"Most horses show no obvious signs of infection," says Divers. Infected horses can show signs so subtle that attributing things such as mild changes in gait to Lyme disease can be extremely challenging.

Divers adds that a veterinarian shouldn't confuse Lyme disease with anaplasmosis, another tick-borne disease that can cause fever, low blood platelet counts, leg edema (swelling), lethargy, jaundice, and sometimes muscle wasting or incoordination.

Diagnostic Dilemmas

Diagnosing equine borreliosis is challenging due to the vague, nonspecific, and variable clinical signs, and the limitations of available tests. Most of the available tests are based on measuring antibodies—produced by the horse's immune system

against *B. burgdorferi* after tick transmission of the bacterium—that are circulating in the horse's bloodstream. The two main tests are an enzyme-linked immunosorbent assay (ELISA) and a Western Blot.

Divers says, "Some ELISA tests only provide information regarding antibody levels produced against either whole (bacterium) cell or specific antigens, but do not differentiate between past and current infections." It is therefore important to note that the Western Blot and C-6 ELISA SNAP test are the only tests that should be used in horses vaccinated against Lyme disease (i.e., using a canine vaccine not approved for use in horses), as these are the only tests capable of differentiating between antibodies produced in response to the vaccine versus antibodies produced after natural exposure to *B. burgdorferi*.

Divers and colleagues reported in 2008 that an ELISA SNAP kit marketed for dogs



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is a reasonable stall-side test to screen horses for *Borrelia* antibodies, rather than submitting samples to a laboratory. The advantages of this SNAP test are speed, convenience, and cost; however, there is a moderate chance of false negative results. If a veterinarian strongly suspects a horse has Lyme disease, he or she should test the horse using traditional lab methods.

Scientists describe this further in the free article, "Validation of an in-clinic enzyme-linked immunosorbent assay kit for diagnosis of *Borrelia burgdorferi* infection in horses," available online at www.jvdi.org/cgi/reprint/20/3/321.

Trick or Treat?

Based primarily on his research involving experimentally infected ponies, Divers recommends treating horses if they have clinical signs and laboratory findings consistent with Lyme disease and if other

diseases have been ruled out.

Treating Lyme disease using antibiotics is advocated and theoretically curative; however, it is not as easy as it sounds. Long-term administration might be required to clear the infection, and this can become expensive. And even following a prolonged course of antibiotic therapy, infection can persist or reinfection can occur.

At present, the first choice antibiotic is intravenous tetracycline (5-7.5 mg/kg/day) for 28 days. The most common treatment, however, is doxycycline at 5-10 mg/kg orally every 12 hours for at least a month.

Fight the Bite!

Since ticks must be attached to the horse for approximately 24 hours to successfully transmit *B. burgdorferi*, aggressive tick avoidance is one of the best ways to protect horses from Lyme disease.

Other preventive measures: Groom and inspect your horse daily for ticks, particularly on the lower limbs and under the mane and tail. Remove and destroy attached ticks, and apply an antibiotic ointment to bite sites if there are skin lesions.

While there is no approved vaccine for use in horses, a 2003 study by Divers and colleagues on experimentally infected ponies showed that a recombinant outer-surface protein A (rOspA) vaccine is effective in preventing Lyme disease.

Take-Home Message

Divers concludes: "Determining if a horse's clinical signs are due to Lyme disease is based upon relating those signs to the preferred location of the organism (i.e., noting damage has occurred in synovial membranes, skin, and nervous system as seen in experimentally infected ponies), serologic or PCR testing, response to treatment, and, most importantly, ruling out other diseases."

According to Divers, treating serologically positive horses that do not meet the other criteria is likely unwarranted. Proper duration of treatment is unknown in field cases because reinfection and duration of infection prior to treatment vary.

The great majority of properly selected and treated horses have clinical improvement, but serum antibodies can persist. Unfortunately, recurrence of clinical signs following treatment is not unusual. 🐾

ABOUT THE AUTHOR

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