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Ticks and Tick-Borne Diseases in Dogs

By Dr. Jean Dodds

Why is Lyme Disease arguably the most well-known tick-borne disease? One can surmise that the prevalence of Lyme Disease and the regular media coverage about it perpetuates its popularity. Of course, the name is easier to pronounce and remember than the other tick-borne diseases. Instead of talking about the disease first, let's first categorize the ticks that spread a particular disease or diseases and then follow up with the diseases they cause.

Ticks

American dog tick (*Dermacentor variabilis*)

Location: East of the Rocky Mountains and California Coastline

Diseases:

- Rocky Mountain Spotted Fever (*Rickettsia rickettsii* bacterial infection)
- Tularemia (Rabbit Fever)

Blacklegged Tick/Deer Tick (*Ixodes scapularis*)

Location: Upper Midwest, Southeastern, Mid-Atlantic and Northeastern United States

Diseases:

- Anaplasmosis – Northeastern and Upper Midwest states
- Babesiosis – Northeastern and Upper Midwest
- *Borrelia mayonii* infection – Upper Midwest; particularly Minnesota and Wisconsin
- *Borrelia miyamotoi* infection
- Lyme Disease – Northeastern and Upper Midwest states
- Powassan Disease – Northeastern and Upper Midwest states; Canada (Northern Ontario)

Brown Dog Tick (*Rhipicephalus sanguineus*)

Location: Worldwide

Diseases:

- Rocky Mountain Spotted Fever – Brown Dog Tick primarily spreads this disease in the Southwestern United States
- Ehrlichiosis

Groundhog Tick/Woodchuck Tick (*Ixodes cooki*)

Location: Eastern United States and Canada

Diseases: Powassan Disease

Gulf Coast Tick (*Amblyomma maculatum*)

Location: Southeastern United States; primarily along the Gulf and Atlantic Coastlines

Diseases: *Rickettsia parkeri* rickettsiosis

Lone Star Tick (*Amblyomma americanum*)

Location: Midwest and Eastern United States. Lone Star Ticks are found in Texas, but are actually named “lone star” because of a single white star-shaped dot on their backs.

Diseases:

- Ehrlichiosis – Predominantly Southcentral and Eastern states
- Southern Tick-Associated Rash Illness (STARI)
- Tularemia (Rabbit Fever)
- Heartland Virus Infection

Pacific Coast Tick (*Dermacentor occidentalis*)

Location: Along the US Pacific Coastline; primarily California

Diseases:

- 364D Rickettsiosis
- Rocky Mountain Spotted Fever

Rocky Mountain Wood Tick (*Dermacentor andersoni*)

Location: Rocky Mountain States and Southwestern Canada

Diseases:

- Rocky Mountain Spotted Fever
- Colorado Tick Fever – Fairly isolated to higher elevations
- Tularemia (Rabbit Fever)

Soft Ticks

Location: *Ornithodoros hermsi* tick species – Coniferous forests at altitudes of 1500 to 8000 feet; *Ornithodoros parkeri* and *Ornithodoros turicata* species – Southwest United States

Diseases: Tick-Borne Relapsing Fever – Primarily in Western United States

Western Blacklegged Tick (*Ixodes Pacificus*)

Location: California, Utah, Washington, Oregon, Nevada, Arizona

Diseases:

- Anaplasmosis

- Lyme Disease – Rare in this region

Diseases

While acute and initial symptoms vary between each of the diseases, all of them present with practically the same acute, initial flu-like symptoms, such as:

- Fever
- Lethargy
- Inappetence
- Swollen Lymph Nodes
- Stiffness of the Joints
- Diarrhea
- Vomiting

Why not call ALL of them “Lyme Disease”? There are several reasons against this classification:

- Powassan Disease, Heartland Virus Infection and Colorado Tick Fever are viruses. *Note: Powassan virus was first identified in Powassan, Ontario near where I did my veterinary school training in the 1960s!* Babesiosis is caused by an intracellular red blood cell parasite. The rest listed above – including Lyme Disease – are all bacterium, and this affects treatment protocols.
- The length of time it takes for a tick to transmit a disease. For instance, a tick must be attached for a minimum of five hours to infect a host with Rocky Mountain Spotted Fever.
- The length of time for symptoms to present.
- If left untreated, chronic conditions of these diseases can manifest differently.

Tick-Borne Bacterial Infections

What is fascinating about the tick-borne bacterial infections is that we treat the majority with doxycycline or minocycline and/or other antibiotics. This is because several of these bacteria are related. Think of them as second or third cousins. **However, these bacteria are not related enough to be cross-protected by the Lyme Vaccine. The Lyme Vaccine *only* covers the bacteria that causes it: *Borrelia burgdorferi*.**

Lyme Vaccine – Yes or No?

Choosing the Lyme Vaccine for your pet needs to be weighed heavily. First, you should consider the documented case risk for Lyme disease in your area. Second, you need to assess the exposure risk imposed by your lifestyle. Even in high-exposure risk areas, I would lean to not automatically vaccinating for Lyme disease, because preventative and treatment measures are easily available and reliable. If relevant clinical symptoms do occur, accurate diagnosis is important. Others have similar views.

University of California Davis Veterinary School of Medicine says:

The incidence of Lyme disease in California is currently considered extremely low. Furthermore, use of the vaccine even in endemic areas (such as the east coast of the US) has been controversial because of anecdotal reports of vaccine-associated adverse events. Most infected dogs show no clinical signs, and the majority of

dogs contracting Lyme disease respond to treatment with antimicrobials. Furthermore, prophylaxis may be effectively achieved by preventing exposure to the tick vector. If travel to endemic areas (i.e. the east coast) is anticipated, vaccination with the Lyme subunit or OspC/OspA-containing bivalent bacterin vaccine could be considered, followed by boosters at intervals in line with risk of exposure. The UC Davis VMTH does not stock the Lyme vaccine or recommend it for use in dogs residing solely in northern California.

Ronald Schultz of University of Wisconsin School of Veterinary Medicine says:

There may be select areas in the state, “hot spots” where infection is very high and vaccination would be indicated, but dogs in most parts of the state would probably not receive benefit and may actually be at risk of adverse reactions if a large-scale vaccination program was initiated.

For instance, Wisconsin has a much higher risk of Lyme than a state like Maine. However, at our Veterinary Medical Teaching Hospital (VMTH), we have used almost no Lyme vaccine since it was first USDA approved in the early 1990’s. What we have found is infection (not disease), in much of Wisconsin, is low (< 10% infection). As you know, infection does not mean disease. About 3 to 4% of infected dogs develop disease. In contrast, in Western and Northwestern parts of Wisconsin infection occurs in 60 to 90% of all dogs. In those areas, vaccination is of benefit in reducing clinical disease. However, whether vaccination is or is not indicated, all dogs should be treated with the highly effective tick and flea medications available today.

Also, vaccinated dogs can develop disease, as efficacy of the product is about 60 to 70% in preventing disease, thus antibiotics must be used in vaccinated dogs developing disease, just like it must be used in non-vaccinated diseased dogs. Therefore, in general areas with a low infection rate of < 10% infection, the vaccine should not be used – as the vaccine will be of no value and may enhance disease (e.g. arthritis) directly or in some dogs that become infected. In areas where infection rates are high (> 50%) then the vaccine will be very useful.

Based upon these and other expert opinions, it can be considered irresponsible to suggest that all dogs in low-risk exposure states should be vaccinated for Lyme disease. Veterinarians should know, based on diagnoses in their clinic and other clinics in the area (town), how common the disease would be and then should base their judgment to vaccinate upon risk factors, and not on a statement that all dogs in a particular low-risk area need the Lyme vaccine!

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