

*epi*TRENDS

A Monthly Bulletin on Communicable Disease Epidemiology and
Public Health Practice in Washington State

Tick-borne Disease in Washington State

Vol. 14 No. 8

Now is the peak season for tick-borne diseases. Washington is home to several species of ticks known to transmit notifiable diseases including four reviewed here: Lyme disease, Rocky Mountain spotted fever, tularemia, and tick-borne relapsing fever.

Lyme Disease (LD)

The primary vector of LD in the western United States is *Ixodes pacificus*, a hard tick that lives in humid environments such as heavily-forested or dense brushy areas. Infected ticks transmit *Borrelia burgdorferi*, the causative bacterium. Although immature ticks preferentially bite birds and small mammals, humans and dogs may serve as substitute hosts. Adult ticks bite livestock, dogs and humans.



Ixodes pacificus
(Western black-legged tick)
Vector for Lyme Disease

Endemic LD is uncommon here. Although the Washington State Department of Health (DOH) receives 7-23 reports of LD annually, most tick exposures occurred in other states or countries. Based on limited data, the local risk of infection appears to be highest west of the Cascade Mountains, reflecting the distribution of its tick vector. However, *Ixodes* ticks and endemic LD have been documented on the eastern side of the state.

In most cases the first sign of LD is a rash called erythema migrans (EM), which begins 3-32 days after a tick bite and is usually first noted at the site of the bite. EM expands over several days with central clearing, resulting in a bull's-eye, or target shaped, appearance. Patients often have fatigue, chills, fever, headache, muscle and joint aches, and swollen lymph nodes. In a few cases, neurological, cardiac, or musculoskeletal complications may develop weeks or months later. LD can be cured with antibiotics, especially with early treatment.



"erythema migrans" (EM)
Bulls-eye rash seen in
Lyme Disease

60.80



*epi*Trends
P.O. Box 47812
Olympia, WA 98504-7812

Mary C. Selecky
Secretary
Maxine Hayes, MD, MPH
State Health Officer
Anthony Marfin, MD, MPH, MA
State Epidemiologist
Communicable Disease
Marcia J. Goldoft, MD, MPH
Scientific Editor
Deborah Todd, RN, MPH
Managing Editor

Continued page 2

However, a small percentage of patients with LD have symptoms months to years after antibiotic treatment. The cause of these symptoms, which can include arthritis, cognitive defects, sleep disturbance, or fatigue, is not known. Some evidence suggests they result from an autoimmune response rather than chronic infection.

The CDC surveillance case definition allows for cases with only clinical criteria, only laboratory evidence, or both. The specific combinations of the evidence available, as well as whether exposure was in a known endemic area, factor into classification of a case as confirmed, probable or suspect. First consider laboratory evidence, then evaluate laboratory results in combination with clinical and exposure evidence. One of the following results is needed to meet laboratory criteria:

1. a positive culture of *B. burgdorferi* from a skin biopsy; *OR*
2. two-step testing consisting of a positive or equivocal enzyme immunoassay (EIA) or immunofluorescent assay (IFA) followed by a positive Western immunoblot (WB); *OR*
3. a single immunoglobulin G (IgG) WB.

Serologic testing is insensitive in the first few weeks. Antibiotic treatment may blunt antibody development. In two-step testing, specimens initially tested negative by EIA or IFA do not need further testing. WB testing is unlikely to be IgG positive until 4-6 weeks after onset. DOH will forward positive serum specimens to CDC for confirmatory testing to help identify endemic cases that only have Washington exposures.

The clinical criteria required to meet the surveillance case definition must be documented by a healthcare provider; not self reported. EM must be >5 cm. Similarly, objective joint swelling or chronic arthritis must be documented; joint pain or muscle aches alone are not case defining.

Rocky Mountain Spotted Fever (RMSF)

RMSF is the most severe tick-borne rickettsial illness in the country. It is a notifiable disease in Washington as a “rare disease of public health significance”, with 0 to 3 cases reported annually. This disease is caused by the bacterium *Rickettsia rickettsii*, which is transmitted in tick saliva. The primary tick vectors *Dermacentor variabilis* and *D. andersoni* occur throughout the state. The ticks prefer habitats such as woodlands, grasslands, brushland between wetlands and woods, and open areas around woods. Immature ticks feed mainly on small mammals, while adults ticks feed on deer, livestock, dogs, and humans. Over 90% of cases are infected during April through September when adult and nymphal *Dermacentor* ticks are actively searching for a blood meal.



Dermacentor andersoni
wood tick
A primary vector of RMSF

*epi*TRENDS Monthly Posting Alert

To receive monthly e-mail notification of *epi*TRENDS, please register at this website:

[http://
listserv.wa.gov/
archives/
epitrends.html](http://listserv.wa.gov/archives/epitrends.html)

Choose the option to join the listserve. Enter your name and email address.

After a 3-14 day incubation period, illness begins with fever, severe headache, chills, muscle aches, and joint pain. There may be diarrhea, vomiting, nausea, or abdominal pain. A rash may start 3-5 days later, generally spreading from the wrists and ankles to the rest of the body. About 20% of cases have no rash (spotless RMSF). Complications are delirium, meningoencephalitis, or death; persons over 40 years are at greater risk for these complications. Antibiotics, typically doxycycline, are the standard treatment.



Rocky Mountain spotted fever rash

The preferred method of laboratory diagnosis is serologic testing of paired serum samples to show a 4-fold rise in titer. Other methods include culture and immunohistochemistry. Antibody detection in single serum specimen supports a probable diagnosis.

Tularemia

Tularemia, also called “rabbit fever”, is caused by the bacterium *Francisella tularensis*. It is endemic in Washington, with 1 to 10 infections reported annually. Cases are most commonly acquired in western counties.

F. tularensis is found in mammals, especially rodents, rabbits, and hares. Transmission is through arthropod bites (most commonly ticks and deer flies), handling infected sick or dead animals, eating or drinking contaminated food or water, or inhaling bacteria from disturbed animal nests while farming or using power landscape tools.

Symptoms reflect the route of exposure. With inhalation, illness typically starts with abrupt fever, chills, headache, and non-productive cough followed by pneumonia. An insect bite typically causes a skin ulcer and large, tender lymph nodes. Inoculation of eyes results in conjunctivitis. Severe throat pain, tonsillitis, and cervical adenopathy can occur after ingestion of contaminated food or water. Tularemia can be fatal if not treated with appropriate antibiotics.



Skin ulcer caused by *Francisella tularensis*

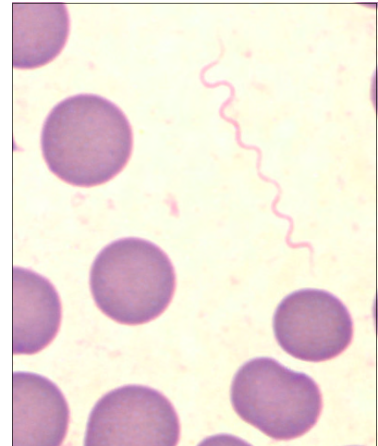
Diagnosis is made primarily through serologic testing of paired samples. Cultures of body fluids and tissues can provide laboratory confirmation but because *F. tularensis* is associated with laboratory-acquired tularemia cases, special handling and protocols are required to protect laboratory personnel.

Tick-borne Relapsing Fever (TBRF)

TBRF is among the most common tick-borne illnesses contracted in our state, with 1 to 12 cases reported annually. In the United States, the louse-borne form of this disease is not endemic and is only rarely seen in travelers.

TBRF is caused by several *Borrelia* species, in Washington most commonly *B. hermsii*. The local vector is *Ornithodoros hermsii*, a soft tick typically found at higher altitudes (1500 – 8000 feet) in eastern parts of the state. The ticks live in rodent nests, which may be under flooring or between walls. If rodents are scarce or nests are disturbed, the ticks may bite other warm-blooded animals, including humans, for their blood meals. Unlike hard ticks, soft ticks usually feed at night. Most people are unaware of a bite. Almost all exposures are associated with overnight stays in rural cabins, usually but not always during summer months.

TBRF is characterized by recurring fevers, often accompanied by headache, muscle and joint aches, and nausea. Complications can occur during pregnancy. Laboratory diagnosis is based on seeing spirochetes on a blood smear, usually during the febrile periods. Confirmation at DOH is not necessary. Serology is not case defining. Treatment is with antibiotics.



Borrelia hermsii spirochete
Vector of TBRF in Washington
Image courtesy of WA-PHL

Preventing Tick-borne Disease

Although few cases of tick-borne disease occur in Washington, the state is home to tick vectors. While in potential tick habitat take the following precautions:

- Tuck pants into socks or boots when hiking.
- Wear light colored clothing.
- Use tick repellents with DEET or permethrin – be sure to follow label instructions.
- Check for ticks after risk activities – transmission usually requires hours of tick attachment.
- Avoid sleeping in rodent infested buildings.
- Identify and remove any rodent nesting material from walls, ceiling, and floors.
- Perform rodent control by sealing entry points where rodents could enter the building.
- Consider tick control products – be sure to follow label instructions or hire a pest management professional.

For more information about tick-borne diseases, see:

- <http://www.doh.wa.gov/notify/guidelines/pdf/lyme.pdf>
- <http://www.doh.wa.gov/notify/guidelines/pdf/tularemia.pdf>
- <http://www.doh.wa.gov/notify/guidelines/pdf/relapsing.pdf>
- www.doh.wa.gov/ehp/ts/Zoo/WATickDiseases.htm
- www.cdc.gov/ticks/diseases/index.html

Editor's note: Other than *Borrelia hermsii*, all images in this month's issue of EpiTrends are courtesy of the Centers for Disease Control and Prevention.