

TICK BORNE DISEASE OVERVIEW

SOUTHERN OREGON LYME DISEASE (SOLD)

Welcome

Thank you for inquiring about us. Below is an overview of the current situation concerning tick-borne diseases in Oregon.

SOLD Mission Statement

Southern Oregon Lyme Disease's mission is to raise awareness of vector-borne illnesses, and provide education and support to patients, the medical community and the general population of Southern Oregon.

SOLD Background

Sold was established in 2009 by Sharon Lee, RN, MSN and Judi Johnston, RN, MS. Both have been diagnosed with multiple tick-borne infections. By 2011, we had over 100 members. By 2015, we had over 200 members. By 2017, we had over 300 members. We maintain regular face-to-face support group meetings in both Jackson and Josephine Counties. We also provide a social media closed group through FaceBook.

Outreach Education

Our leaders have provided educational presentations for the community the past 7 years with emphasis on those who are outdoor workers. We have provided our "Tick Talks" to employees of the US Forest Service, BLM, Search & Rescue groups, hunting, fishing and equestrian groups, as well as service clubs like Lions Club and women's groups throughout Oregon.

Tick-Borne Diseases

Ticks are a smorgasbord of risk. Because ticks bite anything that breathes and gives off heat, they also pick up a variety of infectious organisms. For that reason, many people contract multiple diseases from a single tick bite. Following are the major diseases one can get from a tick bite.

Lyme Disease	Rocky Mountain Spotted Fever
Anaplasmosis (Ehrlichiosis)	Colorado Tick Fever
Babesiosis	Relapsing Fever
Bartonella	Tick-borne Encephalitis/Paralysis
Mycoplasma fermentans	Stari/Master's Disease
Tularemia	Variety of viruses
Q Fever	Variety of Nematodes
Powassan Virus	Alpha Gal Allergy to meat

Transmission of Tick-Borne Diseases

Tick-borne diseases are transmitted by a vector that picks up the pathogen during a blood meal from an infected vertebrate host. Several characteristics of ticks make them outstanding vectors of pathogenic organisms. Their wide host range and tendency to feed on several hosts such as birds, rodents, reptiles and mammals during their life cycle ensures ample opportunity to acquire and transmit pathogens. Ticks also acquire their blood meal slowly and often attach to their host for relatively long periods. This behavior allows ample time for pathogen acquisition and transmission. However, some ticks can transmit organisms rapidly. Their hardiness and longevity enable them to survive long periods of unfavorable environmental conditions such as climate change and lack of a blood meal. Ticks have a high reproductive potential. One female tick can lay from 1000 to 8000 eggs at a time, ensuring maintenance of large populations and a high frequency of host-vector contact. In the western United States, there are several ticks that can transmit diseases; the Western Black-Legged Tick (*Ixodes pacificus*), the Pacific Coast Tick (*Dermacentor occidentalis*) and the Dog or Wood Tick (*Dermacentor variabilis*).

Western Black-Legged Tick



Pacific Coast Tick



Dog or Wood Tick



In Southern Oregon, the ticks prefer the leaf litter from oaks and other deciduous areas and grasses along paths. The tick has a two-year life span and feeds once during each of three developmental stages—larva, nymph, and adult. The larval stage begins in summer and the tick matures into a nymph the following spring. During these two stages, the tick is no bigger than the period at the end of this sentence. The larva and nymph get a blood meal from an infected rodent or ground foraging bird. The percentage of infected rodents ranges from 80% in the gray squirrel to 100% in the deer mice. Many migrating song birds are also carriers of infection. Ticks in these two stages often carry a number of infectious organisms. Because of their minute size, larvae and nymphs may be overlooked and are more likely to feed undetected on humans. Nymphs are responsible for spirochete transmission in 85% of cases during spring and summer. In the fall, the nymph becomes an adult; as such, it prefers larger mammals, such as deer, dogs and humans. Deer are not usually infected with *B. burgdorferi*, but they play a role in transporting and maintaining tick populations. On average, every deer, every year feeds enough adult deer ticks their blood to allow those ticks to create an estimated 450,000 new larval ticks.

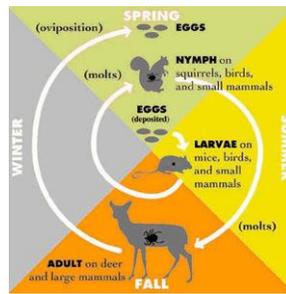
- ▶ Lane, R.S. Mun, J. Eisen, R.J. & Eisen, L. (2005). Western gray squirrel (Rodentia: Sciuridae): A primary reservoir host of *Borrelia burgdorferi* in Californian oak woodlands? *Journal of Medical Entomology*. 42(3)388-396.
- ▶ Lane, R.S. Steinlein, D.B. & Mun, J. (2004). Human behaviors elevating exposure to *Ixodes Pacificus* (Acari: Ixodidea) nymphs and their associated bacterial zoonotic agents in a hardwood forest. *Journal of Medical Entomology*. 41(2)239-248.

Four Stages of Ticks



Nymph 2nd from the left is the size of a poppyseed.

Tick Life Cycle



Engorged Tick



In addition to ticks, other transmission methods of Tick-Borne infections are evident. Transmission of infections can occur from mother to an unborn fetus or from mother to infant via breast milk, as well as transmission from an infected sexual partner.

- ▶ Middelveen, M. J., Burke, J., Sapi, E., Bandoski, C., Filush, K. R., Wang, Y., Franco, A., Timmaraju, T., Schlinger, H. A., Mayne, P. J. & Stricker, R. B. (2014) Culture and identification of *Borrelia spirochetes* in human vaginal and seminal secretions. *F1000Research2015*, 3:309.

Tick Infection Rate

The latest official tick study was done by the Jackson County Vector Control office in 2018. They found that 3% of ticks were infected with *Borrelia burgdorferi* (Lyme organism) and 7% were infected *Borrelia miyamotoi* (Relapsing Fever organism). The previous official tick study in Oregon was conducted in Jackson and Josephine counties in 1998. The results showed that 3.5% of the *I. Pacificus* ticks were infected with the Lyme disease organism. No tests have been done for any other tick-borne organisms in our area. Volunteers from SOLD conducted a tick collection of popular hiking trails in Jackson and Josephine counties in 2011. We found 5% of the ticks were infected with the Lyme organism.

- ▶ Doggett, J. S., Kohlhepp, S., Gresbrink, R., Metz, P., Gleaves, C. and Gilbert, D. (2008) Lyme disease in Oregon. *Journal of Clinical Microbiology*, 46:6, Pages 2115-2118.

Tracking of Cases

Lyme disease has been a nationally notifiable condition in the United States since 1991. Policies regarding case definitions and reporting are determined by each state. Physicians and other clinicians are required to report Lyme disease cases within one working day of diagnosis to Oregon Department of Health (ODH) in their county. Labs are required to report positive test results to Oregon Public Health in the patient's county of residence. County public health officials follow up cases to determine if the case is presumptive or confirmed. Each county's confirmed cases are reported to ODH who, in turn report them to CDC.

Reports of Lyme disease are collected and verified by county health department officials in accordance with their legal mandate and surveillance practices. Follow up should occur with each new patient and he or she is then classified as a presumptive or confirmed case. If two or more confirmed cases are

reported in a county, that county is considered to be endemic for the disease. Confirmed cases are then reported to the CDC.

As a former California public health nurse, I have often followed policies issued by my state when reviewing infectious disease cases. I retrieved Lyme disease guidelines from the Oregon Health Authority. Much to my dismay, I found the guidelines from Oregon to be even more restrictive than the CDC!

CDC Surveillance Criteria

For instance, the CDC requires the following criteria to be considered as positive:

- A case of (EM) with a known exposure, OR
- A case of EM with laboratory evidence of infection and without a known exposure, OR
- A case with at least one late *Musculoskeletal, Nervous or Cardiovascular system* manifestations with laboratory evidence of infection.

For purposes of surveillance, late manifestations include any of the following when an alternate explanation is not found:

Musculoskeletal system: Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. Additionally, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.

Nervous system: Any of the following, alone or in combination: lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Encephalomyelitis must be confirmed by demonstration of antibody production against *Borrelia burgdorferi* in the cerebrospinal fluid (CSF), evidenced by a higher titer of antibody in CSF than in serum. Headache, fatigue, paresthesia, or mildly stiff neck alone, are not criteria for neurologic involvement.

Cardiovascular system: Acute onset of high-grade (2nd-degree or 3rd-degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

- ▶ <http://www.cdc.gov/nndss/script/casedef.aspx?CondYrID=752&DatePub=1/1/2011%2012:00:00%20AM>

Oregon Department of Health Surveillance Criteria

The Oregon Department of Health, in contrast, requires only the following criteria:

- Physician-documented EM rash and
- Laboratory evidence of infection

Because of the restricted surveillance of Lyme disease in Oregon, few real cases are counted. In addition, not all cases reported in Oregon (by either the patient's physician or the testing lab) receive proper follow up by the Oregon Department of Health officials. Results from a recent (2015) SOLD member survey found that 18-24 SOLD members met the criteria based on lab results alone, but only 4 were contacted by public health officials. That is a huge failing. None of the positive lab reports from Igenex (the only tick-borne dedicated lab in the US were ever followed up. If physicians tell their patients there is no Lyme disease in Oregon, it is because cases are not confirmed when reported.

Diagnostic Testing

Testing for tick-borne infections involves a serology test for antibodies one produces to the organism, a PCR (DNA) test of the organism, and a culture of the organism. Current CDC and Oregon guidelines for confirming Lyme disease includes a two-tier testing algorithm: an enzyme-linked immunosorbent assay (ELISA) for detecting anti-Borrelia antibodies, followed by Western blot confirmation of positive ELISA results. This guideline was designed for surveillance purposes only and is not indicated as a diagnostic tool.

Although this test system has a very high specificity of 99%, meaning that there are very few false positives, the system has a sensitivity ranging from 8-56% based on recent population studies, meaning that the algorithm is no better than a coin toss at best, and may miss as many as nine out of ten Lyme cases. Clinicians should rely on a clinical determination of Lyme disease based on symptoms.

- ▶ Stricker RB, Johnson L: Lyme wars: let's tackle the testing. *BMJ* 335,1008 (2007).
- ▶ Tilton RC, Sand MN, Manak M: The western immunoblot for Lyme disease: determination of sensitivity, specificity, and interpretive criteria with use of commercially available performance panels. *Clin. Infect. Dis.* 25(Suppl. 1),S31-S34 (1997).
- ▶ Binnicker MJ, Jespersen DJ, Harring JA, Rollins LO, Bryant SC, Beito EM: Evaluation of two commercial systems for the automated processing, reading and interpretation of Lyme western blots. *J. Clin. Microbiol.* 46,2216-2221 (2008).

Lyme Disease Controversy

Lyme disease is a very controversial or, better said, political subject. There are two main views or standards of care when it comes to Lyme:

Camp 1: In a catch phrase, "Lyme is hard to catch and easy to treat". Those who ascribe to this camp believe that a month of antibiotics is all that is needed to treat Lyme at any stage. Furthermore, this camp purports that current Lyme tests are accurate and seldom miss those with Lyme disease. This is the view of the Infectious Disease Society of America (IDSA). The IDSA are looked to as the experts by the Center for Disease Control & Prevention (CDC). The IDSA has written guidelines for the diagnosis and treatment of Lyme. Most infectious disease doctors will be IDSA members. Most MD's also treat according to the Camp 1 guidelines.

Camp 2: Those who ascribe to this camp believe that Lyme is much more prevalent than widely believed and that current testing misses the majority of those with Lyme disease. They also believe that

treatment can take months or even years if you have been infected for a long time. Furthermore, patients are often infected with other Tick-borne infections along with Lyme disease. Patients commonly refer to doctors that treat according to this view as Lyme Literate MDs (LLMDs).

We at SOLD believe the patient should be aware of both standards of care and be able to choose.

- ▶ Johnson, L. (2005). Lyme disease: Two standards of care. Retrieved on November 1, 2005, from <http://ilads.org/insurance.html>

Oregon ranks as one of the worst states in the nation to get diagnosis and treatment for Lyme disease. Over one-third of the state's population is enrolled in HMOs or the Oregon Health Plan and standards of care seem to be determined by these entities.

Oregon also has the distinction of being the first state to investigate a competent and caring doctor for treating Lyme disease patients. One of the Lyme patients of this doctor was a Kaiser member who tried to get his prescription filled at a Kaiser pharmacy. Kaiser filed a complaint with the medical board and the doctor was forced to choose between giving up his Lyme patients or his medical license. Since then, 5 other physicians have been reported to and harassed by their Oregon Medical Licensing Board and have chosen to leave the state. As a result, because of potential medical board harassment, MDs in Oregon are reluctant to diagnose or treat Lyme patients.

- ▶ <http://www2.lymenet.org/domino/nl.nsf/b18db4ad8571a779852565e3007d9d16/996155967e71fb8f852565e30012f1c0?OpenDocument>

There have been MDs and DOs in the past who treated according to Camp 2, but no longer do so. It is speculated that insurance, disability or Worker's Comp companies have reported those few physicians for licensing review. As a result, there are currently no (0) MDs in Oregon that will treat Lyme patients beyond the recommended 30 days.

Because of the lack of MDs in Oregon to treat Lyme patients, the Oregon Lyme Leaders Task Force had a legislative bill authored in Spring, 2015, to allow physicians (MDs & DOs) and nurse practitioner's (NPs) to choose either Camp 1 or Camp 2 without being scrutinized by their licensing boards. The bill (SB916) passed the senate but failed in the house for lack of support. There are plans to re-submit the bill in the future.

Fortunately, there are several naturopathic physicians (NDs) throughout Oregon who will treat Lyme according to Camp 2. Cory Tichauer, ND is in Medford, and has been trained and mentored by ILADS. He knows how to diagnose and treat tick-borne infections using both allopathic and naturopathic modalities. He has even delivers antibiotics intravenously if needed. Dr. Tichauer now has over 500 patients with a diagnosis of tick-borne diseases.

Prevention of Tick-Borne Diseases

Tick bites are 100% preventable. Following are ways to protect oneself from tick bites.

Wear light-colored clothes, a hat, long sleeved shirt, and long pants. Tuck shirt into pants, and pants into boots or socks. Treat clothing with Permethrin repellent (e.g. Permonone®). Apply DEET or Picaridin repellent to skin that is not covered by clothing. Avoid areas where ticks are found. Most risky behaviors are sitting on logs or wood gathering.



After tick exposure: Do tick check. Take a shower. Place clothes in hot dryer for one half hour. Watch for tick attachment over next 2-3 days. Watch for changes in health for next 30 days. Seek medical attention at first sign of illness after tick exposure.

If you find a tick, remove it carefully with a tick remover or fine tweezers. DO NOT try to smother, burn, smash, use chemicals or otherwise irritate the tick in any way. If the tick feels irritated, it will throw up its stomach contents and all possible organisms into the skin. If possible, save the tick for testing to see what infections it may be carrying. Place the tick into a zip lock bag with a moistened blade of grass. Keep in a cool place. The tick will live for about a month.

Proper Tick Removal:

Place the tip of fine tweezers around the tick mouthpart
Pull the tick firmly away from the skin.

A tick key may be easier to use. Pull up & back



Send the tick to a dedicated tick lab for testing

- Public Health Regional Laboratory (\$35.00/tick—only test for Lyme)
3313 Chanate Road
Santa Rosa, CA 95404
(707) 565-4711

- IgeneX A tick-borne disease dedicated lab(\$65.00/tick---can test for most tick-borne organisms)
795 San Antonio Rd
Palo Alto, CA 94303
(800)832.3200
- Tic Kit
A prepaid testing kit includes a tick removal device, storage container, tick identification card and comprehensive laboratory testing. A full report is sent in just 4-7 days. <https://bottomlinestore.com/tic-kit-by-pharmasan-animal-health.html>

If you have an EM rash---take a picture of it—date the picture



Create a Tick Safe Zone of Your Property

Create a clearly defined, manicured border. A dry wood chip, tree bark, mulch, or gravel barrier between woods and lawn can reduce tick migration into the lawn. The removal of leaf litter at the lawn perimeter also can help reduce the number of ticks.



The exclusion of deer from large areas, by fencing and reductions in the deer population, has been shown to reduce tick abundance. Reduction of deer tick larvae (100%), nymphs (85%) and adults (74%) were reduced within a 300 foot area surrounded by an electric deer fence. Clean up stonewalls near the home that provide shelter for mice and chipmunks. Place woodpiles away from the house.

Acaricides (pesticides or insecticides that kill ticks) may be applied to lawns and woodland edges to kill ticks around the home and have been reported effective. The optimum time for an application to control ticks would be mid-May to early June, and once in the summer and fall.



Protect Your Pets

Dogs, cats and horses can also contract tick-borne illnesses. Don't forget that pets that go in and out of doors can transport ticks into your house. Tick and flea products may keep ticks from biting, but they can still latch onto animal fur when pets come inside. Be sure to do frequent tick checks of your dogs and cats and promptly remove any ticks you find. Do not sleep with your pets or let them on furniture until you know they are free of ticks.



Aadi, my friend's fur baby.