Tick Prevention: Nymphal blacklegged ticks are very small (about the size of a pinhead), difficult to spot, and are active during the late spring and summer months when human outdoor activity is greatest. Ticks require moisture to survive, therefore favor a moist, shaded environment. These area include rock walls, leaf litter piles, wood piles and wooded, brushy or overgrown grassy habitats. Deer paths are often loaded with ticks and anywhere mice are present is also usually tick abundant. Ticks do not jump, fly or drop from trees, but grasp passing hosts from the leaf litter piles, tips of grass, etc. Most ticks are probably picked up on the lower legs and then crawl up the body seeking a place to feed. Wear light colored clothing, long sleeves and pants, and tuck pants into socks. Wear a hat and tie back long hair to make it harder for ticks to attach to your scalp. When walking or working in the woods for an extended period, use duct tape wrapped inside out around the ankles to trap ticks attempting to crawl up your legs. After spending time outdoors where you might have been exposed to ticks, make sure you get undressed in a dry bathtub so you can spot ticks that fall off clothing. Immediately shower using a washcloth to knock off any unattached ticks and DO A ROUTINE TICK CHECK on yourself and children. Check dark, moist areas, hair and scalp, behind ears and knees, elbows, underarms, skin folds and the groin area.

References: Excerpts taken from the following websites: www.lymedisease.org, www.canlyme.com, www.natcaplyme.org, www.mlasg.com and the Connecticut Agricultural Experiment tick management handbook.

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This brochure is informational only and should not be substituted for seeing a Lyme disease literate doctor.

Take a bite OUT OF LYME

Lyme Disease and You!

Facts and information you should know about Ticks and Lyme Disease

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What is a tick? Ticks are not insects but are arthropods more closely related to mites, spiders, scorpions, and harvestmen. There are about 80 species of ticks in the United States (~ 865 species worldwide). However, only about 12 or so in the U.S. are of major public health or veterinary importance with a few others that occasionally attack humans.

What is Lyme Disease? Lyme disease is a multisystem bacterial infection caused by a type of spirochete ("spy-roh-keet") named Borrelia burgdorferi (Bb). Spirochetes are bacteria with a spiral or corkscrew-type shape. Lyme disease is then transmitted to humans and animals by the bite of an infected tick. Lyme disease bacteria can infect any organ of the body including the brain, heart, central nervous system, and joints. The pathogen was named in honor of the discoverer Willy Burgdorfer.

What is a ticks life and infection cycle?
Ticks, like many mite species, are obligate blood-feeders, requiring a host animal for food and development. Ticks have four stages in their life cycle: egg, the 6-legged larva (seed ticks), 8-legged nymph and adult, (male or female). Larvae and nymphs change to the next stage after digesting a blood meal by molting or shedding the cuticle. Most of the ticks mentioned in here have a 3-host life cycle, whereas each of the three active stages feed on a different individual host animal, taking a single blood meal. Larvae feed to repletion on one animal, drop to the ground and molt to a nymph. The nymphs must find and attach to another animal, engorge, drop to ground and molt to an adult. The adult tick feeds on a third animal. A replete or engorged (blood filled) female tick will produce a single large batch of eggs and then die. Depending upon the species of tick, egg mass deposited can range roughly from 1,000 to 18,000 eggs. The larvae and nymphs generally feed on small to medium-sized host rodents, mainly the white-footed mouse, while adult ticks feed on larger animals like deer. People acquire Lyme disease mainly from the nymph stage tick because they are active during the time of year when people are in their ecosystem, such as walking through brush or tall grass. Because the nymph is the size of a small freckle or poppy seed, it often is not detected and remains attached from 36-48 hours, the period that is required to transmit infection. As the tick feeds, spirochetes escape from the salivary gland into the skin of the human host.

How do you get Lyme Disease? The Lyme disease bacterium, *Borrelia burgdorferi*, normally lives in mice, squirrels and other small animals. It is transmitted among these animals and to humans through the bites of certain species of ticks. In the northeastern and north-central United States, the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease. Not all ticks are infected, and the infection rate depends on area and vary from place to place.

Can Lyme Disease be spread other ways?
Researchers believe that other biting insects such as mosquito's, flea's and biting flies maybe able to transmit Lyme disease as well. It is also mentioned that Lyme disease can be transferred from mother to baby in the womb as well as through breast milk. Sexual transmission is also an open subject. Everyone knows Lyme disease is a distant cousin to Syphilis which is sexually transmitted and the jury is still out on this one.

An adult tick is pictured at left, though it is the smaller nymphal stage ticks which most commonly bite humans.

What about Lyme Disease and blood donations or transfusions? The CDC website states: "Although no cases of Lyme disease have been linked to blood transfusion, scientists have found that the Lyme disease bacteria can live in blood that is stored for donation. Individuals being treated for Lyme disease with an antibiotic should not donate blood. Individuals who have completed antibiotic treatment for Lyme disease may be considered as potential blood donors". Seeing as how Lyme is misdiagnosed in many cases for many years, is it any wonder that no cases of Lyme disease have been linked to blood transfusion? According to the Red Cross website, blood donations are routinely tested for HIV and Hepatitis C, but nothing is mentioned about Lyme disease. On the website for the New York/Pennsylvania regional office, they do have a section on Lyme disease. It states that people who have chronic Lyme disease are ineligible to donate, but anyone diagnosed with Lyme who has taken antibiotics and completely recovered can donate 12 months after the last dose of antibiotics. With the testing for Lyme, we have to ask is anyone ever completely recovered?

Can I tell if I have Lyme Disease?

The classic rash described as a "bull's-eye" may only occur or have been seen in as few as 30% of cases (many rashes are in body hair and indiscreet areas and go undetected). More recent studies have shown that the "bull's-eye" is no longer the most common rash associated with a Lyme-infected tick bite. Solid red rashes of varying shades, lesions that ooze or contain blisters, and non-circular or oval shapes have since been attributed to Lyme disease. The rash is sometimes warm to the touch and rarely painful. Treatment in this early stage is critical. If left untreated or treated insufficiently, symptoms may creep into one's life over weeks, months, or even years. Lyme disease is often referred to as "The Great Imitator" because it mimics so many other diseases. With symptoms present, a negative lab result means very little as they are very unreliable. **The diagnosis, with today's limitations in the lab, must be clinical.**

Many Lyme patients were first diagnosed with other illnesses such as Juvenile Arthritis, Rheumatoid Arthritis, Reactive Arthritis, Infectious Arthritis, Osteoarthritis, Fibromyalgia, Raynaud's Syndrome, Chronic Fatigue Syndrome, Interstitial Cystis, Gastroesophageal Reflux Disease, Fifth Disease, Multiple Sclerosis, Scleroderma, Lupus, early ALS, early Alzheimers Disease, Crohn's disease, Ménières Syndrome, Reynaud's Syndrome, Sjogren's Syndrome, Irritable Bowel Syndrome, Colitis, prostatitis, Psychiatric disorders (bipolar, depression, etc.), Encephalitis, Sleep disorders, Thyroid disease and various other illnesses which can make diagnosis difficult, resulting in delayed diagnosis, and thus improper treatment.

What are the stages of Lyme Disease?

Stage One consists of an initial skin rash at the site of the tick bite, but sometimes elsewhere on the body. Stage Two is characterized by a flu-like illness of fever, muscle aches, and fatigue. Stage Three involves serious neurological, cardiac, and arthritic complications. The second stage of Lyme disease usually involves an illness of fatigue, muscle aches, and fever that is easily mistaken for the flu. Stage two is sometimes termed "disseminated infection" because it represents the spread of the Lyme organism past its initial battle with the immune system in the skin (producing the EM rash) to the rest of the body. Eventually, this flu-like ailment may pass, easily forgotten as a common viral infection. Accordingly, both doctors and patients are advised to be suspicious of flu-like illnesses striking people during the spring, summer, and fall, when ticks, rather than the flu virus, are known to be most active. The third stage of Lyme disease includes what are deemed the late-stage neurological, cardiac, and rheumatological manifestations of the disease.

What are the Symptoms of Lyme Disease?

The one common thread with Lyme disease is the number of systems affected (brain, central nervous system, autonomic nervous system, cardiovascular, digestive, respiratory, musco-skeletal, etc.) and sometimes the hourly/daily/weekly/monthly changing of symptoms.

No one will have all symptoms but if many are present serious consideration must be given by any physician to Lyme disease as the possible culprit. Lyme disease is endemic in many states period. The infection rate with Lyme disease in the tick population is exploding in North America and as the earth's temperature warms this trend is expected to continue.

As part of your current illness, have you had any of the following: (Yes or No)

- Tick bite
- Rash at bite site
- Rashes at other sites
- Fever, chills, sweats
- Weight change (loss or gain)
- Fatigue, tiredness
- Unexplained hair loss
- Swollen glands
- Sore throat
- Testicular pain or pelvic pain
- Unexplained menstrual irregularity
- Irritable bladder or bladder dysfunction
- Sexual dysfunction or loss of libido
- Upset stomach
- Change in bowel function, constipation
- Chest pain or rib soreness
- Shortness of breath, cough
- Heart palpitations, pulse skips, heart block
- Joint pain or swelling
- Muscle pain or cramps
- Twitching of the face or other muscles
- Headache
- Neck creaks and cracks, neck stiffness
- Stiffness of the joints or back
- Tingling, numbness, burning or a stabbing
- Facial paralysis (mouth is crooked on one side when you talk in front of a mirror-Bell's Palsy)
- Eyes/vision: double, blurry, pain, increased floaters (specks in front of vision)
- Ears/hearing: ringing, buzzing, ear pain
- Dizziness, poor balance, increased motion sickness
- Light-headedness, wooziness, difficulty walking, clumsy bumping into objects
- Tremor
- Confusion, difficulty in thinking, difficulty in concentrating, difficulty with sticking with a task
- Difficulty with concentration or reading
- Decreased short-term memory
- Disorientation: driving past your turn, getting lost, going to wrong place
- Difficulty with speech
- Mood swings, irritability, depression
- Disturbed sleep: too much, too little, early awakening goes through cycles sometimes too much
- Exaggerated symptoms or worse hangover from alcohol
- Slowed pulse
- Testicular enlargement
- Nodules on earlobes
- Stomach distension
- Breathing with mouth open
- Eye lesions
- Nasal stuffiness /restriction
- Shortness of breath
- Hypersensitive olfactory organ (sensitive to the slightest odors/smells)
- Feeling drunk without drinking
- No desire to do anything - including favorite hobbies
- Too slow a pulse when resting
- Rapid pulse with slightest exertion
- Perfuse sweating - soaking wet if you go snow skiing
- Muscle pains, cramps or charley horse
- Pains switching from one side of the body to the other
- Enlarged lymph glands
- Stiff aching neck
- Changes in vision
- Generalized achiness
- Limbs - especially arms feel heavier than normal.
- Diminished or absent reflexes
- Brain fog
- Poor coordination/ataxia
- Continual infections
- Poor concentration
- Decreased ability to spell correctly
- GI distress/abdominal pain
- Poor word retrieval/aphasia
- Anxiety
- Difficulty swallowing
- Nausea/vomiting
- Anorexia
- Vasculitis
- Loss of muscle tone
- Changes in taste or smell
- Obsessive-compulsive symptoms
- Panic attacks
- Changes in cerebral blood flow/brain waves
- Number reversal
- Light sensitivity
- Trigeminal neuralgia (TMJ)
- Dilated cardiomyopathy
- Loss of temperature control

Are there co-infections to Lyme Disease?

The simple answer is yes, there are many co-infections to Lyme disease. A tick may carry more than just Lyme disease, it may carry other diseases as well. One tick may carry more than one disease, so many people get sick with more than just Lyme disease. Many people wont respond well to one kind of treatment and this is especially when a co-infection should be looked into. People can have multiple co-infections at one time, and generally have more symptoms, more severe illness, and a longer recovery time. Below is a listing of the most common co-infections.

Babesiosis: Babesiosis is an infection caused by a malaria-like parasite that infects red blood cells. Symptoms of babesiosis are similar to those of Lyme disease but it more often starts with a high fever and chills. As the infection progresses, patients may develop fatigue, headache, drenching sweats, muscle aches, nausea, and vomiting. Babesiosis is often so mild it is not noticed but can be life-threatening to people with no spleen, the elderly, and people with weak immune systems.

Bartonella: Bartonella are bacteria that live inside cells. They can infect humans, mammals, and a wide range of wild animals. Bartonella species can infect healthy people but are considered especially important as opportunistic pathogens. Bartonella is transmitted by insect vectors such as ticks, fleas, sand flies, and mosquitoes, as well as by a cat bite or scratch. At least eight Bartonella species or subspecies are known to infect humans. Symptoms of Bartonella are often mild but in serious cases can affect the whole body. Early signs are fever, fatigue, headache, visual problems, poor appetite, and an unusual, streaked rash. Swollen glands such as significant lymph node enlargement are typical, especially around the head, neck, and arms.

Ehrlichiosis: Ehrlichia are intracellular bacteria caused by tick - borne rickettsial parasites that infect different kinds of white blood cells. The symptoms of ehrlichiosis are often characterized by sudden high fever, fatigue, muscle aches, and headache. The disease can be mild or life threatening. Severely ill patients can have low white blood cell count, low platelet count, anemia, elevated liver enzymes, kidney failure, and respiratory insufficiency. Older people or people with immune suppression are more likely to require hospitalization. Deaths have occurred.

Tick Paralysis: One of the eight most common tick-borne diseases in the United States is an acute, ascending, flaccid motor paralysis that can be confused with Guillain-Barre syndrome, botulism, and myasthenia gravis. Certain ticks secrete a toxin that causes a progressive paralysis, which is reversed when the tick is removed.

How do I remove a tick properly?

Remove a tick promptly, the sooner it is removed the less of a chance of infection. Use a tick removal device or a fine pair of tweezers. Grab the tick by its mouthparts or as close to the skin as possible. DO NOT grasp the tick by its body, which can spread infected body fluids. Tug gently and repeatedly pulling the tick straight out, do not twist or try to burn it. A ticks mouthpart is barbed and will release it's hold, but tick removal requires patience. Take note of the date, where the tick was removed from the body, clean the area with an antiseptic and watch for any rash or symptoms. Ticks can be sent to specialty labs for testing to see if they are infected with Lyme disease and/or certain types of co-infections.