

LYME DISEASE IN CALIFORNIA

TABLE OF CONTENTS

	Page		
Introduction & Myths	1	Vaccine	7
Risk	2	Prevention	7
Infection Rates	2	Recommendations	7
Adult & Nymphs	2	Conclusion	7
Tick Habitat	3		
Life History	3	APPENDIX	
Removal of a Tick	3	Reliable Laboratories-A	8
Symptoms	4	Tick Removal Device	8
Diagnosis	4	Lyme Literate Doctors-B	8
Tests and Rash	4	Symptom Check List-C	9
Treatment	5	Diagnostic Criteria	9
Jarisch-Herxheimer	6	Information-D	10
Treatment Failures	6	Web Sites	11
Medical Confusion	6	References	11
Insurance	6		

INTRODUCTION

People who work and play in the out-of-doors are at risk for Lyme disease. Currently there is no consensus on how to diagnose this ever-changing disease. Lyme patients are caught in the middle of an unusually rancorous medical debate over the diagnosis and treatment of a poorly understood disease. (21) Delays in diagnosis and treatment may result in chronic Lyme disease. Misdiagnose, combined with failure to report, leads to low incident rates. (8) Education has been found to be the best prevention. (9)

Top 10 Myths about Lyme disease: (32)

10. There is no Lyme disease in California
9. Only deer ticks, found on the East Coast, carry *Borrelia burgdorferi*, the cause of Lyme disease.
8. All patients with Lyme disease have a skin rash.
7. Arthritis is the only symptom of Lyme disease.
6. A negative Elisa and Western Blot blood tests rules out Lyme disease.
5. Men and women react with the same symptoms to Lyme disease.
4. All labs doing blood work are the same.
3. Two weeks of antibiotics will cure Lyme disease.
2. Neurologic symptoms of Lyme disease are easy to treat.
1. There is no such thing as chronic Lyme disease.

RISK

High-risk occupational groups include forestry, agriculture, and ranching. (8) Individuals that are at risk include but are not limited to biologists, trail builders, trail users, rangers, gardeners, hunters, cross country runners, vacationers, campers, hikers, surveyors, wood cutters and those removing brush. Children are a high-risk group because they play outdoors. (24) Lyme disease is now recognized as the fastest spreading tick-borne disease throughout the northeastern USA from Massachusetts to Delaware; in the Midwest in Minnesota and Wisconsin; and in western states, including California. Lyme disease was recognized in many European countries in the early 1900's.

The *Ixodes pacificus* tick, also called the Western Black-legged tick, transmits Lyme disease in California, and is found in 55 of the 58 California counties. It is most common in the humid coastal areas and on the western slope of the Sierra Nevada Range. (20) Over 128,000 cases of Lyme disease have been reported by the US government. This represents the tip of the iceberg in terms of total cases of Lyme disease - which may be as high as 2 million. (3)



What do you think is the most dangerous creature in these woods, Dad? The western blacklegged tick.
The Sacramento Bee August 18, 2000.

INFECTION RATES

Ticks in California carry a number of infectious diseases: Lyme disease, Colorado tick fever, human granulocytic ehrlichiosis, human monocytic ehrlichiosis, *Bartonella henselae*, Rocky Mountain spotted fever, tularemia, and Babesiosis microti. (6) Individuals can be infected with Lyme, Ehrlichiosis, *Bartonella* and Babesiosis combinations from the bite of one infected *Ixodes pacificus* tick. David Persing widely recognized for his work in detecting vector-borne infections stated "I don't think we know half of the agents that are potentially transmissible by ticks." The *Ixodes* tick may harbor at least a dozen microbes. (35)

Of all tick-borne disease in California, 94-95% is Lyme. Infection rates in nymphal ticks may exceed those in adult ticks. (7) In California nymphal infection rates average 5-15% and range from 0-41%. (8) Adult infection rates are usually average 1-2% and range from 0-10%. (6) Geographical hot spots include coastal and moist damp areas that cause infection rates to be dynamic and variable. (8) (2) The bulk of the infection rate studies in California have been in the North Coast Area, and portions of the Bay Area. Infectivity rates also may vary in adjacent areas but information is lacking due to limitations in studies of tick infection and under-reporting. (2) The last study of all California counties was a general survey completed in 1990 by the State Health Department. (20) There are 50 different species of ticks in California (36)

The longer a *B. burgdorferi* infective tick feeds, the greater the chance of infection. "The new *Borrelia* should be transmitted more efficiently than *B. burgdorferi*", says Durland Fish a Yale entomologist. "The reason is that *B. burgdorferi* must travel from the tick gut to its salivary glands to infect people and that takes some time, but the new *Borrelia* live in the salivary glands from the start." (35)

NYMPHS

A nymph is about the size as a poppy seed and is no larger than the period at the end of this sentence. Professor Robert Lane of U.C. Berkeley, who has done extensive research on the Western Black-legged tick claims the nymphs may account for 2/3-3/4 of all Lyme disease transmission. Nymphs feed two times faster than adults and attach to humans readily. If an infected nymph bites a Western Fence Lizard the infection is cleared from that nymph. This explains why nymphs have a higher infection rate than adults in California. (20) Nymphs feed on, mice, lizards, birds, rabbits, raccoons, deer, cows, horses, dogs, cats, and humans. (7)

ADULTS

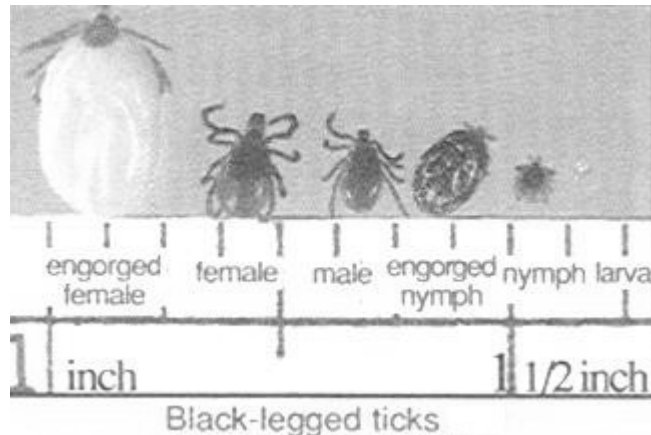
Adults are most active in October to June, and peak in December -February. Adults feed on large mammals including deer, dogs and humans. One blood meal per tick stage- i.e., a tick must feed once in each of it's three life stages- larval, nymph, and adult. Females are more likely to transmit Lyme disease, as they need a large blood meal to develop eggs. (7)

TICK HABITAT

Nymphs are found in March-July in moist leaf litter in oak woodland, mixed chaparral, madrone forest, redwood forests, and fir needle duff. (31) Adult ticks are found on trails, 80-90% are found in shaded moist ecotones (north facing) on the uphill side of a trail. (7, 20) They quest on low vegetation or grass at a level of about 26-24 inches above ground waiting for months for a host to brush past them. (7)

LIFE HISTORY

Ticks are bloodsucking external parasites that feed on humans, wild and domestic mammals, birds, reptiles and others. They are totally dependent on the blood/tissue fluids of the host. A tick uses carbon dioxide, scent, body heat, and other stimuli to find a host. (25) Ixodes species ticks do not possess eyes. Ticks are not insects. Adult and nymph ticks have eight legs (larva has 6 legs) and two body segments. A tick life cycle is 2-3 years depending on the climate. (7) In California, climate ranges from desert to temperate rain forest. Ticks are active year round except in extremely dry areas. When the temperature falls below 40 degrees Fahrenheit the ticks almost become almost dormant. (25) Dusky-footed wood rats (pack rats) have been shown to be a reservoir in the coastal region. (31) Recent study by Write implicated that ground dwelling migratory birds may be acting as a reservoir and contributing to tick infection in the Sierra Nevada Foothills. (30) Of the individuals bitten by ticks, approximately 70% do not remember the bite. (7)



REMOVAL OF AN EMBEDDED TICK

Above all, be patient, as proper tick removal will take time. Remove ticks carefully and do not twist, or cover with Vaseline. Do not squeeze the tick body, hold a cigarette, or match to it- this could

cause the contents of the gut of the tick to be injected into the wound. The sooner it is removed, the less chance of Lyme infection. Use either a tick-removing device (appendix A) or a fine-point tweezers. Grasp it as close to the skin as possible, where the mouthparts enter the skin. Tug gently and repeatedly until it releases its hold by withdrawing its barbed mouthpart from the skin. Above all be patient, as proper tick removal takes time. To have a tick tested for disease, place the live tick with a piece of dampened cotton for moisture into a clean pill bottle or camera film container or in a zip lock bag carefully sealed and send it to a reliable laboratory. See Appendix A.

SYMPTOMS (20) (33)

For a comprehensive list see Appendix C. Most individuals have night sweats and nearly 75% of Lyme patients are depressed.

Early Lyme Disease:

Lyme disease is sometimes characterized with a erythema migrans “bull’s eye” rash, flu-like symptoms, fevers and chills, sore throat, malaise, fatigue, headache, neck ache, sore and aching muscles and joints, swollen lymph nodes, and forgetfulness. Cardiac irregularities may occur.

Late Lyme Disease:

Long-term complications of Lyme disease involve the heart, nervous system, migratory pain in joints, tendons, muscles, and bones, arthritis especially in the large joints (knees most often effected), Bell’s palsy, neuropsychiatric and cognitive disorders, possible organ disorders, double vision, photosensitivity, pain and tingling of extremities, prickling, burning, numb sensation of skin, trouble with concentration, memory loss, extreme fatigue, sleep disorders, and seizures. The implication is that the infection may be for life. One can have a relapse if the immune system or antibiotics are ineffective in eliminating all the spirochetes.

Symptoms may resolve spontaneously without treatment, and reoccur later and be more difficult to successfully treat, or new symptoms may appear at any time.

DIAGNOSIS

Lyme disease is the greatest imitator and should be considered in the differential diagnosis of Fibromyalgia, Chronic Fatigue Syndrome, Multiple Sclerosis, Alzheimers disease, arthritis, ADHD, hypochondriacs, somatization disorder, mental illness, seizure and neuralgic disease, and difficult-to-diagnose multisystem syndromes. (2) According to an informal study conducted by the American Lyme Disease Alliance, most patients diagnosed with Chronic Fatigue Syndrome are actually suffering from Lyme disease.

Lyme is diagnosed clinically. (4) The current state of laboratory testing for Lyme disease is very poor. The situation has led many people to be misdiagnosed and delayed proper treatment. (37) The entire clinical picture must be taken into account, including a search for concurrent conditions and alternate diagnoses, and other reasons for some of the presenting complaints. (4) There is no consensus on how to diagnose the disease. There is no immunity from an initial infection- a person can be infected with Lyme disease more than once.

1999 Cost increase with delayed diagnosis (12)

Time of Diagnosis	Number of Doctors seen	Cost
< 7 Months	3	\$35,000
7-12 Months	5	\$68,000
> 12 Months	7	\$92,000

THE RASH

About 38% of the individuals bitten by a tick infected with Lyme disease exhibit an erythema migrans “Bulls-eye” rash. Of these rashes 70% are atypical. (5) The rash is characterized by being flat, red with a white, clear center and will typically begin 7-9 days after the bite but can appear between 3-30 days and may disappear whether or not antibiotics are given. It can last for a month. For this reason, it is best to photograph the rash to assist with diagnosis. Reoccurring rashes are not uncommon in patients with Lyme disease.

TESTS

The blood test for Lyme disease is difficult, inaccurate and poorly standardized. False negative serologies are commonly estimated at 30%; false positive serologies are rare, occurring less than 5% of the time. Testing within the first two weeks of a bite can prove to be unproductive. After a tick bite, serological tests (ELISA, IFA, Western blots, etc.) will not always be accurate until the person’s immune system reacts, which may take several weeks. (5) The ELISA test alone is unacceptable as a preliminary diagnostic test as it misses 40% of culture proven Lyme. In patients with culture proven Lyme, 20-30% remain seronegative on repeat Western Blot testing. The report should include the readings on all bands, especially bands 31, and 34 (not simply say “positive” or “negative”). In patients with culture proven Lyme, 20-30% remain seronegative on repeat Western Blot testing. The report should include the readings on all bands, especially bands 31, and 34 (not simply say “positive” or “negative”). The slow reproductive rate of *Borrelia burgdorferi* coupled with an early introduction of antibiotics can leave the immune response to a *Borrelia* infection undetectable. (21) Specimens should be sent to reliable labs. Labs issue a proper protocol for collecting specimens.

Blood & Urine Tests:

Lyme AG/ Urine, Human Grannulocytic Ehrlichiosis, Human Monocytic Ehrlichiosis, Babesiosis WA1, SPEC scan (if neurological symptoms occur), PCR (patient should not be on antibiotics for this test). (2)(5)(10) See Appendix A.

Neurological and Neuropsychological Testing

Physicians challenged with a difficult differential neuropsychaitric diagnosis will benefit from employing an approach in which the clinical presentation and history are primary with other modalities used to test the clinical impression. These additional modalities include laboratory testing of the serum and Central Spinal Fluid, neuropsychological testing, & neuroimaging procedures. (22) Serial neuropsychological testing before and after antibiotic treatment may reveal significant improvement after treatment. The neuropsychological tests are: California Verbal Learning Test, Wechsler Memory Scale, Symbol Digit Modalities, Booklet Categories Test, Block Design Subtest of the WAIS, and Purdue Pegboard. (23)

An improvement in SPECT perfusion after treatment provides evidences that the brain has not been permanently damaged and that the treatments are resulting in a physiological change. (22)



In this picture, the medication being administered for advanced/late stage Lyme disease is an antibiotic called ceftriaxone (Rocephan). First, this patient had a PICC (Peripherally Inserted Central Catheter) inserted. The catheter is an out patient procedure in which a doctor/nurse places clear tubing in the vein from the patients' arm directly into the superior vena cava of the heart. The purpose of the PICC line is to place antibiotics directly to the body.

TREATMENT

The disease is greatly underdiagnosed and undertreated. (4) The infecting *Borrelia burgdorferi* spirochete hides in tissue cells. The antibiotic cannot penetrate the cell wall. The only way to kill the bacteria is to have an antibiotic in the body as the cell is dividing. Many physicians are now prescribing long term antibiotics after the diagnosis is made. (1) An uncomplicated case of chronic Lyme disease requires an average of 6-12 months of high dose antibiotic therapy. Many patients require treatment for 1-4 years or until the patient is symptom free. Relapses can occur and maintenance antibiotics may be required. There are no tests available to assure that a patient is cured. (2) Once an individual is infected with Lyme disease, he/she has a 6-8 week window of opportunity to receive proper treatment to prevent chronic problems. However it takes 22 months and 7 doctors on average to get diagnosed. (12) Future treatment and guidelines are still being

THE JARISCH-HERXHEIMER REACTION (also called J-H, HERXHEIMER, and Herxing)

The J-H reaction sometimes occurs with intravenous (IV) antibiotics. It may be noted within days of treatment; with oral antibiotics it may be noted within days to weeks of treatment. When the antibiotics begin to destroy the Lyme spirochete, a toxin is given off causing either direct reactions or indirect reactions through the stimulation of the immune system. The more advanced the Lyme disease is, the more severe the reaction is. The J-H symptoms can vary from systemic reactions such as low blood pressure, fever, chills, and hives to more specific symptoms such as increase in joint pain, headaches, rash or in general, a reversal or worsening of the Lyme symptoms complex. Mistaking the J-H reaction for an allergic reaction to antibiotics, serum sickness or some other catastrophe might lead to prematurely stopping the antibiotics on the part of the physician or non-compliance in taking the medication by the patient. J-H reactions are 10 times more common than allergic reactions to antibiotics. (13)

FACTORS THAT CAN CAUSE LYME DISEASE TREATMENT FAILURES

The popular, but erroneous perception of California as a low risk environment for acquisition of Lyme disease has significant public health consequences. Senate Bill 1115 was chaptered October 1999. (27) This bill encourages education of all health professionals and the public on Lyme disease. Failure to diagnose combined with failure to report, leads to low incident rates resulting in widespread denial of Lyme disease by physicians, leaving undiagnosed and untreated patients to progress to a late stage of the disease with severe disability and suffering.

More education and further research on the West Coast is urgently needed to combat the significant morbidity associated with undiagnosed and untreated Lyme disease and other tick borne

diseases and to encourage physicians to persist in diagnosis and reporting of Lyme disease. (8) Denial by individuals with Lyme contributes to treatment delays. (21) Consumption of alcohol, caffeine, smoking, lack of sleep, or stress can cause treatment failures. (1)

MEDICAL CONFUSION AND CONTROVERSY

Lyme patients are caught in the middle of an unusually rancorous medical debate over the diagnosis and treatment of this poorly understood disease. Some physicians assert that the disease is both over diagnosed and over treated. These physicians seem to believe there is no such thing as chronic Lyme disease and that a short course of antibiotics will cure the infection.

Other doctors believe the infection can become chronic and that Lyme disease should be treated aggressively. (21) Recent newspaper headlines explain that physicians are harassed, persecuted or made to fear for their medical practices, because they do not adhere to the conservative “short term” care for Lyme disease. (21)

Lyme disease can and does exist as a chronic illness with persisting infection. (4) The Lyme disease spirochete *Borrelia burgdorferi* is difficult to isolate. For various reasons, the immune systems of some people do not react to the Lyme disease bacteria consequently rendering an antibody test useless for detecting exposure for those persons. The spirochete prefers to travel through tissue rather than blood making it difficult for a patient to overcome infection. A person must have the antibiotic in their body to kill the spirochete when the cell is dividing.

INSURANCE PROBLEMS

Insurance companies are permitted to deny payment for Lyme disease as no conclusive diagnostic tests exists and the prevailing conservative short-term care is not backed by definitive scientific research. (4) Lyme patients experience both lost income and medical expenses. Of the costs, 40% is spent before the diagnosis, 10% is lost income after the diagnosis, and 50% is medical bills after the diagnosis. Non-cash losses are common. 71% of patients experience mental anguish, 41% have permanent physical damage, 19% lose time at work, 17% lose time from school, about 3% experience divorce, and 1% actually dies. Of pregnant women with Lyme disease there were 55 live births, 19 miscarriages, and 7 neonatal (the first 4 weeks after birth) deaths. In 1992, the United States the national average per 1,000 live births is 7.4 for fetal deaths and 5.4% neonatal deaths. (12)

VACCINE

On February 26, 2002 the maker of the nation’s only Lyme disease vaccine pulled it off the market, citing poor sales. Lymerix had caused controversy in recent years, as patients who argued they were sickened by the vaccine asked the government to restrict sales and also filed numerous lawsuits against maker GlaxoSmithKline Lyme disease vaccine. (34)

PREVENTION (21)

- Education

Tick Avoidance:

- 1) Dress appropriately. For example, wearing shorts into tick habitat increases the risk. Tuck pants into boots, and shirt into pants. Pull socks over pants. Wear a hat.
- 2) Wear light colored clothing so ticks easily can be seen.
- 3) Apply Permanone (0.5% Permethrin) on clothing to repel or kill ticks. Apply insect repellents containing 25% or less of DEET on exposed skin of adults and 10% on Children. Use pesticides in a responsible manner.
- 4) When in tick habitat, avoid brush, and grassy areas. Avoid trail margins by staying in the middle of a trail. Conduct tick checks on yourself and your children frequently.

Environmental:

- 1) Mow grass along *trails*, buildings, and camping areas.

- 2) Remove brush along *trails* or other areas of high human activity.
- 3) Spraying area application of insecticides in yard, around property is questionable.
- 4) Check your pets for ticks.
- 5) Recognize tick habitat: shaded moist ecotones on the uphill side of a trail, where animals bed down or make nests, and moist leaf litter in oak woodland, mixed chaparral, madrone forests, redwood forests, and fir needle duff.

RECOMMENDATIONS

- 1) Educate yourself about Lyme disease and other tick borne illnesses.
- 2) Protect yourself if you are going to be in tick habitat.
- 3) If you find an attached tick on your body then have it removed properly.
- 4) Record any symptoms or changes you may have daily.
- 5) Photograph the bulls eye rash if you have one. It will disappear with or without antibiotics.
- 6) Seek Lyme Literate Doctors.

CONCLUSION

- 1) People who work and play in the out-of-doors are at risk for Lyme disease.
- 2) Of all tick-borne disease in California, 94-95% is Lyme. There are 48 species of ticks in California and 9 species that can carry disease.
- 3) The Ixodes tick may harbor at least a dozen microbes.
- 4) Most cases of Lyme disease arise from tick exposures in late spring and early summer.
- 5) Black legged nymphal ticks, about the size of a poppy seed, account for most of the Lyme disease transmission in California. The infection rate range in nymphs is 0-41%.
- 6) Sitting on logs is the riskiest behavior, followed, in descending rank, by gathering wood, sitting against trees, walking, stirring and just sitting on leaf litter.
- 7) Nymphs are found in April-July in moist leaf litter in oak woodland, mixed chaparral, madrone forests, redwood forests, and fir needle duff.
- 8) Adult ticks are found on trails, 80-90% are found in shaded moist ecotones (north facing) on the uphill side of a trail October to June, and peak in December -February.
- 9) The pack rat is a reservoir for *Borrelia burgdorferi* in the north coast area and birds are the reservoir on the west slope of the Sierras.
- 10) Proper tick removal requires patience. It is more important to get prompt medical treatment than to get the tick tested.
- 11) Of the individuals shown to have Lyme disease, 70% don't remember a bite.
- 12) About 38% of the individuals bitten by an infected blacklegged tick exhibit an erythema migrans ("Bull's-eye" rash). 70% of these rashes are atypical and do not occur on the bite site.
- 13) Lyme is diagnosed clinically.
- 14) Treatment costs increase with delayed diagnosis. On average it takes 22 months and 7 doctors to get diagnosed.
- 15) The current state of laboratory testing for Lyme disease is very poor. The situation has led many people to be misdiagnosed and delayed proper treatment. Specimens should be sent to reliable labs.
- 16) Once an individual is infected with Lyme disease proper treatment of antibiotics is recommended immediately. Treatment should be continued until all the symptoms are gone.
- 17) The infecting *Borrelia burgdorferi* spirochete hides in tissue cells. The antibiotic cannot penetrate the cell wall. The only way to kill the bacteria is to have an antibiotic in the body as the cell is dividing (every 28-30 days).
- 18) Once an individual is infected with Lyme disease, he/she has a 6-8 week window of opportunity to receive proper treatment to prevent chronic problems.
- 19) Lyme disease can be a chronic illness with persisting infection. Widespread denial of Lyme disease leaves undiagnosed and untreated patients to progress to a late stage of the disease. Long-term antibiotic treatment is common in cases with persistent clinical symptoms.

- 20) Total cases of Lyme disease in the U.S. may be as high as 2 million.
- 21) Ignorance, lack of concern, and under reporting continues to complicate the problems of recognized Lyme disease the most common of the vector-borne diseases.
- 22) Education of the public and the medical community is the most important way to reduce the risk and increase the awareness of tick-borne diseases.

RESOURCES: APPENDIX A

Reliable Laboratories:

IGeneX, Inc. Reference Laboratory
 Lyme tests and testing of live and dead ticks
 797 San Antonio Road
 Palo Alto, CA. 94303
 (800) 832-3200
 (415) 424-1191
FAX (415) 424-1196 www.igenex.com



Sonoma County Health Department
 Babesia WA1 and live tick tests.
 3313 Chanate Road, Room 213
 Santa Rosa, CA 95404
 (707) 756-4700

Muir Lab
 175 La Casa Via
 Walnut Creek CA
 925 952-2944
 (near John Muir Hospital)

Lab Corp (Formerly IDL) 3 Locations
 490 Post Street
 S F CA
 (415) 986-4323
 18988 Cox
 Saratoga CA
 (408) 253-5205
 3317 Elm St.
 Oakland CA

Focus Technologies, Inc.
 Coinfections
 5785 Corporate Avenue
 Cypress, California 90630
 (800) 445-0185 www.focusanswers.com

Tick Removal Device:

Pro-Tick Remedy \$3.50 ea.
 SCS Limited
 P. O. Box 573
 Stony Point, NY 10980
 (800) 749-8425
 Email: sales@scslimited.com

CALIFORNIA LYME LITERATE DOCTORS: APPENDIX B

Also see Lyme Disease Foundation web site www.lyme.org for recommendations of Lyme literate Doctors.

Dr. Stephen Harris (Nevada City) 530-470-9184

Dr. Rafael Stricker, (415) 399-1035 San Francisco. Will treat children

7 Lyme Literate Doctors in Chico Contact Jo Anne Hoggard at the Chico Hyperbaric Center
 (888) 324-6240

Dr. Yang (619) 596-4963, San Diego

Dr. Walter Prehn, Sonoma (707) 996-8455

Dr. Kurt Johnson (530) 345-0064 Chico
Dr. Weiss (310) 228-6202, fax (310) 827-4649 Los Angeles
Visiting Doctor Program (702) 256-9776 A Lyme Literate doctor is in Nevada every 6 weeks.
Marilyn M. Robertson, M.D. QME (415) 561-1714 S.F. Help people to get disability coverage as a result of neuro-psy exam.
Dr. Wade Gray Mendocino CA (707) 937-5896
Dr. Christine Green (Palo Alto) 650-325-8592
Dr. Andy Davidson (Petaluma) 707-778-3171
Dr. Liza Chavez, Los Alamitos, (562) 595-7164

Out of the State Lyme Literate Doctors your California Personal Physician can consult with:

* **Dr. Joseph Burrascano's** Physician's Assistant, Gerry.
 (516) 329-0520

Dr. Dorothy Pietrucha
 Pediatric Neurology
 (201) 922-0337

Dr. Nina Pearlmutter
 (954) 384-7200

Dr. Ritchie Shoemaker
 (410) 957-1550 Call @ 9:30-10:30 AM or 2-2:30 PM Pacific Time.

Dr. Brian A. Fallon, New York Psychiatric Institute, 722 West 168 Street, Box 13, New York, New York 10032 (212) 721-4131

*Best time to call them is after 5 PM Eastern Time.

Dr. Kenneth Liegner
 (914) 273-2121 or 273-9433
 ***Dr. Richard Horowitz** (914) 229-8977
 ***Dr. Greg Bach** (215) 997-9421
Dr. Edwin Masters
 (314) 334-0511

Symptoms Check List APPENDIX C ⁽¹⁾

Risk Profile (Please Check)

Tick infested area___ Frequent Outdoor Activities___ Hiking___ Fishing___ Camping___
 Gardening___ Hunting___ Ticks noted on pets___
 Do you remember being bitten by a tick? No___ Yes___ When? _____
 Do you remember having a "bull's eye rash"? No___ Yes___
 Any other rash? No___ Yes___

Have you had any of the following? (CIRCLE ALL YES ANSWERS)

- (1) Unexplained fevers, sweats, chills, or flushing
- (2) Unexplained weight change—loss or gain
- (3) Fatigue, tiredness, poor stamina
- (4) Unexplained hair loss
- (5) Swollen glands: list areas _____
- (6) Sore throat
- (7) Testicular pain/pelvic pain
- (8) Unexplained menstrual irregularity
- (9) Unexplained milk production: breast pain
- (10) Irritable bladder or bladder dysfunction
- (11) Sexual dysfunction or loss of libido
- (12) Upset stomach
- (13) Change in bowel function-constipation, diarrhea
- (14) Chest pain or rib soreness
- (15) Shortness of breath, cough
- (16) Heart palpitations, pulse skips, heart block
- (17) Any history of heart mummer or valve prolapse?

- (18) Joint pain or swelling: list joints _____
- (19) Stiffness of the joints, neck, or back
- (20) Muscle pain or cramps
- (21) Twitching of the face or other muscles
- (22) Headache
- (23) Neck creaks and cracks, neck stiffness, neck pain
- (24) Tingling, numbness, burning, or stabbing sensations, shooting pains
- (25) Facial paralysis (Bell's Palsy)
- (26) Eyes/Vision: double, blurry, increased floaters, light sensitivity
- (27) Ears/Hearing: buzzing, ringing, ear pain, sound sensitivity
- (28) Increase motion sickness
- (29) Lightheadedness, wooziness
- (30) Tremor
- (31) Confusion, difficulty in thinking
- (32) Difficulty with concentration, reading
- (33) Forgetfulness, poor short term memory
- (34) Disorientation: getting lost, going to wrong places
- (35) Difficulty with speech or writing
- (36) Mood swings, irritability, depression
- (37) Disturbed sleep-too much, too little, early awakening
- (38) Exaggerated symptoms or worse hangover from alcohol

Lyme Disease Diagnostic Criteria and Relative Value

Tick exposure in an endemic region

Value=1

Historic facts and evolution of symptoms consistent with Lyme

Value=2

Systemic signs & symptoms consistent with Lyme (other potential diagnoses excluded):

- Single system, e.g., monoarthritis Value=1
- Two or more systems, e.g., monoarthritis & facial palsy Value=2
- Erythema migrans, physician confirmed Value=7
- Acrodermatitis Chronica Atrophicans, biopsy confirmed Value=7
- Seropositivity Value=3
- Seroconversion on paired sera Value=4
- Tissue microscopy, silver stain Value=3
- Tissue microscopy, monoclonal immunofluorescence Value=4
- Culture positivity Value=4
- Culture positivity Value=4
- B. burgdorferi antigen recovered Value=4
- B. burgdorferi DNA/RNA recovery Value=4

INFORMATION APPENDIX D

WEB SITE ON LYME DISEASE IN CALIFORNIA

Lots of links on Lyme disease –<http://www.geocities.com/HotSprings/Oasis/6455/lyme-li>

ADVANCED TOPICS IN LYME DISEASE

http://www2.lymenet.org/domino/file.nsf/UID/guidelines#DIAGNOSTIC_HINTS

<p>Diagnosis</p> <p>Lyme Borreliosis Highly Likely Value =7 or above</p> <p>Lyme Borreliosis Possible Value=5-6</p> <p>Lyme Borreliosis Unlikely Value=4 or below (1)</p>
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Placer & Nevada Counties
 Contact Person: Peg Leonard
 Contact Telephone: (530) 272-3204
 Contact E-Mail: flwrpeg@foothill.net
 Grass Valley, California
 Alternate contact:
 Meg Hughes
 hughes@ncws.com (530) 437-4780

California Lyme Support Groups:

<http://www.lymenet.org/SupportGroups/UnitedStates/California/>

Lyme Disease Resource Center (LDRC)

<http://www.lymedisease.org/index.html>

P. O. Box 1423

Ukiah Ca 95482

Phyllis Mervine-President (707) 468-8460

pcm@pacific.net

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Lyme Times

LDRC

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Lyme Disease Foundation

Karen Vanderhof-Forchner

Educational Materials

www.lyme.org

Lyme Borreliosis: Biology, Epidemiology, and Control by J. S. Gray (Editor), O. Kahl (Editor), R. S. Lane (Editor), G. Stanek (Editor)

Diagnostic Hints and Treatment Guidelines for Lyme and Other Tick-Borne Illnesses:

Fourteenth Edition, by Dr. Joseph J. Burrascano, Jr., MD.: http://www.ilads.org/burrascano_1102

The ILADS Lyme disease treatment guidelines:

http://www.guideline.gov/summary/summary.aspx?doc_id=4836&nbr=3481&string=lyme

OTHER WEB SITES

Lyme Controversy- <http://www.nytimes.com/2001/06/17/magazine/17LYMEDISEASE.html>

www.patientsamerica.com

Lyme Truth-<http://www.lymetruth.org/>

Lyme Alliance – <http://www.lymealliance.org/>

Excellent source of lyme info <http://www.lyme.org/index2.html>

International Lyme and Associated Diseases Society- www.ilads.org

Controversy Over Diagnosis & Treatment http://www.lymesite.com/reliable_testing.htm

The Lyme Disease Network – <http://www.lymenet.org/>

The Lyme Disease Information Resource – <http://x-l.net/Lyme/>

http://www.actionlyme.com/Bransfield_Tick_borne_diseases_and_Psychiatry.htm

Tick Management: <http://www.caes.state.ct.us/SpecialFeatures/TickManagementHandbook.pdf>

International Lyme and Associated Diseases Society: <http://www.ilads.org/basic2.html>

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- (7) Lane, Robert, and Brownfield, Nancy, Lyme Disease Training conducted on July 28,19 99. Note I asked Dr. Lane a number of questions after the class was over.
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- (16) News Release by the Lyme Disease Foundation, summer 1999.
- (17) Butte County Lyme Disease Support Group Newsletter
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I know 30 individuals with Lyme disease. Three have received treatment in time the other 27 have chronic Lyme disease like my wife, Stephanie and I. This information was compiled to educate the public about this debilitating disease and help those suffering with chronic Lyme disease.

Steve Diers, Ranger/Naturalist January 2005