LYME DISEASE
Eugene D. Shapiro, M.D.

LYME DISEASE
THE TRUTH ABOUT TICKS
Eugene D. Shapiro, M.D.
Yale University School of Medicine

LYME DISEASE
1. Etiology and Epidemiology
2. Clinical features
3. Diagnosis
4. Phenomenon of Chronic Lyme Disease

LYME DISEASE
Cause: Borrelia burgdorferi
Vectors:
1. Northeast and Upper Midwest:
   Ixodes scapularis
   (black-legged tick; deer tick)
2. Pacific Coast:
   Ixodes pacificus
   (Western black-legged tick)

LYME DISEASE
Natural Reservoirs for B. burgdorferi
1. Northeast and Upper Midwest
   a. White-footed mouse
   b. Other small mammals
   c. Birds may contribute to spread to new areas
   d. Deer are not competent hosts
2. Pacific Coast
   a. Lizards, main host for I. pacificus, have a low rate of infection
   b. Wood and kangaroo rat, white-footed mouse

Larva, nymph, adult male, and adult female of Ixodes dammini on mm scale (about seven times actual size).
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Proportion of Ticks Infected with B. Burgdorferi

<table>
<thead>
<tr>
<th>Tick</th>
<th>Nymphs</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ixodes scapularis</td>
<td>20-25%</td>
<td>40-50%</td>
</tr>
<tr>
<td>Ixodes pacificus</td>
<td>3-8%</td>
<td>1-2%</td>
</tr>
</tbody>
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An engorged Ixodes dammini nymph, shown in relation to the size of a common pin, in the act of drawing blood.
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Early Localized Disease
Clinical Manifestations
1. Early localized disease
2. Early disseminated disease
3. Late disease
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DIFFERENTIAL DX OF ERYTHEMA MIGRANS
1. Eczema (nummular)
2. Ringworm
3. Cellulitis
4. Granuloma annulare
5. Spider bite (other bites)
6. Erythema multiforme

LYME DISEASE
Early Disseminated Disease
1. Multiple erythema migrans
2. Flu-like illness
3. Aseptic meningitis
4. Neuritis (Seventh-nerve palsy)
5. Carditis
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LYME DISEASE
Early Disseminated Disease
1. Meningitis
   a. Uncommon
   b. Clinically presents like aseptic meningitis but of long duration
   c. Papilledema common

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Early Disseminated Disease
2. Seventh-nerve palsy
   a. Relatively common
   b. Unaffected by treatment
   c. Do not use corticosteroids
   d. Complete resolution is the usual outcome.

LYME DISEASE
Late Disease
1. Lyme Arthritis
   a. The knee is affected >90% of the time
   b. Mono- or pauciarticular
   c. Duration of arthritis is variable
   d. Usually resolves completely with treatment, though it may recur
   e. Chronic/recurrent arthritis is associated with HLA-DR4 (and DR2) allotypes

TIME COURSE OF LYME DISEASE
MONTHS OF ILLNESS
0 1 2 3 4 5 6 7 8 9 10 11 12

- Flu-like symptoms
- Cardiac/secondary skin lesions/early neurologic
- Arthritis/Late neurologic

MAP OF LIME DISEASE
States with reported cases are shaded.
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**LYME DISEASE**

**Diagnosis**
1. Clinical Diagnosis
2. CDC Criteria
   a. Physician-diagnosed erythema migrans (>5 cm)
   b. One or more clinical manifestations of early disseminated or of late Lyme disease plus positive serology

**SEROLOGIC TESTS FOR LYME DISEASE**
1. Two-step procedure
2. First a quantitative test (e.g., ELISA)
3. If ELISA is positive or equivocal, then confirm specificity of result with a Western immunoblot

**LYME DISEASE**

**Serologic Tests**
1. Antibodies may be bound in immune complexes early in the course of the illness
2. Early treatment with antimicrobials may ablate the antibody response
3. Once antibodies develop, they may remain positive indefinitely
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TEST FOR ANTIBODIES AGAINST B. BURGDORFERI
1. Sensitivity 95%
2. Specificity 90%
3. Prevalence of Lyme disease in the population (pre-test probability)

TEST FOR ANTIBODIES AGAINST B. BURGDORFERI

<table>
<thead>
<tr>
<th>Test</th>
<th>Lyme Disease</th>
<th>No Disease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>95</td>
<td>990</td>
<td>1,085</td>
</tr>
<tr>
<td>Negative</td>
<td>5</td>
<td>8,910</td>
<td>8,915</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>9,900</td>
<td>10,000</td>
</tr>
</tbody>
</table>

False-Positives = 990 = 91%

LYME DISEASE
Clinical Situation
1. Patient with non-specific, vague symptoms not likely to be Lyme disease
   a. Antibody to B. burgdorferi: Negative
      Diagnosis: Not Lyme disease
   b. Antibody to B. burgdorferi: Positive
      Diagnosis: Not Lyme disease
2. Moral: Don’t order Lyme titers

LYME DISEASE
Nonspecific (Chronic) Symptoms
1. Nonspecific symptoms associated with Lyme disease
   a. Fatigue
   b. Arthralgia
   c. Myalgia
   d. Headache

Recurring Symptoms Getting Worse?
- muscle or joint pain
- chronic fatigue
- upset stomach
- disturbed sleep
- dizziness
- mood swings

You may have Lyme Disease, a debilitating but treatable bacterial infection transmitted by the bite of a tick. You can pick up a tick in wooded and in shore areas, even from your cat or dog.

Lyme Disease symptoms mimic lifestyle problems and other illnesses which complicate diagnosis. Our Center is a complete Lyme Disease resource. Skilled registered nurses will provide you with information or direct you to a physician in your area specializing in Lyme Disease and a support group.

You can be helped. Call now.

THE LYME CARE CENTER
1-800-TICK BITE
1-800-842-5248
Suite 26, Oak Park, Sherman Road, Madison, CT

*Access to prior authorization for healthcare expenses obtained by The Lyme Care Center

Do you have unexplained symptoms?
If so you could have Lyme Disease. Call your Doctor or InforCure America for more information at 1-800-389-4521.

InforCure America provides expert consultations and treatments for Lyme disease.
LYME DISEASE
Nonspecific (Chronic) Symptoms

2. Never the ONLY manifestation of Lyme disease
a. Nonspecific (subjective) symptoms accompany OBJECTIVE signs of Lyme disease

3. Now incontrovertible scientific evidence that “chronic Lyme disease” does not exist

LYME DISEASE
A Little Piece of My Life

I am official media spokesperson on Lyme Disease for the Infectious Disease Society of America
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Distribution of Lyme Disease Support Groups

http://www.lymenet.org/SupportGroups/

LYME DISEASE
Infectious Disease Society of America
3. Subpoenas
4. Scientific data are very clear
5. Politicization of science (akin to creationism vs. evolution issue)

“CHRONIC” LYME DISEASE
How to Define the Problem
1. In 2007, approximately 100,000 serologic tests for Lyme disease ordered in CT, most for persons with non-specific symptoms (fatigue, pain, headache)
   a. About 3,000 reported cases, 90% of which are EM for which serologic testing is NOT recommended
2. Testing and treatment of driven in part by misunderstanding among patients and MDs, by patient advocate groups and popular media
3. In Pediatrics, complicated by the issue of whether problem is with the patient, with the parent(s) or with both!

“CHRONIC” LYME DISEASE
1. Majority of patients with “chronic Lyme disease” have no evidence of ever having had Lyme disease by either history or serologic tests.
2. Definition essentially is that someone (often a “Lyme-literate” doctor) says that you have it.
**“CHRONIC” LYME DISEASE**

**Clinical Trials of Treatment**
1. There now are 5 published randomized controlled clinical trials of “long-term” antibiotic treatment.
2. Results consistently demonstrate that this strategy is not associated with any meaningful benefit but IS associated with substantial risk and potential serious harm.
   - Secondary infections (potentially life-threatening)
   - Pseudolithiasis from ceftriaxone
   - Financial costs
   - Real problem not being treated or addressed
   - Selection of drug-resistant “superbugs”

**Managing the Problem**
1. Doctors are part of the problem
2. Good at treating “diseases” (diagnoses); Poor at managing symptoms without a diagnosis
3. Large literature on “medically unexplained symptoms” and “functional somatic syndromes”
4. Saying that it is not Lyme disease does not solve the problem
5. Stigma associated with unexplained symptoms (“it’s all in your head”)
6. Doctors may have negative feelings about such patients that influence their management

**Managing the Problem**
7. Paradigm for many other functional syndrome
8. More research needs to be done
9. Focus on symptoms, not diagnosis
10. Trusting relationship important
11. Exercise, counseling, improve sleep, in some instances medications
12. Get patients back to school or work, up and going

**Summary**
1. This is a very difficult problem
2. Substantial evidence that there is no such thing as “chronic Lyme disease”
3. Many of these patients ARE suffering
4. Teaching doctors to manage medically unexplained symptoms without a diagnosis is a major challenge
5. Science will triumph in the end