LYME DISEASE IN NOVA SCOTIA:
A FOCUS ON ARTHRITIS

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Objectives

- Describe the landscape of Lyme disease distribution in Nova Scotia and in Canada
- State the current accepted recommendations for diagnosis and management
- Describe the referral pattern, clinical characteristics, and outcomes of patients with Lyme arthritis seen through the IWK Rheumatology clinic
Disclosures

- I have nothing to disclose
Background
Circular Letter #12-32
To: Directors of Health

Fifty-one residents (39 children and 12 adults) in Old Lyme, Lyme and East Haddam have had an apparently similar arthritis. It has been characterized by usually short and mild but often recurrent attacks of pain and swelling in a few large joints, especially knees, with longer intervening periods of no symptoms at all. No patients have had permanent injury to joints. Although almost half the patients had only joint symptoms, others had fever, headaches, weakness and a skin rash as well. One quarter of the patients had an unusual skin lesion before the onset of joint symptoms.

The seasonal and geographic distribution of cases and the association with a skin lesion suggest that a virus carried by a biting insect may be responsible for this disease. Accordingly, a concentrated effort by Yale University and by the Connecticut State Department of Health is now aimed at identifying viruses in new cases of arthritis from the Lyme area and in insects trapped in that area. Blood studies to identify virus infection in the cases already studied have not to date implicated any known virus or other infectious agent.
Increased recognition in Canada

Lyme disease in Canada: Focus on children
Heather Onyett; Canadian Paediatric Society
Infectious Diseases and Immunization Committee
Paediatr Child Health 2014;19(7):379-83

Childhood Lyme disease
Action Plan on Lyme Disease

Vision
Economic and health burdens caused by LD are minimized

Goals
1. LD cases are prevented
2. LD cases are treated early in the course of disease

Key Federal Objectives
- Environmental risk is reduced by control of ticks and environment management
- Canadians at risk adopt preventive behaviours due to targeted risk communications
- Surveillance identifies the population at risk by identifying emerging endemic areas
- Medical practitioners are armed with up-to-date information to help diagnose LD promptly

Priority Areas
- Knowledge transfer and exchange of surveillance/control tools for
- Public awareness campaign: public and clinicians; risk communications developed
- Risk perception and intervention assessment produced; systematic review of current information
- Tick control methods and programs designed
- Enhanced surveillance implemented; increase P/T surveillance capacity
- Enhance laboratory diagnostic methods; enhance suite of pathogens tested; identify range of Borrelia species and strains
- Tools to assist diagnosis/treatment by medical practitioners developed

Engagement, Education and Information
Lyme Disease (LD) is a tick-borne infection caused by the spirochete *Borrelia burgdorferi*. In eastern North America it is transmitted to humans by the blacklegged tick *Ixodes scapularis*. 
Blacklegged tick

Blacklegged Tick (Ixodes scapularis)
- adult female
- adult male
- nymph
- larva

Lone Star Tick (Amblyomma americanum)

Dog Tick (Dermacentor variabilis)
They get as big as the Bluenose!!
Why should we care?
Reported Cases of Lyme Disease
United States 2012

1 dot placed randomly within county of residence for each confirmed case
Geographic distribution
The number of cases of Lyme disease reported in Canada from 1994 to 2012
Figure 1. Number of reported cases of Lyme disease by case classification and year, Nova Scotia, 2002-2011 (n=120)

A report on Lyme disease epidemiology and surveillance in Nova Scotia, April 2012
Diagnosis
Diagnosis

Two-Tiered Testing for Lyme Disease

First Test
- Enzyme Immunoassay (EIA)
  OR
- Immunofluorescence Assay (IFA)

Second Test
- Signs or symptoms ≤ 30 days
  IgM and IgG Western Blot
- Signs or symptoms > 30 days
  IgG Western Blot ONLY

Consider alternative diagnosis
OR
If patient with signs/symptoms consistent with Lyme disease for ≤ 30 days, consider obtaining a convalescent serum

National Center for Emerging and Zoonotic Infectious Diseases
Division of Vector Borne Diseases | Bacterial Diseases Branch
Diagnosis

CASE DEFINITION FOR CHILDHOOD LYME DISEASE

Report a patient less than 16 years of age with Lyme disease, meeting the following criteria:

Confirmed Lyme disease – Patient fulfills one of two conditions:

1. Clinical evidence of illness with laboratory confirmation
   a. isolation of *Borrelia burgdorferi* from an appropriate clinical specimen
   OR
   b. detection of *B burgdorferi* DNA by PCR in appropriate tissues

2. Clinical evidence of illness with a history of residence in, or visit to, an endemic area* and with laboratory evidence of infection
   • positive serologic test using the two-tiered serological approach (i.e., ELISA followed by Western blot assays)

Probable Lyme disease – Patient fulfills one of two conditions:

1. Clinical evidence of illness without a history of residence in, or visit to, an endemic area* and with laboratory evidence of infection
   • positive serologic test using the two-tiered serological approach (i.e., ELISA followed by Western blot assays)

2. Clinician-observed erythema migrans without laboratory evidence but with history of residence in, or visit to, an endemic area*.
Laboratory limitations

- Results may be negative with early presentation (first 2-4 weeks)
- Repeat testing four weeks after an initially negative test if diagnosis not secure and convincing presentation
What NOT to do!

- Test in absence of objective finding
- Test asymptomatic patient with Tick bite
- Test when typical EM rash present in endemic area
- Test after treatment
- Send specimen to lab which has different criteria than the CDC
- Send PCR on blood, serum or urine
Clinical Manifestations
Erythema Migrans
Meningitis
Encephalopathy
Bell’s Palsy
Radiculopathy
Peripheral neuropathy
Arthritis
Carditis
Heart block
Flu Like illness
Fever
Arthralgia
Flu Like illness
Fever
Arthralgia
Erythema Migrans

- Most common early manifestation of Lyme disease.
- Gradually enlarges over time, may be multiple lesions.
- Lesions become apparent 7–14 days after the tick has detached.
- In adults mostly on legs and feet, in children on trunk and upper body.
Bell’s Palsy

- Most common neurological presentation
  - Affects 8% of patients with Lyme disease

- In highly endemic areas in the United States LD caused up to 50% of cases of facial nerve palsy and in parts of Scandinavia, up to 65%

- Lumbar puncture is not necessary unless other clinical signs point to meningitis

- Antibiotic therapy may not quicken resolution BUT is needed to prevent late manifestations

Halperin 2012
Lyme Meningitis

- Affects 8-10% of patients with Lyme Disease
- May be difficult to differentiate from viral meningitis
- 2 case control trials of pediatric patients show that patients with Lyme meningitis:
  - Are less likely to be febrile
  - Have longer preceding illness (7 days vs. 2 days)
  - More likely to have papilledema, erythema migrans or cranial nerve palsy
  - Have fewer than 10% polymorphonuclear leukocytes in CSF

Cohn et al. Pediatrics 2011
Cardiac manifestations

- Can manifest as conduction abnormality or rarely as myopericarditis
- Reported in 4%–10% of untreated patients with Lyme Disease

- Case series of 84 patients with lyme carditis by CDC showed:
  - 69% reported palpitations
  - 19% had conduction abnormalities,
  - 10% had myocarditis
  - 5% had left ventricular systolic dysfunction
Lyme Arthritis

- Late manifestation of LD and occurs in 20-60% of untreated patients.
- Children are more likely than adults to develop arthritis and more likely to have arthritis as the only presenting symptom.
- Responsive to antibiotics in the majority of cases.
- A minority will have antibiotic-refractory arthritis and require anti-rheumatic treatment.
Post Lyme Syndrome

- Documented episode of early or late Lyme disease
- Received appropriate antibiotic therapy
- Resolution or stabilization of the objective manifestation(s) of Lyme disease after treatment

- Development of symptoms within 6 months of the diagnosis of Lyme disease and lasting at least 6 months post therapy:
  - Fatigue
  - Widespread musculoskeletal pain
  - Complaints of cognitive difficulties
  - Result in substantial reduction in previous levels of occupational, educational, social, or personal activities

IDSA Guidelines 2006
Clinical Presentation

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[Bar chart showing percentages of symptoms reported: Rash (81.7%), Influenza-like illness (70.0%), Erythema migrans (43.3%), Brief recurrent joint swelling (12.5%), Bell's palsy (5.8%), Heart block (0.8%)]
Treatment
**Oral vs. parenteral**

**Oral therapy**
- 14-28 days

**IV Ceftriaxone therapy**
- Meningitis
- Radiculopathy
- Late neurologic disease
- Persistent arthritis
- Unstable cardiac

**Oral**
- Erythema migrans
- Uncomplicated cardiac
- Bell’s Palsy
- Arthritis
Oral therapy

8 years or older
- Doxycycline

Under 8 years
- Amoxicillin
- Cefuroxime
Arthritis treatment

Partial response to treatment
- Additional 4 weeks of oral therapy
- If still symptomatic 1 month of IV therapy

Little to no response to treatment
- 1 month of IV therapy
Prophylaxis

- For prevention of Lyme disease after a recognized tick bite, **routine use of antimicrobial prophylaxis** or serologic testing is not recommended.

- 1 x dose doxycycline can be considered in children over 8 years of age if:
  - tick looks engorged and attached more than 36 hours
  - prophylaxis started within 72 h of tick removed
  - endemic area
  - doxycycline is not contraindicated
Local Distribution

- In Nova Scotia there are six key affected areas:
  - Yarmouth County
  - Pictou County
  - Lunenburg County
  - Queens County
  - Halifax Regional Municipality
  - Shelburne County
Month of symptom onset LD

Figure 4. Number of reported cases of Lyme disease by month of symptom onset*, Nova Scotia, 2002-2011 (n=120)

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Lyme is here!!! Numbers are expected to increase in years to come

Consider Lyme in every new onset mono, oligo and limited poly arthritis

Negative tick bite history does not mean no Lyme Disease!

Consider Lyme Disease in cases of Bell’s Palsy, Meningitis
Resources

- Canadian Pediatric Society Practice Point
- Infectious Disease Society of America Guidelines
- Centre for Disease Control
- Public Health Agency of Canada
Questions?