

Pediatric Lyme Disease

Dr. Ann F Corson

Sunday, October 03, 2004

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Risk Factors

- Age 10-19
- Rural (*suburban*) vs. urban, 3x risk
- Single family homes
- Homes with yards +/- woods or attached land
- Homes within 100 feet of woodland
- Tick hosts being seen on land: deer, mice
- CDC: Any child under 9 yrs at risk with many new cases LD in children under 14 yrs

Public Health Reports 2001, Volume 116, 146-156. Risk Factors for Lyme Disease in Chester Country, Pennsylvania

MMWR 1991. 42: 557-558

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Risk Factors

- Having pets that come in and out, dogs or cats
- Outdoor activities:
 - Horseback riding
 - Hunting, fishing
 - Any activity in the woods or open land or abutting high grasses including field sports, golf
 - Activities in any outdoor area frequented by deer

Anyone can be infected on any warm day of any month of the year!

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Signs and Symptoms

- Lyme disease is truly is the "great imitator" of our time just as syphilis was for prior generations
- All organ systems of the body can be affected
- Onset of illness may be abrupt or indolent
- Symptoms are often vague and shift from day to day therefore many children are thought be maligning
- Children often don't understand what is wrong with their bodies

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Signs and Symptoms

- All children
 - Tick bite – less than 50% remember a bite, even less remember an EM rash
 - Flu-like illness **at any time of year** in 80% (parents often claim the child was never well again)
 - Fatigue, often unrelieved by rest, in 100%
 - Unexplained cyclical fevers
 - Headaches occur in 90% to 100%

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Signs and Symptoms

- All children, cont.
 - Dizziness
 - Neck pain and stiffness in almost 90%
 - Sore throats
 - Swollen lymph nodes
 - Excessive thirst
 - Chest pains in at least 70%, some have palpitations
 - Sense of air hunger or shortness of breath, dry cough

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Signs and Symptoms

- All children, cont.
 - Abdominal pain in about 50%, can mimic acute appendicitis, mesenteric adenitis, Crohn's disease, colitis, irritable bowel syndrome, sometimes vomiting, heartburn
 - Urinary urgency and frequency, sudden lack of control in toilet trained child, return to or new onset enuresis.
 - Rashes that come and go, malar rashes, new psoriasis

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Signs and Symptoms

- All children, cont.
 - Migratory arthralgias, joint pains in 50% to 100% (arthritis in only 40%), myalgias in over 80%, back ache, morning stiffness, pain at rest, muscle weakness
 - Frequent illnesses, dark circles under their eyes, intermittent red, hot pinnae of ears
 - Sleep disturbance in over 80%
 - Trouble falling asleep
 - Frequent awakenings
 - Excessive sleep

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Signs and Symptoms

- All children, cont.
 - Neurological symptoms are protean and can appear **at any time** during the course of infection (few weeks to over a year or more)
 - Hypersensitivity of skin, scalp and hair
 - Hypersensitivity to noise, light, smell
 - Alterations of taste
 - Poor balance and coordination
 - Uncharacteristic behavior outbursts, mood disturbances, depression in over 90% with suicidal thoughts in over 40%
 - Social withdrawal, decreased participation

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Signs and Symptoms

- All children, cont.
 - Neurological symptoms, cont.
 - New onset phobias, anxiety disorders
 - Oppositional behaviors
 - Obsessive compulsive disorders
 - Deterioration in school performance in over 90%
 - Difficulty with concentration and attention in school with easy distractibility as well as "brain fog" in over 80%
 - Word finding problems in over 80%
 - Short term memory difficulties in over 90%
 - New onset ADD

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Signs and Symptoms

- All children, cont.
 - Neurological symptoms, cont.
 - When measured with formal neuropsychiatric testing, children demonstrate defects in auditory and visual sequential processing
 - less commonly:
 - Movement disorders – spasticity, ataxia, motor or vocal tics
 - Cranial neuropathies, e.g. Bell's Palsy or optic nerve neuritis (can result in visual loss)
 - Peripheral neuropathies – numbness and tingling, distal paresthesias, subtle weakness

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Signs and Symptoms

- All children, cont.
 - Neurological symptoms, cont.
 - Peripheral motor weakness
 - Partial complex seizures
 - Apparent demyelinating disease (multiple sclerosis)
 - Spinal cord involvement
 - Pseudo tumor cerebri or increased intracranial pressure, papilledema

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Signs and Symptoms

- Adolescents
 - Parents and teachers may think any unusual behaviors are just “normal” adolescence or problems such as illicit drug use or new onset psychiatric disorder
 - Mood swings, oppositional behaviors, anxiety, depression
 - Self mutilating behaviors
 - Teenagers often do not report to or show parents problems with their bodies

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Signs and Symptoms

- Adolescents, cont.
 - Teens can also turn to alcohol and illicit drugs as self medication
 - Teenage girls may have pelvic pain or menstrual problems, ovarian cysts, boys may have testicular pain
 - Teens need to be aware that Borrelia may be sexually transmitted and that a fetus can acquire the infection from the mother during pregnancy

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Signs and Symptoms

- Pre-schoolers and toddlers
 - Mood swings, sudden emotional outbursts
 - Irritability
 - Personality changes
 - Regression of motor and social skills (developmental milestones)
 - Changes in play behavior, tire easily, less active

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Signs and Symptoms

- Pre-schoolers and toddlers, cont.
 - Trouble falling asleep, frequent awakenings
 - Nightmares, new phobias, recurrence of separation anxiety
 - Diaper rash unresponsive to normal treatment
 - Frequent URIs, ear and throat infections, bronchitis, pneumonia

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Congenital Lyme disease

- Infants can be infected with Borrelia transplacentally in any stage of pregnancy and/or via mother's breast milk.
- The co-infections: Babesia, Bartonella, Mycoplasma and perhaps even the Ehrlichias can be transmitted transplacentally to the developing fetus.

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Congenital Lyme disease

- Gestational Borreliosis can be associated with repeated miscarriages, fetal death in utero, fetal death at term (stillbirths), hydrocephalus, cardiovascular anomalies, intrauterine growth retardation, neonatal respiratory distress, “sepsis” and death, neonatal hyperbilirubinemia, cortical blindness, sudden infant death syndrome and maternal toxemia of pregnancy.

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Congenital Lyme disease

- *Borrelia spirochetes* have been found at autopsy in fetal brain, liver, adrenal glands, spleen, bone marrow, heart and placenta
 - None of the infected tissues showed any sign of inflammation
- Maternal antibiotic treatment during pregnancy does not guarantee that the fetus will be free of infection
- Mothers with Lyme disease should be treated throughout pregnancy

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Congenital Lyme disease

- Infants either infected congenitally or from breast milk can have
 - Floppiness with poor muscle tone
 - Irritability
 - Frequent fevers and illness early in life
 - Joint sensitivities and body pain
 - Skin sensitivity
 - Gastro esophageal reflux
 - Developmental delays
 - Learning disabilities and psychiatric problems

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Congenital Lyme disease

- Infants infected congenitally can have
 - Small windpipes (tracheomalacia)
 - Eye problems (cataracts)
 - Heart defects
- Infants bitten very early in life will have many of the same symptoms
 - loss and decline in developmental milestones

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Co-Infections

- ***Bartonella henselae***: abdominal pain, headache, visual problems, significant lymph node enlargement (e.g. mesenteric adenitis), rashes, unusual “stretch marks”, resistant neurological deficits, new onset seizure disorder, acute encephalitis
- ***Babesia microti*** (and other species): malarial like illness inside red blood cells with intermittent fevers, chills, day and night sweats, abdominal pain, profound fatigue

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Co-Infections

- **Ehrlichiosis**: high fevers, headaches, muscle pains, flu-like symptoms. Labs can show low WBC, platelets and increased liver enzymes
- ***Mycoplasma sp.***: fatigue, abdominal pain
- **Viruses**: abdominal pain, mouth sores

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Co-Infections

Co-Infections are the rule, not the exception

- Co-Infections are often best diagnosed clinically
- Co-Infected patients are:
 - sicker
 - more likely to have failed prior treatment
 - require longer treatment with multiple agents
- Co-Infections must be eradicated or Borrelia infection will persist

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Evaluation

- Tick borne disease is a clinical diagnosis
- Laboratory testing can be very difficult as many patients are serologically negative for antibodies to Borrelia despite active infection
- Routine labs are usually unremarkable
- Even the majority of spinal taps reveal normal spinal fluid
- Full evaluation at labs that specialize in TBD can be very helpful although negative results do not mean absence of disease

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Treatment

- Treatment lasts as long as is necessary
 - Until children are completely symptom free for 2 to 3 months
 - No more cyclical Herxheimer reactions
 - No recurrence of Lyme symptoms with concomitant infections, illnesses or stresses, e.g. surgery, trauma, psychological stresses
- Sickest children often need many months of intravenous antibiotic therapy
- Children whose diagnosis and treatment are delayed may suffer considerable impairment

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School issues

- Teachers, school administrators, school health professionals, pediatricians, family practitioners and parents all need to be aware of the protean manifestations of TBD
- Mental health professionals and educators in Lyme endemic areas need to recognize the possible infectious etiology of neuropsychiatric disease in children.

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School issues

- It is imperative to identify children with persistent neuroborreliosis so they can receive appropriate medical, psychological and educational assistance.
- Two Federal laws exist that protect students with Lyme disease and supercede state codes and regulations:
 - IDEA: Individuals with Disabilities Education Act
www.ideapractices.org
 - Section 504 of the 1973 Rehabilitation Act
www.504idea.org

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Social impact

- Isolation
- Loss of peers and normal socialization
- Loss of self-esteem
- Inability to participate in sports or extracurricular activities
- Loss of academic work
- Interruption of normal family life

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Social impact

- Quote from Pat Smith, President of the Lyme Disease Association, from her address to Congress:
 "The emotional damage these children suffer is tremendous and it follows them through out the most impressionable stages of their lives. To get out of bed is an accomplishment, to shower is a miracle. They have few or no friends, no regular school attendance, no sports or activities, and no self-esteem. Some contemplate suicide, unfortunately, some are successful."

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Prevention

- Avoid exposure to ticks
- Get the deer out of your yard and spray yard with permethrin
- Clear away underbrush and cut back shrubbery
- Wear protective clothing and use appropriate insecticides while outdoors
- Put out Damminix® for mice to use in nests
- Contact your local government regarding tick and deer control and elimination

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Caveats

- Any child who becomes ill after a tick bite needs a full evaluation for the presence of co-infections
- Any child who becomes ill after a tick bite who was treated with 3 to 4 weeks of oral antibiotics has most likely been inadequately treated.
- Initial inadequate treatment makes future treatment more difficult

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Caveats

- Neurological signs and symptoms are often the most common indication of persistent infection after inadequate treatment
- In 1989, Dr. Pachner predicted that "If, as it now seems, the Lyme spirochete is indeed highly neurotrophic and able to remain dormant in the CNS for long periods, we may well see a sizable number of individuals who currently have latent neuroborreliosis presenting in the future with symptomatic infection."

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Selected references

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 - www.lymepa.org
 - www.lymediseaseassociation.org