

Neuropsychological Considerations in Lyme Disease

Tick-borne Diseases – A Complex Picture More Than Just Lyme Disease

**New York City Lyme Disease Support Group
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Common Tick- borne Diseases

- Lyme Disease
- Bartonella
- Babesia
- Micoplasma
- Anaplasma
- STARI (Master's Disease)
- Rocky Mountain Spotted Fever
- Tularemia

Facts About Lyme Disease

- Fastest growing vector-borne disease in US
- Accounts for more than 95% of all vector-borne disease in US
- Underreported by a factor of 10 nationwide
- Found in all 50 states and more than 80 countries
- Serious national health crisis
- Affects children, adolescents and adults
- Ixodes tick attaches itself to deer, small animals and migratory birds

Transmission:

Tick Bite

- Most common method of transmission is a tick bite that transmits the *Borrelia Burgdorferi* bacterium (a spirochete). The tick habitat is:
 - **Animals**
 - **Woodlands**
 - **Shrubbery/lawns**
 - **Grasses**

Transmission: Human To Human?

- In utero
- Breast milk
- Blood transfusion
- Sexually transmitted

Diagnostic Dilemmas

- Bull's Eye rash
- No definitive test – Spirochete difficult to detect
- Western Blot, Elisa, PCR, C6
- PET and SPECT scans
- Treatment controversy
- ILADS and IDSA guidelines

Common Lyme Symptoms

- Bull's Eye rash
- Arthritis
- Summer flu
- General malaise
- Muscle/Joint Pain
- Fatigue
- Headaches
- Bell's Palsy
- Cognitive changes
- Brain fog
- Multi-system symptoms
- "Living with Pain"

Common Lyme Symptoms

- Mood Changes
- Personality Changes
- Tingling and Numbness-Paresthesias
- Hear Music Others Do Not Hear
- Sensory Disturbances/Sensitivities
- Auditory and Visual Changes

Common Lyme Symptoms

- **Ambiguous Loss:**
 - **Friendships**
 - **Academic Achievement**
 - **Professional Identity**
 - **Personal Identity**
 - **Role Loss (Family, Community etc)**
 - **Missed Developmental and Life Cycle Milestones**

Common Lyme Symptoms

- Family Factors:
 - Family Illness
 - Emotional Resources Strained
 - Changed Spousal and Family Roles
 - Misdiagnosis or Denial of Diagnosis
 - Frustration with Diagnosis and Treatment
 - Financial Burdens
 - Generalized Stress

Treatment Dilemmas

- Persisting infection
- Co-infection
- Opportunistic secondary infection
- Compromised immune response response
- Altered hormonal functions
- Genetic factors
- Psychological factors
- Chronic infection

More Than an Infection

(J.J. Burrascano Jr., M.D.)

- Immune system
- Neurotoxins
- Hormonal disturbances
- Tissue damage
- Nutritional disturbances
- Metabolic effects
- Inflammatory responses

Clinical Features

- Depression
- Anxiety
- Panic reactions
- Suicidal thoughts and gestures
- Homicidal thoughts and gestures
- Rage responses

Clinical Features

- Obsessive-compulsive behavior
- Bipolar behavior
- Autism
- Attention Deficit Disorder
- Difficulty Filtering Out Irrelevant Stimuli
- Sensory Integration Disorder

Clinical Features

- Attention and Concentration Problems
- Memory Changes
- Word Finding Difficulty
- Reading Difficulty
- Difficulty Thinking And Reasoning
- Difficulty With Multi-tasking

Clinical Features

- Difficulty Following Conversations
- Changes In Daily Life Functioning
- Changes In Relationships
- Sleep Disturbances

Neuropsychological Evaluation and Treatment Services

- Patients from all over the country
- All ages
- High incidence of cognitive change
- High incidence of ADD, Learning Disability, etc
- Erratic school attendance and declining academic performance
- Inconsistent and Ineffective Work Performance
- Previous treatment
- Delayed diagnosis and treatment

Common History Facts

- Tick bite
- Pulling ticks off child
- Current or past infection in other family members
- Allergies
- Ear infections
- Sensory sensitivities
- Sleep problems
- General Fatigue

Common History Facts

- Gastrointestinal problems
- Sensorimotor difficulties
- Attention problems
- Auditory processing problems
- Visual problems
- Autistic-like behavior
- Mood swings
- Problems with emotional control, rages

Neuropsychology

- The study of brain-behavior relationships and the impact of neurological disease, injury and illness on the whole person
- Cognitive
- Emotional
- Behavioral
- Interpersonal
- Family
- Academic/Professional
- Functional

Neuropsychological Evaluation

- An established method of evaluating brain function and its relationship to cognition and behavior.
- An important diagnostic tool in delineating changes in cognition and emotion accompanying illnesses and injuries involving the central nervous system.
- Compromised Functioning of Central Nervous System in Lyme Disease

Neuropsychological Evaluation

- Neurocognitive functioning across skill domains
- Verbal and non-verbal conceptual skills and reasoning
- Visual discrimination
- Visual-spatial skills
- Visual-motor skills

Neuropsychological Evaluation

- Attention and concentration
- Memory
- Speed of information processing
- Auditory processing
- Graphomotor skills
- Fine motor skills

Neuropsychological Evaluation

- Academic Skills
 - Reading
 - Math
 - Written Expression
 - Oral Expression
- Emotional Factors
- Interpersonal Factors

Evaluation Report

- Delineation of Strengths and Weaknesses
- Evaluation Recommendations
- Treatment Recommendations
- Academic Accommodations
- Consultation With School
- PPT meeting
- Consultation With Employer
- Workplace Accommodations

N-E-T-S Preliminary Findings

N=21, Ages 7-15, 11 males, 10 females

WISC-IV / WIAT-II / WRAML-2

- Verbal Comprehension Index greater than Perceptual Reasoning Index
- Processing Speed lower than Verbal Comprehension and Perceptual Reasoning
- Working Memory lower than Verbal Comprehension and Perceptual Reasoning

N-E-T-S Preliminary Findings

N=21, Ages 7-15, 11 males, 10 females

WISC-IV / WIAT-II / WRAML-2

- Verbal Comprehension greater than Reading Composite and Math Composite
- Verbal Comprehension and Perceptual Reasoning greater than Attention/Concentration

Top Ten Reasons To Think Spirochete

10. A weekend in the Hamptons or Nantucket, family camping trip, summer camp, school field trip
9. Deer in back yard, living in tick infested area
8. Summer flu
7. Bell's Palsy
6. Persistent fatigue

Top Ten Reasons To Think Spirochete

5. Recurring infections/allergies
4. Emotional changes/rages
3. Decline in cognitive functioning and school performance
2. Recurrent or persistent joint pain
1. **Bull's-eye rash!!!**

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