

“The Role of the Neuropsychological Evaluation in Understanding and Treating Lyme Disease: What Doctors, Educators and Parents Need to Know”

“Understanding and Treating Lyme Disease”
University of New Haven
Dodds Theater
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Neuropsychology

- Neuropsychology is the study of brain behavior relationships
- Neuropsychology explores how brain function is reflected in cognition, emotion and behavior

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**Common Terms:
Similarities and Differences**

- Neuropsychological:
 - Relationship between brain/central nervous system and cognitive/emotional/behavioral functioning
- Neurocognitive:
 - Thinking; Sensory and perceptual processes that impact daily functioning
- Neuropsychiatric:
 - Emphasis on emotional/behavioral disorders relating to diseases of the central nervous system

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Neuropsychology and Lyme Disease



- The Central Nervous System is a primary site
- Brain function is frequently compromised
- Cognitive, emotional and behavioral symptoms are common in Lyme disease/TBD
- These symptoms negatively impact academic, vocational, interpersonal and family functioning

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Neuropsychological Evaluation: Sooner Rather Than Later



- The subtle declines in cognitive and behavioral functioning occur much sooner than most clinicians diagnose
- Retrospective review reveals long-standing difficulties and declining function that have compromised day-to-day life
- These difficulties need to be evaluated as part of the initial workup for a Lyme or TBD diagnosis is made
- A referral for neuropsychological testing should be made at the time of diagnosis

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Presenting Problems



- Attention/Concentration 87%
- Memory 63%
- Multi-tasking 40%
- Word finding 34%
- Auditory Processing 33%

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Presenting Problems



- Sensory Sensitivities 40%
- Fatigue 66%
- Sleep Difficulties 69%

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Presenting Problems



- Anxiety/Panic Attacks 54%
- Mood swings 50%
- Depression 37%
- Sadness 30%
- Rages 25%
- Anger/Irritability 53%

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Functional Manifestations of Neurocognitive Symptoms



- Brain Fog
- Forgetful
- Can't complete tasks
- Last one to finish
- Can't complete homework
- Forget information for tests
- Severe fatigue and reduced stamina limits ability to participate in activities

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Functional Manifestations of Neurocognitive Symptoms



- Lose friends
- Feel isolated and alone
- The familiar looks unfamiliar
- Familiar faces unfamiliar
- Lose track in the middle of a task
- Misunderstand what someone is saying
- Miss information in class
- Easily distracted

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Functional Manifestations of Neurocognitive Symptoms



- Lose patience with loved ones
- Rages
- Misunderstand facial expressions
- Can't keep track of bills
- Get lost in the middle of a conversation
- Can't meet job responsibilities
- Inconsistent from day to day

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Functional Manifestations of Neurocognitive Symptoms



- I can be in a conversation with someone and not remember what was just said.+
- Information is clogged up inside my brain.+
- I can read a paragraph three times and still not know what it is saying.+
- I look stupid.+
- I am withdrawn and avoid interaction with others.+

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Functional Manifestations of Neurocognitive Symptoms



- I get stumped and don't know what to write.
- I waste the use of studying when I don't remember it the next day for the test.
- Sometimes I feel like I don't fit in at home or at school.
- Sometimes I feel like I am zoned out.

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Neuropsychological Testing: WHY??



- A critical adjunct to support:
 - Diagnosis
 - Treatment decisions
 - Treatment interventions
- Understand the impact of Lyme symptoms on academic, vocational, interpersonal and family functioning

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Neuropsychological Testing: Goals



- Delineate neurocognitive strengths and weakness
- Corroborate medical findings
- Provide information for further diagnostic testing
- Provide information for treatment planning
- Provide information for academic planning
- Provide information for vocational planning

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Neuropsychological Domains

- Innate Intellectual Ability:
 - Auditory/Verbal and Visual Reasoning
 - Visual Spatial
 - Visual Motor
 - Visual Discrimination
- Executive Functions:
 - Organization
 - Planning
 - Problem Solving

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Neuropsychological Domains

- Attention and Concentration
- Processing Speed
- Auditory Processing
- Visual processing
- Memory
- Sensorimotor
- Fine Motor
- Graphomotor

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Neuropsychological Domains

- Language and Communication Skills
- Verbal Fluency and Word Finding
- Academic Skills
- Emotional
- Behavioral
- Interpersonal
- Family

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Attention



- Simple
- Complex
- Sustained
- Selective
- Focused
- Divided
- Split
- Sequential
- Alternating
- Shifting

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Memory Processes



- Encoding
- Consolidation
- Storage
- Retrieval
- Recognition

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Memory Modalities



- Visual
- Auditory
- Tactile
- Olfactory
- Kinesthetic

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Memory Types



- Simple
- Complex
- Working
- Immediate
- Delayed
- Short Term
- Long Term
- Remote
- Autobiographical
- Semantic
- Procedural Memory

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Neuropsychological Test Battery: Pediatric



- Wechsler Intelligence Scale for Children (WISC-IV)
- Wechsler Individual Achievement Test (WIAT-II)
- Gray Oral Reading Test (GORT-IV)
- Nelson-Denny Reading Test
- Delis-Kaplan Executive Function System (D-KEFS)
- Cognitive Assessment System (CAS)

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Neuropsychological Test Battery: Pediatric



- NEPSY: A Developmental Neuropsychological Assessment
- Wide Range Assessment of Memory and Learning (WRAML2)
- Rey Complex Figure Test
- Sentence Completion Test
- Behavior Rating Inventory of Executive Function (BRIEF)
- Purdue Peg Board
- Clinical Evaluation of Language Fundamentals (CELF-3)

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Neuropsychological Test Battery: Adult



- Wechsler Intelligence Scale for Adults (WAIS-III)
- Wechsler Individual Achievement Test (WIAT-II)
- Wechsler Memory Scale (WMS-III)
- Wide Range Assessment of Memory and Learning (WRAML2)
- Test of Everyday Attention
- Rey Complex Figure Test
- Delis-Kaplan Executive Function System (D-KEFS)

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Neuropsychological Test Battery: Adult



- Behavior Rating Inventory of Executive Function (BRIEF)
- Purdue Peg Board
- Frontal Systems Behavioral Scale (FrSBe)
- Booklet Category Test, Short Form
- Nelson-Denny Reading Test
- Watson Glaser Test of Critical Thinking
- NEO-PI-R
- ZUNG Depression Scale
- Trauma Symptom Inventory (TSI)
- Effort Tests

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Results: WISC-IV, WRAML2, WIAT-II and D-KEFS



- Strengths
 - WISC-IV:
 - Similarities
 - Vocabulary
 - Comprehension
 - Information
 - Word Reasoning
 - Matrix Reasoning
 - WIAT-II:
 - Oral Expression
 - Listening Comprehension

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Results: WISC-IV, WRAML2, WIAT-II and D-KEFS



- Weaknesses
 - Working memory and processing speed
 - WISC-IV:
 - Picture Completion
 - Coding
 - Cancellation
 - Digit Span
 - WIAT-II:
 - Word Reading
 - Pseudoword Decoding
 - Spelling
 - Reading rate

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Results: WISC-IV, WRAML2, WIAT-II and D-KEFS



- Weaknesses
 - WRAML2:
 - Visual and Verbal Memory
 - Visual and Verbal Recognition
 - D-KEFS:
 - Trail Making subtests
 - Color Word Interference
 - Verbal Fluency
 - Motor Speed
 - Purdue Peg Board

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Recommendations



- Audiological evaluation
- Speech and Language evaluation
- Neuro-optometric evaluation
- Physical Therapy evaluation
- Occupational Therapy evaluation
- Assistive Technology evaluation

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Recommendations



- Individual Cognitive Remediation
- Individual Psychotherapy
- Supportive Family Therapy
- Academic Accommodations (environmental and instructional)
- 504-Plan or Disability Designation as Other Health Impaired and IEP
- Educational Advocate

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Academic Accommodations



- Shortened school day
- Excusal from school attendance policy
- Small classes and opportunities for one-to-one instruction
- Preferential classroom seating
- Hands-on learning experiences
- Use of a computer for learning opportunities

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Academic Accommodations



- Printed information to supplement classroom chalkboard information
- Printed outline to supplement class lesson
- Printed homework assignments
- Allow student the opportunity to raise his/her hand in class
- Provide student with questions to be answered for reading assignments
- Reduce length of reading assignments

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Academic Accommodations



- Chunk information for assignments and tests
- Regular meetings with teachers
- Use of visual materials that are discrete and simplified
- Extended time for assignments and tests
- Multiple choice learning and testing format
- Oral presentations
- Open book tests

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Workplace Accommodations



- Preferential workplace seating to maximize eye contact with the employer
- Variable work day
- Reduced work week
- On-site / home-office accommodations
- Use of a computer
- Provide simplified printed information
- The use of a handout or outline that serves as a supplement to what is given aloud
- Additional support staff
- Regular meetings with superiors to review work, track progress and to review effectiveness of accommodations

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Case Study: Pediatric



- Male: Evaluations at age 10-2 and 11-10
- Full term uncomplicated pregnancy
- Motor milestones WNL
- Low tone
- Delayed speech development
- Small for age
- Special Ed preschool
- Speech therapy and occupational therapy

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Case Study: Pediatric



- ADD
- Auditory Processing Disorder
- Sensory sensitivities
- PDD/ASD
- 2005 - Mother diagnosed with Lyme (chronic)
- Child diagnosed with Lyme
- Younger sister diagnosed with Lyme

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Case Study: Pediatric



- Fatigue
- GI symptoms
- Poor social skills but longs for friendships
- Anxiety
- Mood swings

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Case Study: Pediatric



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|--|--|
| <ul style="list-style-type: none"> • 2006 Neuropsychological Evaluation: • Range - 2nd %ile - 96th %ile • WISC-IV VCI . 23rd %ile • WISC-IV PRI - 66th %ile • WISC-IV WMI - 61st %ile • WISC-IV PSI - 16th %ile • Similarities . 91st %ile | <ul style="list-style-type: none"> • 2008 Neuropsychological Evaluation: • Range - 1st %ile - 96th %ile • WISC-IV VCI . 66th %ile • WISC-IV PRI - 90th %ile • WISC-IV WMI . 86th %ile • WISC-IV PSI - 16th %ile • Similarities . 91st %ile |
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Case Study: Adult



- Woman: Evaluations at age 44 and 45-7
- Master's degree
- High level executive position
- Tick bite in 1/92
- Symptoms in 2/92
- Treated and symptoms under control until 1/03
- Babesia, Mycoplasma, Bartonella, Tularemia and Chlamydia

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Case Study: Adult



- | | |
|---|---|
| <ul style="list-style-type: none"> • 2006 Neuropsychological Evaluation: <ul style="list-style-type: none"> • Range - 1st %ile - 99th %ile • WAIS-III VCI - 97th %ile • WAIS-III PRI - 68th %ile • WAIS-III WMI - 66th %ile • WAIS-III PSI - 27th %ile | <ul style="list-style-type: none"> • 2008 Neuropsychological Evaluation: <ul style="list-style-type: none"> • Range - 1st %ile - 99th %ile • WAIS-III VCI - 99th %ile • WAIS-III PRI - 73rd %ile • WAIS-III WMI - 61st %ile • WAIS-III PSI - 47th %ile |
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