

Neuropsychological Testing in Children

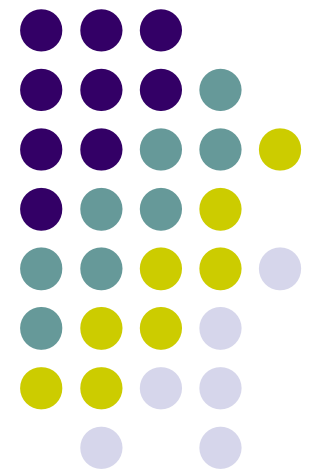
Saturday October 27th, 2007
ILADS 2007 Annual Scientific Meeting

Leo J. Shea III, Ph.D. - Presenter

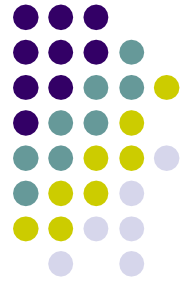
NEUROPSYCHOLOGICAL EVALUATION
& TREATMENT SERVICES, P.C.

Judith G. Leventhal, Ph.D. - Collaborator

Rebecca Gordon – Statistician



Basis for Pediatric Neuropsychological Testing



- Cognitive, emotional and behavioral symptoms are associated with Lyme disease
- These symptoms negatively impact academic, interpersonal and family functioning
- Neuropsychological testing delineates and documents strengths and weaknesses
- To mitigate the impact on academic and functional abilities and physical stamina

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

Neuropsychological Testing



- Exhibited neuropsychological strengths and weaknesses impact:
 - Academic functioning
 - Peer and family relationships
 - Social and emotional functioning
 - Self-confidence and self-esteem

Goals: Neuropsychological Testing



- Diagnosis
- Neuropsychological treatment
- Medical treatment
- Disability designation
- Academic accommodations
- Advocacy
- Family support

Compromised Neuropsychological Functioning



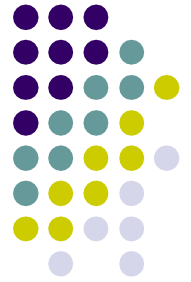
- Overall intellectual performance
- Attention and concentration
- Processing speed
- Auditory and visual processing
- Executive functions
- Communication difficulty / Word-finding
- “Lyme Undulation”
- “Brain Fog” / Confusion
- Memory

Compromised Neuropsychological Functioning



- Depression
- Anxiety/panic
- Mood swings
- Tantrums/rages
- Obsessive-compulsive behaviors
- Autistic/Asperger's-like behaviors
- Suicidal/homicidal ideations

Neuropsychological Domains



- Verbal and non-verbal reasoning
- Visual discrimination
- Visual-spatial
- Visual-motor
- Grapho-motor
- Fine-motor
- Attention and concentration
- Memory
- Information processing speed
- Auditory processing
- Executive functions
- Oral and written communication
- Academic
- Emotional
- Behavioral
- Interpersonal and family

Subjects



- 54 children
- Ages 6 to 15 – Average age: 11
- 19 females - 35 males
- Nationwide: NY, CT, NJ, VA, MD, PA, MA, TN, AZ, CA, FL, MN, NV, RI, NH
- Positive Lyme test results
- History of chronic medical problems
- Lyme in other family members
- Erratic school attendance and performance

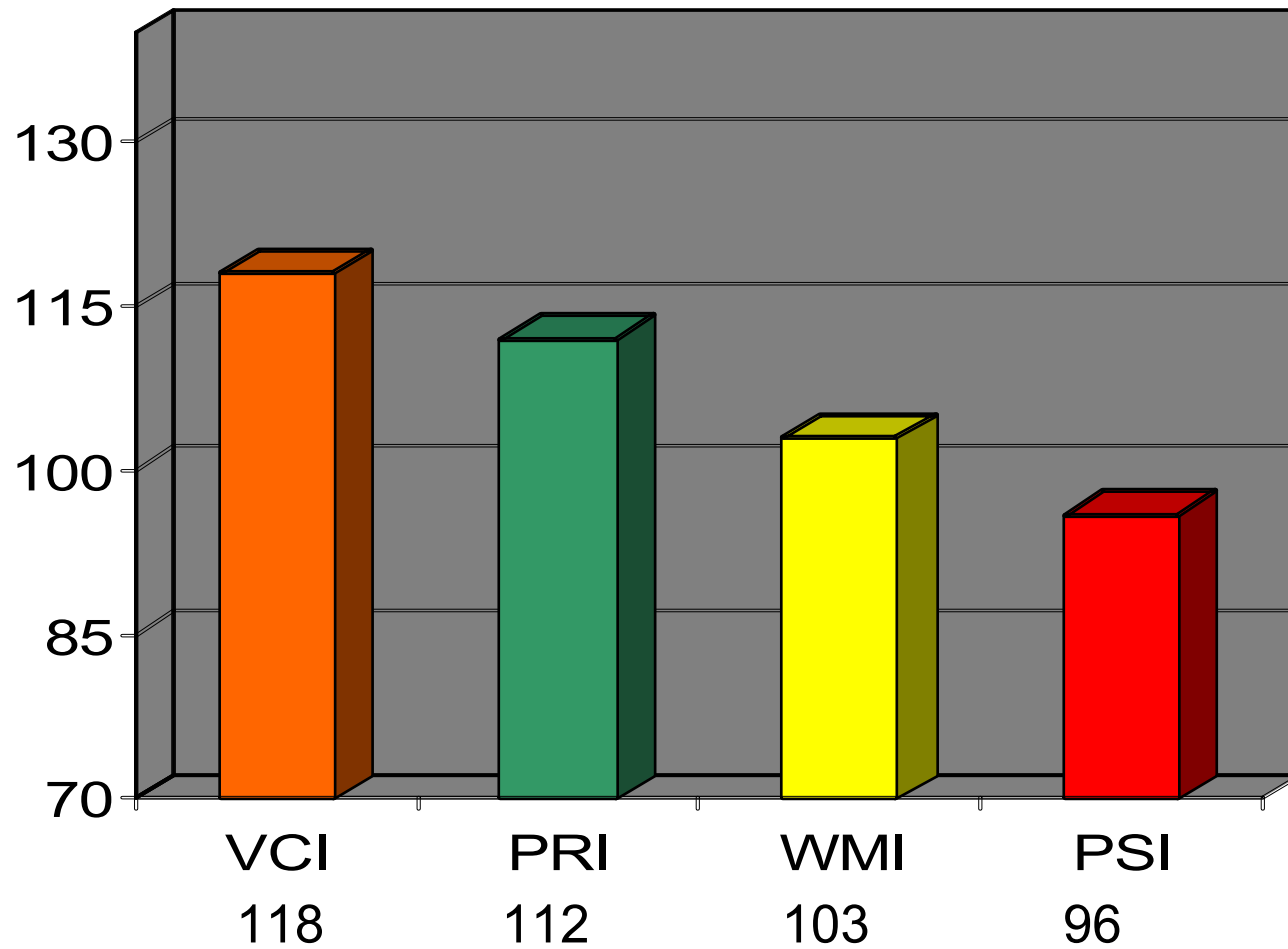
Neuropsychological Test Battery



- Wechsler Intelligence Scale for Children (WISC-IV)
- Wechsler Individual Achievement Test (WIAT-II)
- Gray Oral Reading Test (GORT-IV)
- Nelson-Denny Reading Test
- Cognitive Assessment System (CAS)
- NEPSY: A Developmental Neuropsychological Assessment
- Wide Range Assessment of Memory and Learning (WRAML2)
- Rey Complex Figure
- Sentence Completion Test
- Behavior Rating Inventory of Executive Function
- Purdue Peg Board
- Clinical Evaluation of Language Fundamentals (CELF-3)

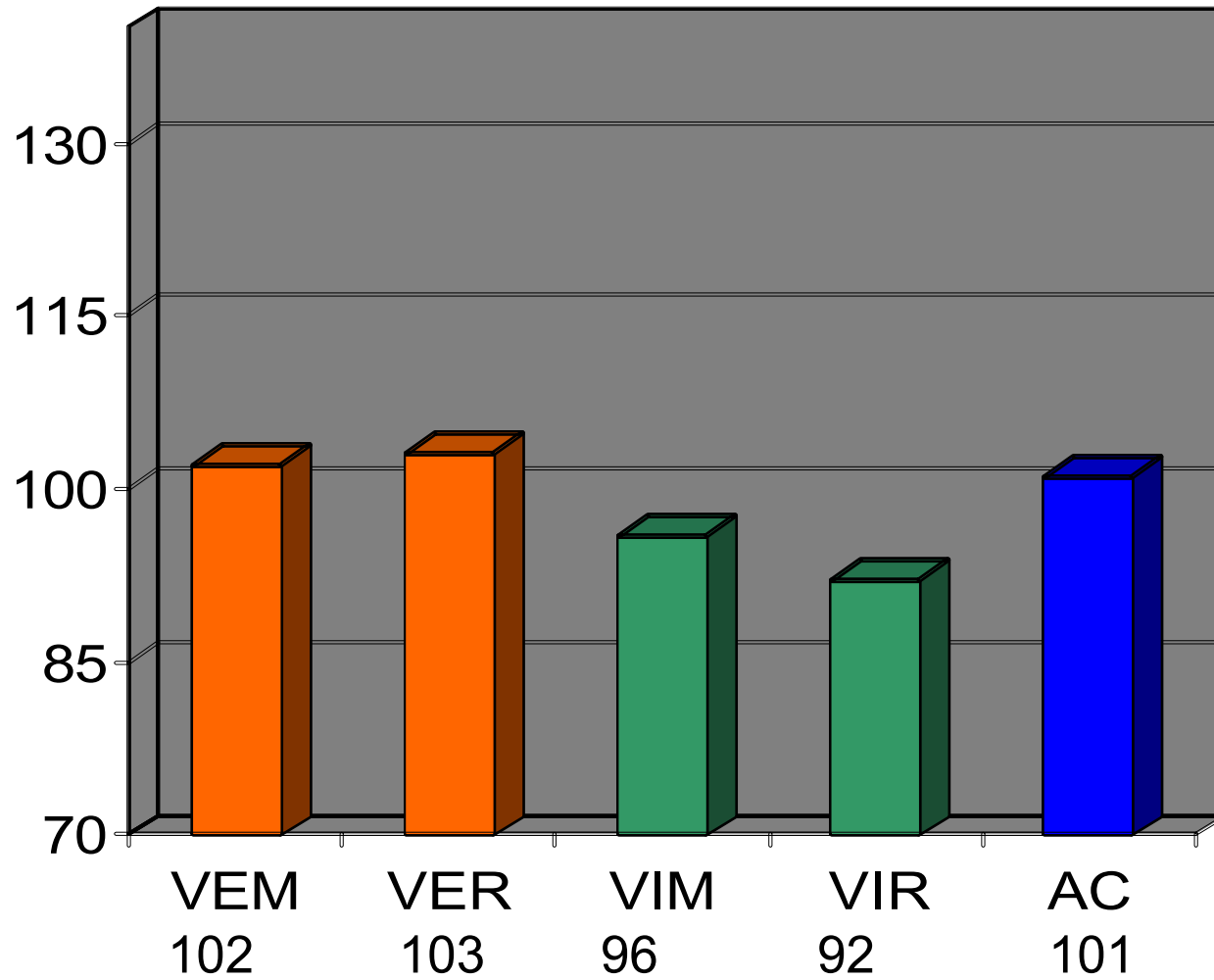
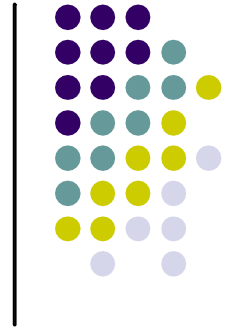


Results: WISC-IV

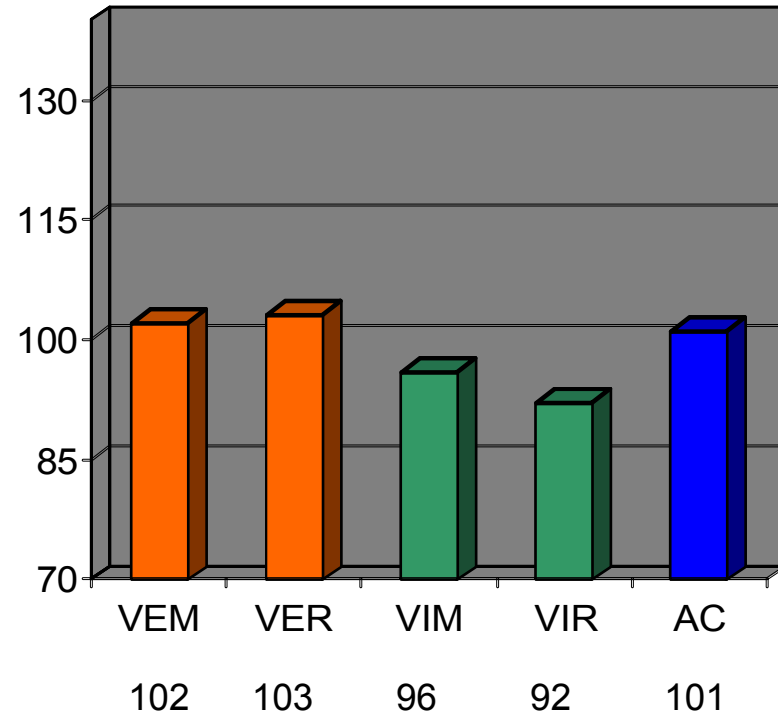
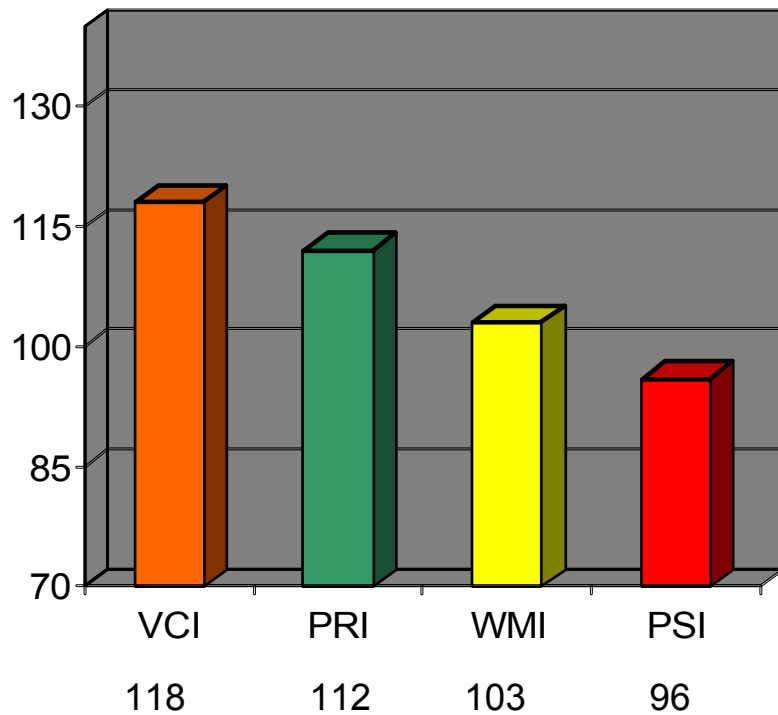
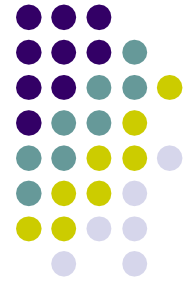


- Standard deviation = 15

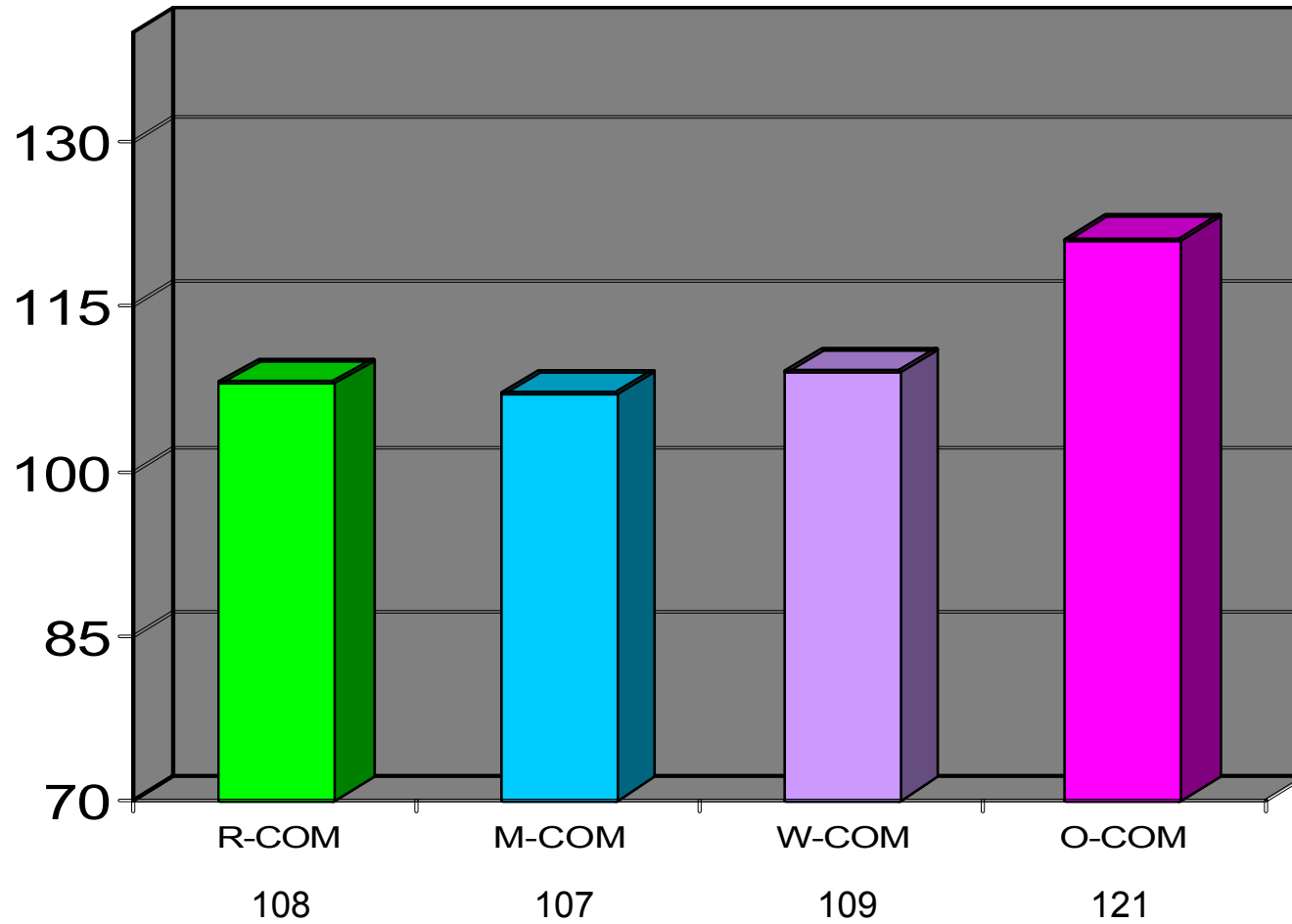
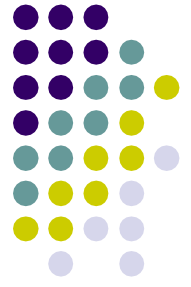
Results: WRAML2



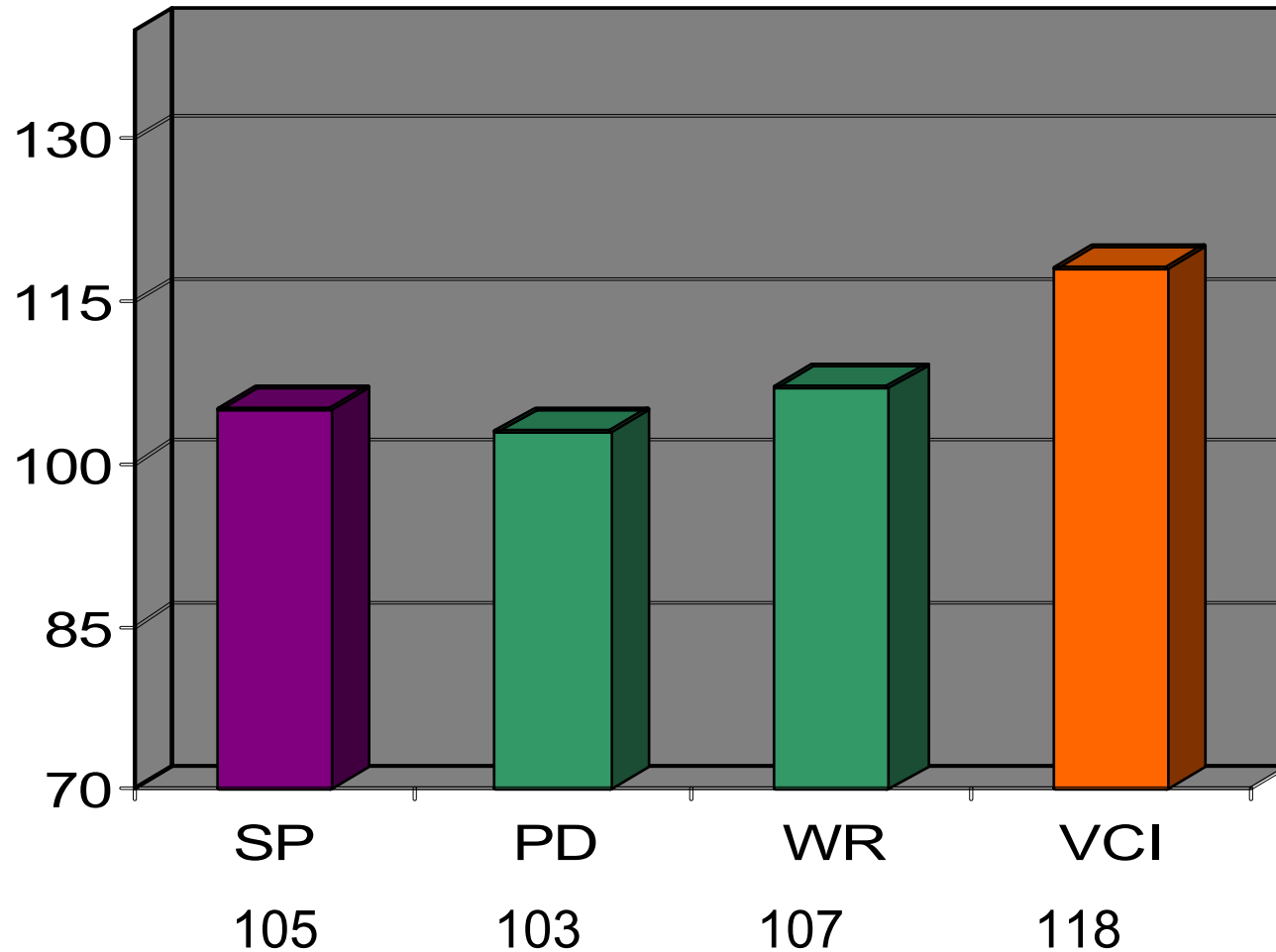
Results: WISC-IV vs. WRAML2



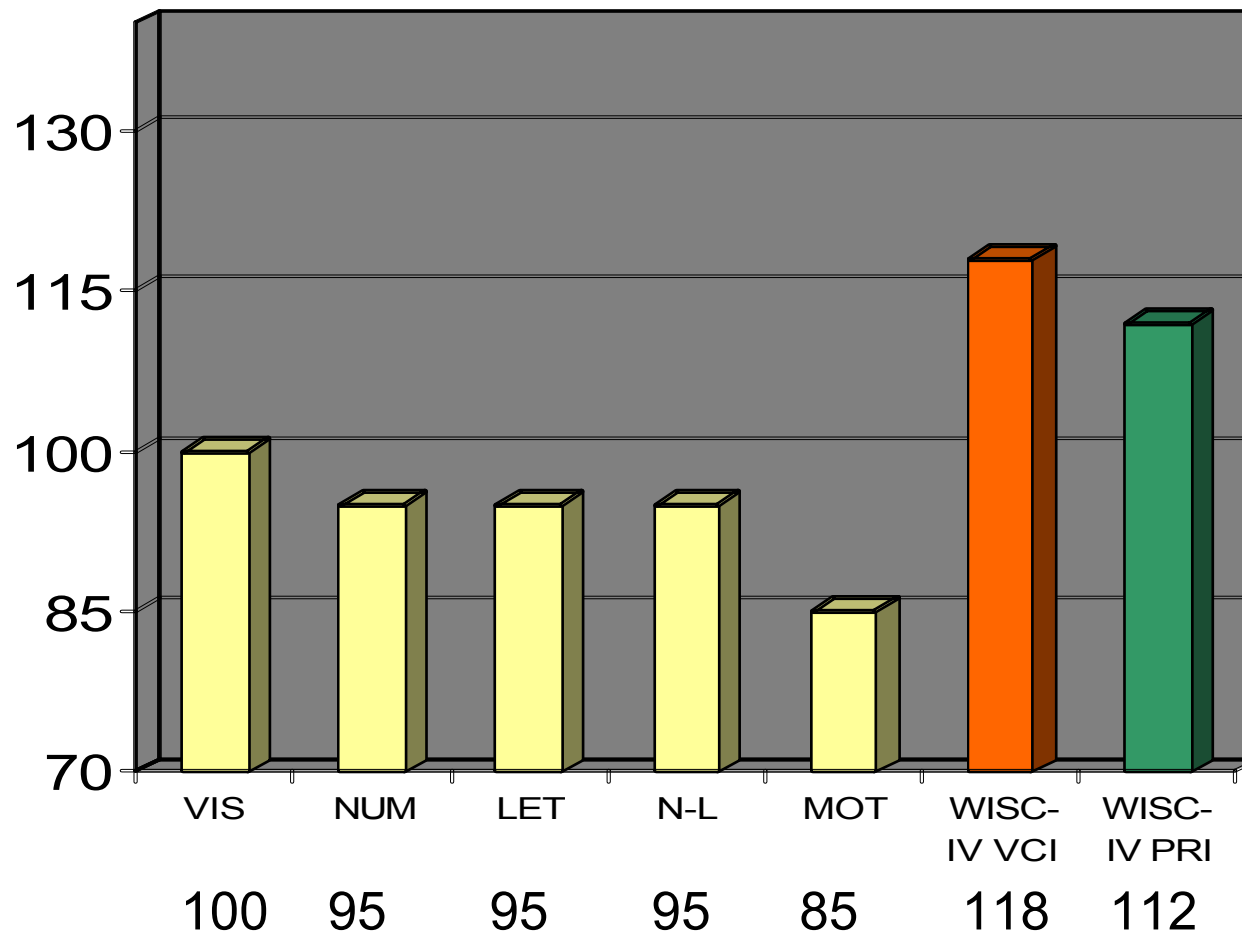
Results: WIAT-II Composite Scores



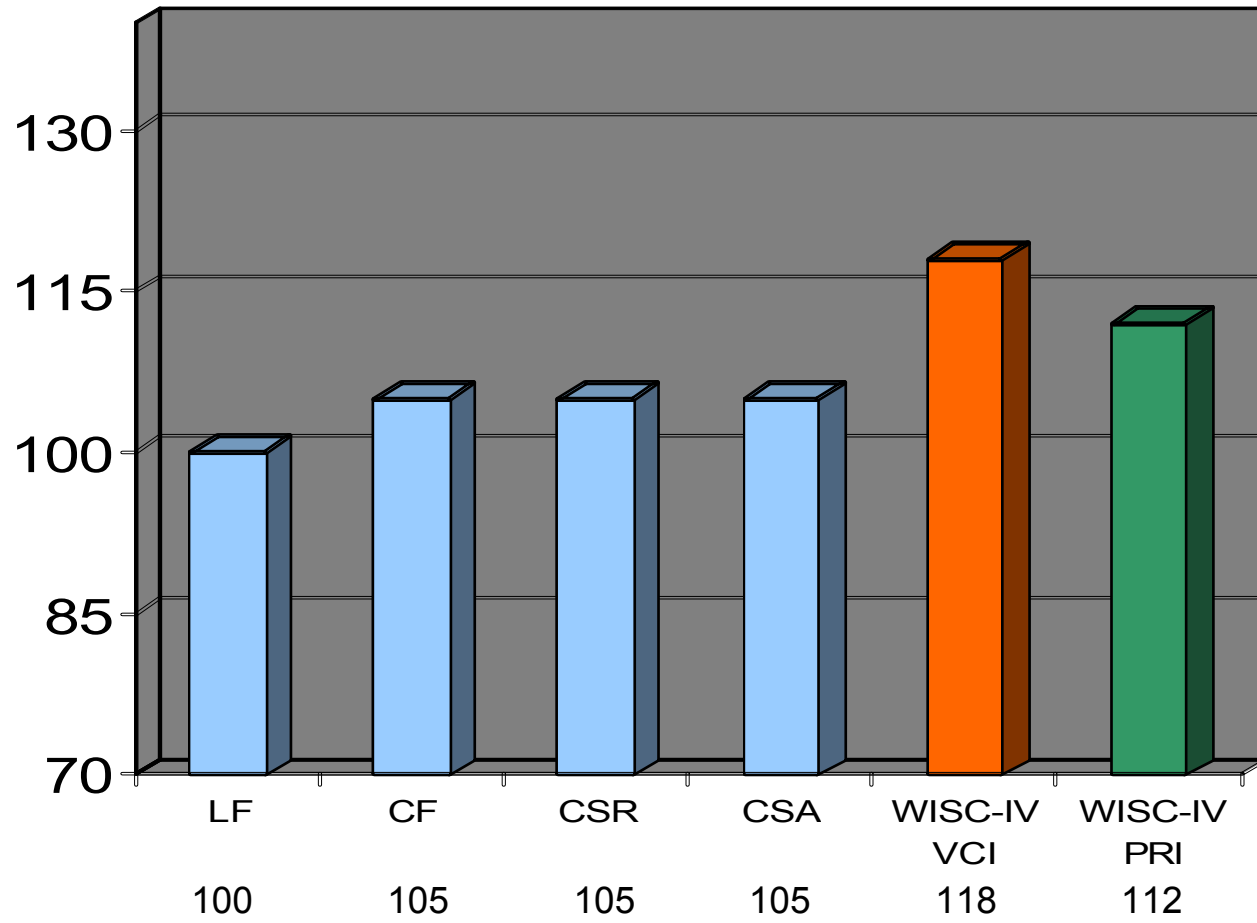
Results: WIAT-II - SP-PD-WR vs. WISC-IV VCI



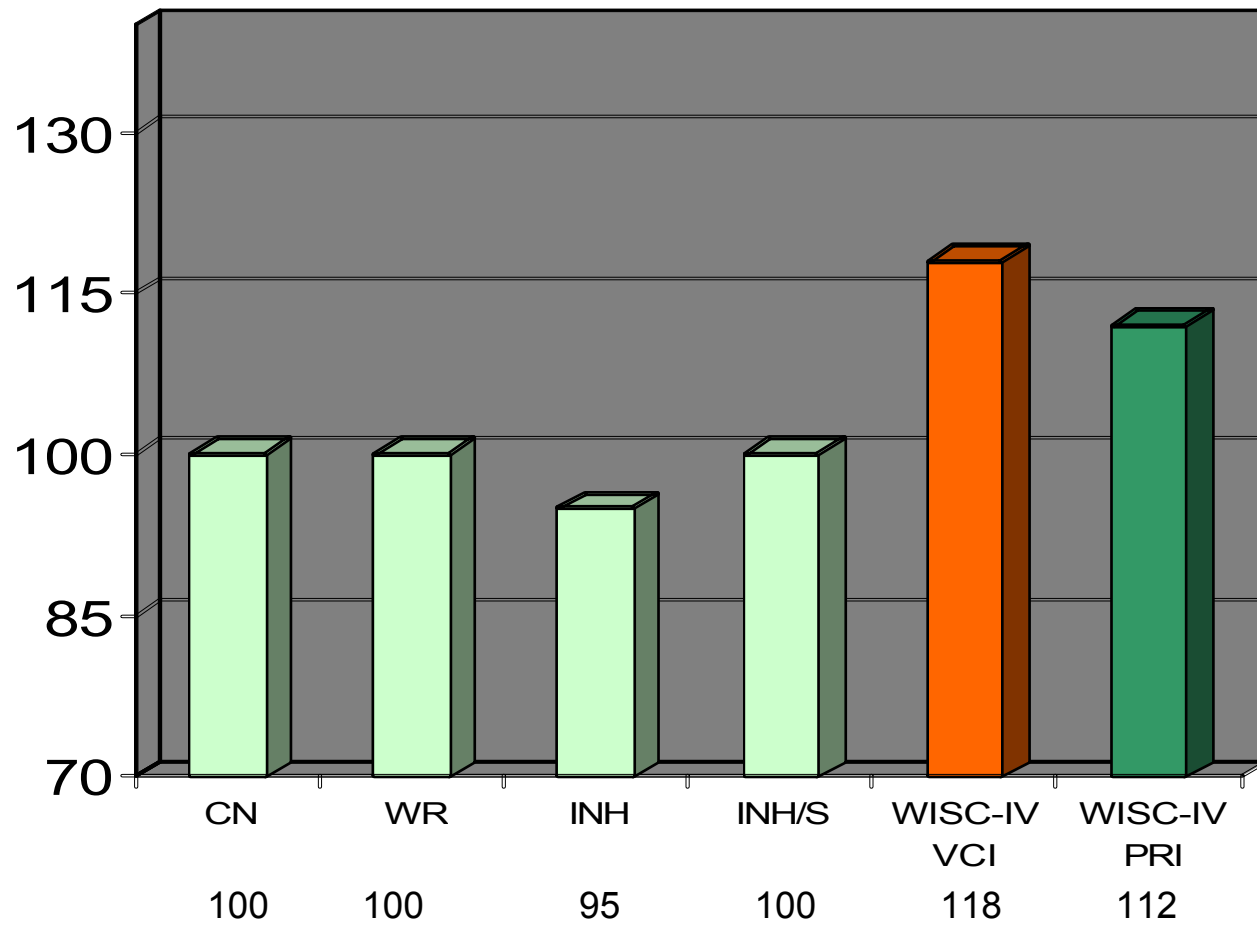
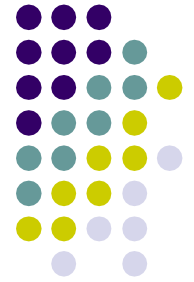
Results: D-KEFS Trail Making



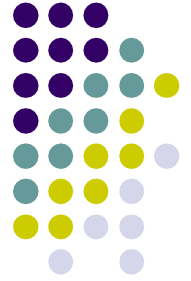
Results: D-KEFS Verbal Fluency



Results: D-KEFS Color Word Interference

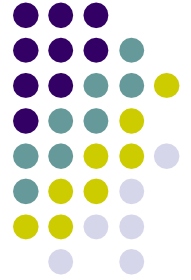


Results: WISC-IV, WRAML2, WIAT-II and D-KEFS



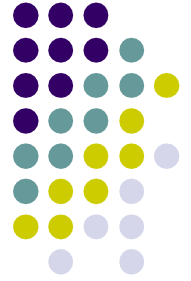
- Strengths
 - WISC-IV:
 - Similarities
 - Vocabulary
 - Comprehension
 - Information
 - Word Reasoning
 - Matrix Reasoning
 - WIAT-II:
 - Oral Expression
 - Listening Comprehension

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

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



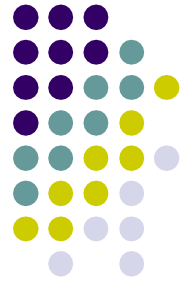
- Weaknesses
 - WRAML2:
 - Visual and Verbal Memory
 - Visual and Verbal Recognition
 - D-KEFS:
 - Trail Making subtests
 - Color Word Interference
 - Verbal Fluency
 - Motor Speed
- Purdue Peg Board

N-E-T-S PRELIMINARY FINDINGS



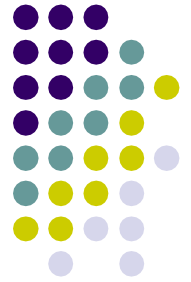
- WISC-IV:
 - Perceptual Reasoning Index < Verbal Comprehension Index
 - Working Memory Index < Perceptual Reasoning Index
 - Working Memory Index \leq 1 SD below Verbal Comprehension Index
 - Processing Speed Index \leq 1 SD below Verbal Comprehension Index
 - Processing Speed Index \leq 1 SD below Perceptual Reasoning Index

N-E-T-S PRELIMINARY FINDINGS



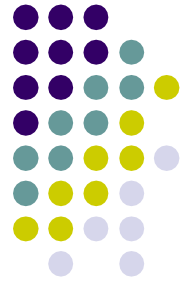
- WISC-IV vs. WIAT-II:
 - WIAT-II Reading Composite \neq 1 SD below Verbal Comprehension Index
 - WIAT-II Math Composite \neq 1 SD below Verbal Comprehension Index

N-E-T-S PRELIMINARY FINDINGS

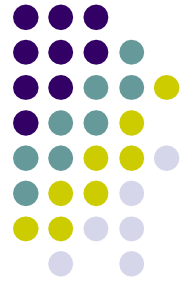


- WISC-IV vs. WRAML2
 - WRAML2 Attention/Concentration \neq 1 SD below Verbal Comprehension Index
 - WRAML2 Attention/Concentration \neq 1 SD below Perceptual Reasoning Index
 - WRAML2 Verbal Memory and Verbal Recognition \neq 1 SD below Verbal Comprehension Index
 - WRAML2 Visual Memory and Visual Recognition \neq 1 SD below Verbal Comprehension and Perceptual Reasoning Indexes

N-E-T-S PRELIMINARY FINDINGS



- WISC-IV vs. D-KEFS
 - D-KEFS Trail Making \geq 1 SD below Verbal Comprehension and Perceptual Reasoning Indexes
 - D-KEFS Color Word Interference \geq 1 SD below Verbal Comprehension Index



Recommendations

- Audiological evaluation
- Speech and Language evaluation
- Neuro-optometric evaluation
- Physical Therapy evaluation
- Occupational Therapy evaluation
- Individual Cognitive Remediation
- Individual Psychotherapy
- Supportive Family Therapy
- Academic Accommodations (environmental and instructional)



Neuropsychological Studies

- Westervelt and McCaffrey (2002)
- Tager and Fallon et. al. (2001)
- Fallon, Das, et. al. (1997)
- Keilp et. al (2006) - Adult study.
- Deficits found in:
 - Verbal fluency
 - Mental flexibility
 - Fine motor dexterity
 - Auditory and visual processing
 - Attention
 - Working memory
 - Perception and organization
 - Processing speed
 - Auditory and visual memory

Thanks and Appreciation



- International Lyme and Associated Diseases Society
- National Research Fund for Tick-borne Diseases
- Lyme-literate medical and mental health colleagues
- N-E-T-S patients and families