

The Connection between Mental Health and Lyme Disease: Clinical Diagnosis, Testing and Treatment

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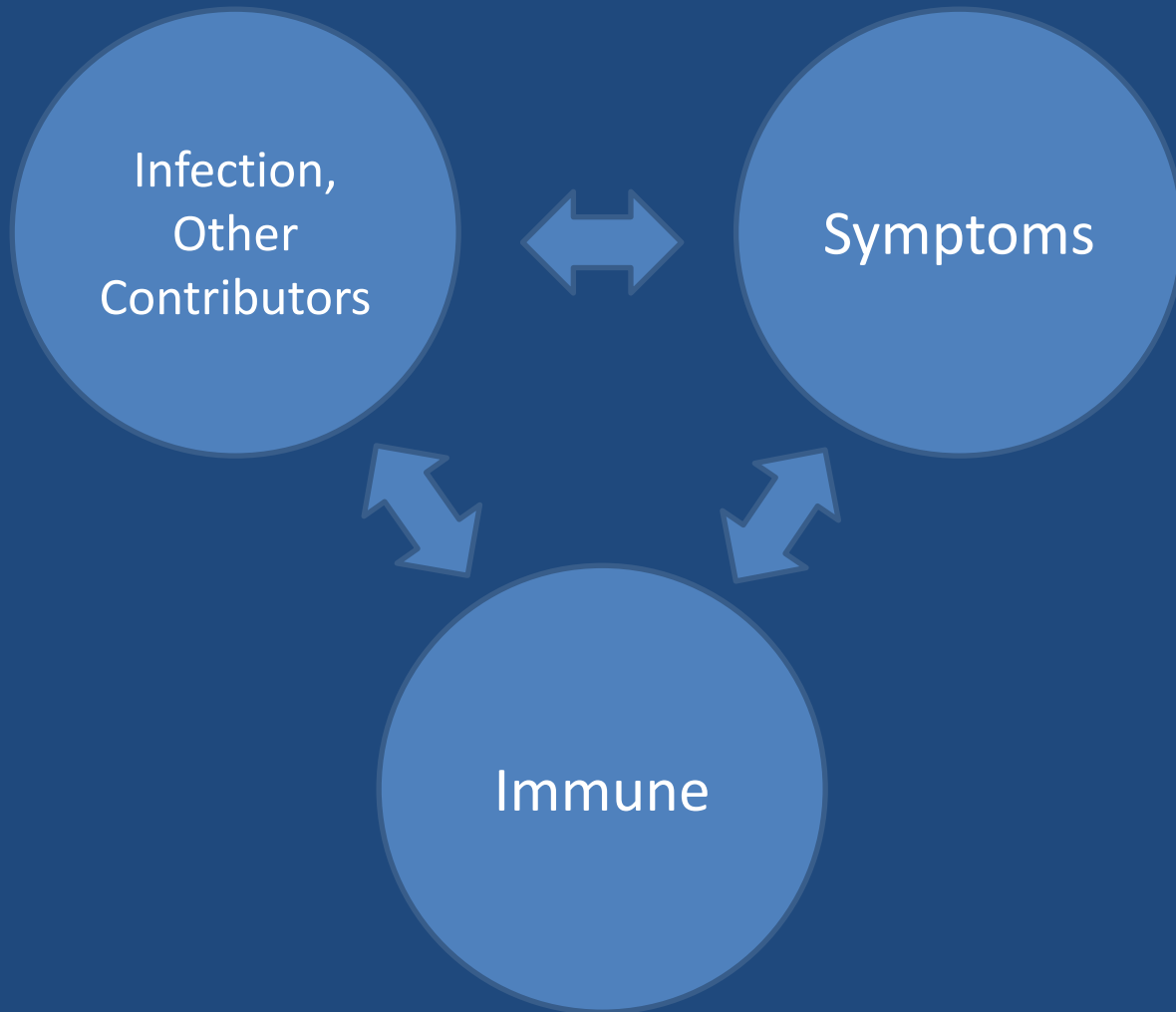
February 15, 2024

8 PM EST

Disclosures

- I have no relevant financial or non-financial relationships to disclose.
 - Most of my income is paid directly from patients in return for trying to help them.
 - I have been an expert witness in cases involving Lyme disease.
- Any reference to off-label or non-FDA approved usage in this presentation will be noted and disclosed.

Assessment



There are many faces to Lyme disease



Clinical Presentation Variability

- The same infection can have a very different presentation in different individuals. This is the result of a combination of different host and pathogen considerations. There are also many genetic and other susceptibility and resistance contributors. Microbial variables can include the number of organisms, the route and location of transmission, and coinfections. Host variables include age, and genetic and other susceptibilities.

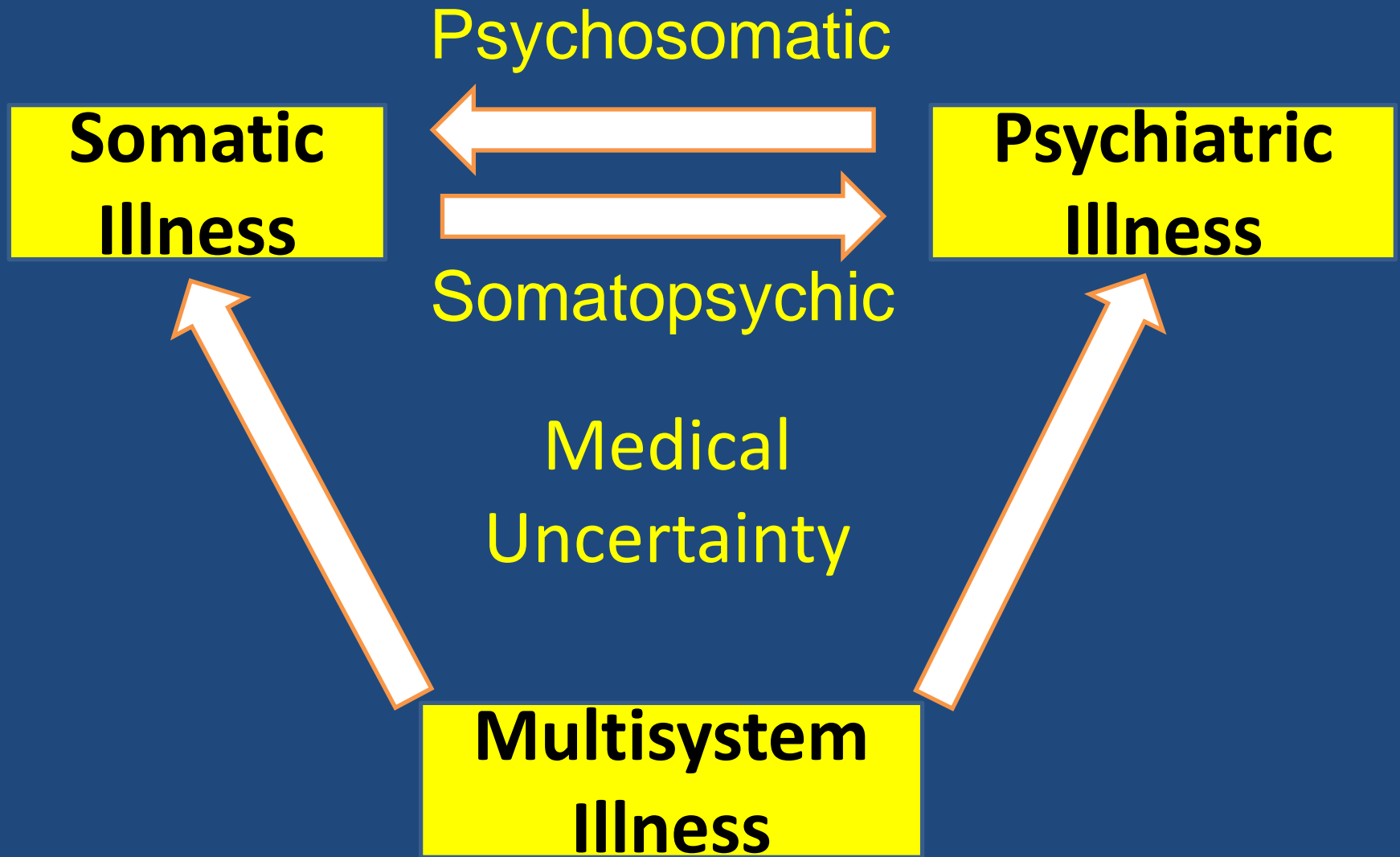
Neuropsychiatric Consequences of Infectious Diseases

- Impairments can harm:
 - Cognitive functioning
 - Vegetative functioning (sleep, eating, sex, energy)
 - Emotional functioning
 - Electrical activity (seizures)
 - Cranial nerves
 - Headaches
 - Autonomic nervous system
 - Spinal cord
 - Nerve roots (radiculopathy)
 - Peripheral nerves (sensory and motor)

How Are Patients Labeled Who Don't Fit the Disease Dogma?

Bransfield RC, Friedman KJ. Differentiating Psychosomatic, Somatopsychic, Multisystem Illnesses, and Medical Uncertainty. *Healthcare (Basel)*. 2019 Oct 8;7(4):114. doi: 10.3390/healthcare7040114.

Term	DSM-5 Diagnosis	ICD-10 Diagnosis	ICD-11 Diagnosis
All in your head	No	No	No
Somatic symptom disorder	Yes	Yes	No
Somatoform disorder	No	No	No
Medically unexplained symptoms	No	No	No
Functional neurological symptom disorder	Yes	Yes	No
Conversion disorder	No	Yes	No
Illness anxiety disorder	Yes	No	Yes
Factitious disorder imposed upon another (Munchausen's by proxy)	Yes	Yes	Yes
Functional disorders	No	Yes	No
Psychogenic disorders	No	Yes	No
Compensation neurosis	No	No	No
Psychogenic seizures	No	Yes	Yes
Psychogenic pain	No	Yes	No
Psychogenic fatigue	No	No	No
Delusional parasitosis	No	Yes	Yes
Subjective vs. Objective	No	No	No
Non-specific or vague symptoms	No	No	No
Bodily distress disorder	No	No	Yes
Bodily distress syndrome	No	No	No



Bransfield RC, Friedman KJ. Healthcare (Basel). Differentiating Somatopsychic, Psychosomatic, Multisystem Illness and Medical Uncertainty 2019, 8;7(4).

Assessment

- **The standard of care in medicine has always been the detailed clinical evaluation.** Like other illnesses, the search for the diagnosis and cause of a condition may be initiated by using a screening assessment followed by a thorough history, review of systems, a comprehensive psychiatric clinical exam, mental status exam, neurological exam and physical exam relevant to the patient's complaints. Laboratory or other testing may be ordered based upon the clinical assessment. The diagnosis and the cause of the condition is determined by a knowledge of the medical literature, clinical judgment, pattern recognition and a knowledgeable interpretation of all clinical findings.

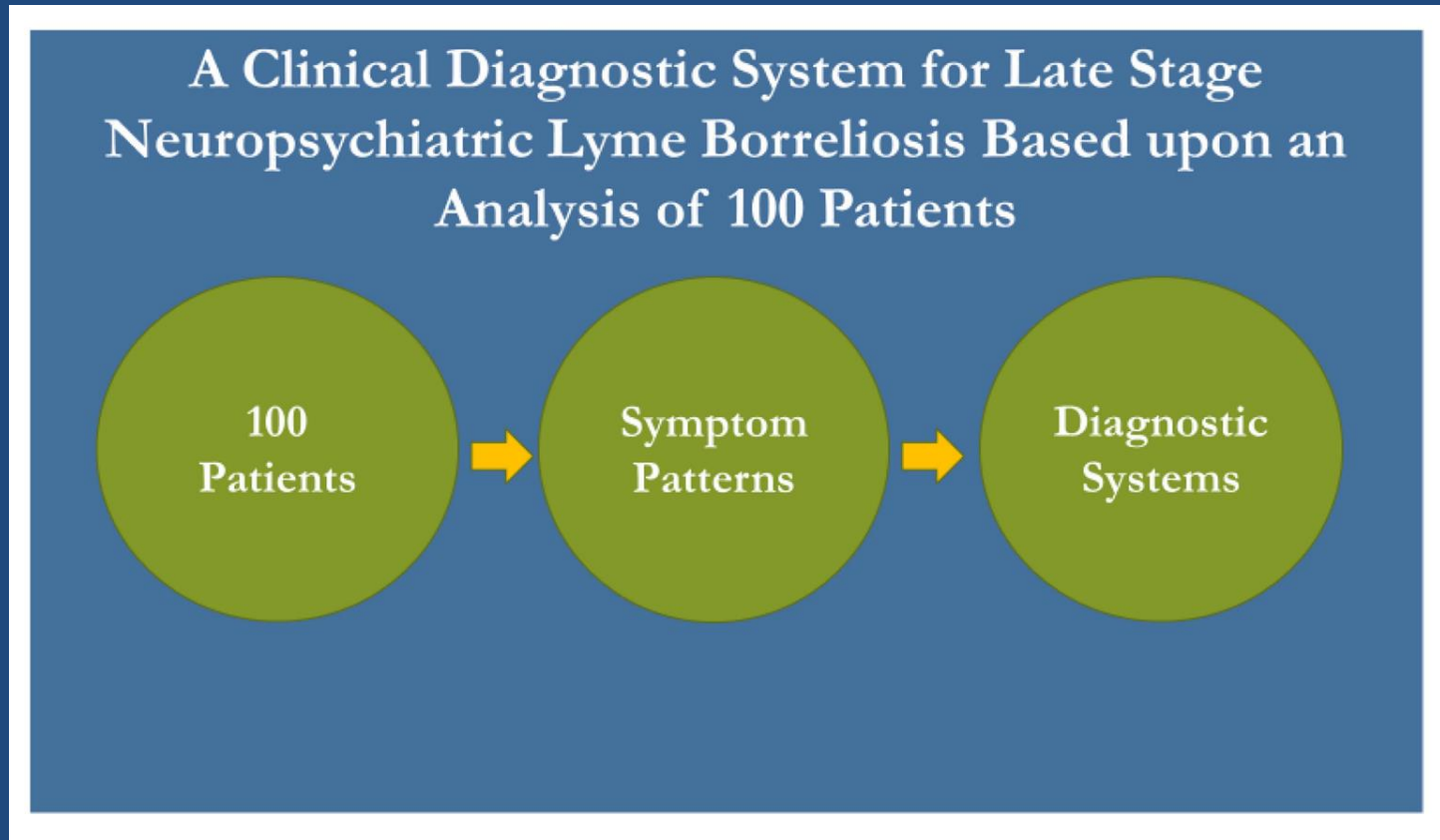
Lyme Disease Assessments

- Burrascano JJ. ADVANCED TOPICS IN LYME DISEASE Fifteenth Edition. DIAGNOSTIC HINTS AND TREATMENT GUIDELINES FOR LYME AND OTHER TICK BORNE ILLNESSES JOSEPH J. 2005: <http://www.lymediseaseassociation.org/drbguide200509.pdf>
- Citera, M.; Freeman, P.R.; Horowitz, R.I. Empirical validation of the Horowitz Multiple Systemic Infectious Disease Syndrome Questionnaire for suspected Lyme disease. *Int. J. Gen. Med.* **2017**, *10*, 249–273.
- Shroff, G.; Hopf-Seidel, P. A Novel Scoring System Approach to Assess Patients with Lyme Disease (Nutech Functional Score). *J. Glob. Infect. Dis.* **2018**, *10*, 3–6.
- Fallon, B.A.; Zubcevik, N.; Bennett, C.; Doshi, S.; Rebman, A.W.; Kishon, R.; Moeller, J.R.; Octavien, N.R.; Aucott, J.N. The General Symptom Questionnaire-30 (GSQ-30): A Brief Measure of Multi-System Symptom Burden in Lyme Disease. *Front. Med.* **2019**, *6*, 283.

Coinfection Screens

- Burrascano JJ. Sorting out Lyme and Associated Coinfections:
<https://www.lymedisease.org/members/resources/lyme-disease-resources-non-members>
- Rawls W. Lyme Coinfection Comparisons Charts: What Your Symptoms Could be Telling You (rawlsmd.com)

Lyme Disease Symptoms



Bransfield RC , Cook MJ, Aidlen DM, Javia S. A Clinical Diagnostic System for Late Stage Neuropsychiatric Lyme Borreliosis Based upon an Analysis of 100 Patients Healthcare (Basel). 2020, 8(1), 13

Screening & 3 Assessment Forms

- Screening questions
- 24-item patient self-assessment
- 61-item assessment (more common symptoms)
- 283-item assessment with 810 data points (full assessment)
- Coinfection Screen

Results: Control Groups

- The 100 patients pre-infection: the average patient had **4.6 clinical findings pre-infection and 82 clinical findings post-infection.**
- Healthy medical students w/o Lyme disease: the average had **4 clinical findings.**
- Age-matched controls with conditions other than Lyme disease. The average patient had **21.7 clinical findings, N=10.**
- The National Comorbidity Replication Survey

Pre-infection prevalence of mental disorders in the patients studied compared to the prevalence of the same disorders in the 12 month National Comorbidity Replication Survey

Psychiatric Syndromes	Pre-Infection	95% CI	National Comorbidity Survey
Depression	9.0%	(3–15%)	8.2%
Rapid cycling bipolar	3.0%	(0–6%)	2.6%
Panic disorder	2.0%	(0–5%)	2.7%
Obsessive compulsive disorder	2.0%	(0–5%)	1.0%
Social anxiety disorder	7.0%	(2–12%)	6.8%
Generalized anxiety disorder	3.0%	(0–6%)	3.1%
Posttraumatic stress disorder	6.0%	(1–11%)	3.5%
Explosive anger	3.0%	(0–6%)	2.6%

Attention Span



Clinical Impairment	Pre-Infection	95% CI	Post-Infection	95% CI
Attention span				
Sustained attention	7%	(2–12%)	84%	(77–91%)
Distracted by frustration	7%	(2–2%)	79%	(71–87%)
Allocation of attention	6%	(1–11%)	66%	(57–75%)
Hypersensitivity to sound	3%	(0–6%)	66%	(57–75%)
Hypersensitivity to light	2%	(0–5%)	63%	(54–72%)
Hypersensitivity to touch	2%	(0–5%)	41%	(31–51%)
Hypersensitivity to smell	5%	(1–9%)	36%	(27–45%)
Sensory overload	No data			

Memory				
Working memory	3%	(0–6%)	78%	(70–86%)
Recent memory	5%	(1–9%)	77%	(69–85%)
Working spatial memory	1%	(0–3%)	46%	(36–56%)
Remote memory	4%	(0–8%)	35%	(26–44%)
Memory retrieval				
Words	3%	(0–6%)	70%	(61–79%)
Names	6%	(1–11%)	68%	(59–77%)
Numbers	3%	(0–6%)	52%	(42–62%)
Geographical/spatial	1%	(0–3%)	49%	(39–59%)
Faces	1%	(0–3%)	23%	(15–31%)
Motor memory	1%	(0–3%)	10%	(4–16%)



Processing				
Fluency of speech	4%	(0–8%)	62%	(52–72%)
Reading comprehension	6%	(1–11%)	59%	(49–69%)
Spelling errors	8%	(3–13%)	56%	(46–66%)
Word substitution errors	5%	(1–9%)	55%	(45–65%)
Calculation	10%	(4–16%)	51%	(41–61%)
Optic ataxia	1%	(0–3%)	51%	(41–61%)
Auditory comprehension	5%	(1–9%)	49%	(39–59%)
Handwriting	8%	(3–13%)	47%	(37–57%)
Letter reversals	2%	(0–5%)	45%	(35–55%)
Fluency of written language	2%	(0–5%)	43%	(33–53%)
Number reversals	1%	(0–3%)	39%	(29–49%)
Left–right confusion	6%	(1–11%)	30%	(21–39%)
Transposition of laterality	2%	(0–5%)	22%	(14–30%)
Spatial perceptual distortions	1%	(0–3%)	21%	(13–29%)
Sound localization	3%	(0–6%)	19%	(11–27%)

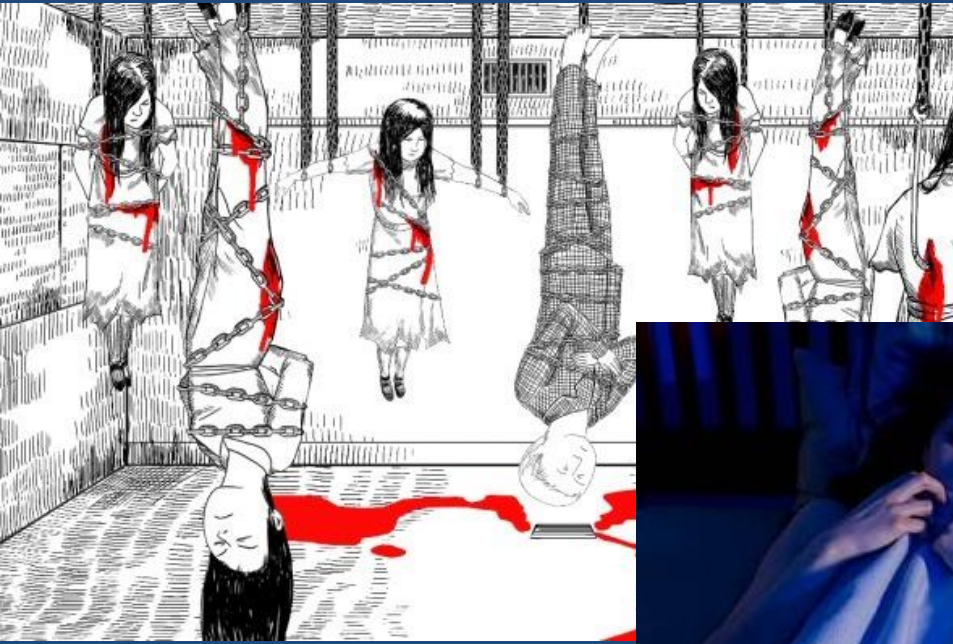
Executive Functioning



Executive functioning				
Brain fog	3%	(0–6%)	84%	(77–91%)
Unfocused concentration	4%	(0–8%)	81%	(73–89%)
Prioritizing multiple tasks	6%	(1–11%)	76%	(68–84%)
Multitasking	3%	(0–6%)	74%	(65–83%)
Mental apathy	4%	(0–8%)	72%	(63–81%)
Obsessive thoughts	4%	(0–8%)	56%	(46–66%)
Racing thoughts	1%	(0–3%)	54%	(44–64%)
Abstract reasoning	3%	(0–6%)	51%	(41–61%)
Intrusive thoughts	no data			
Time management	no data			

Imagery				
Vivid nightmares	3%	(0–6%)	38%	(28–48%)
Hypnagogic hallucinations	2%	(0–5%)	21%	(13–29%)
Illusions	2%	(0–5%)	20%	(12–28%)
Capacity for visual imagery	2%	(0–5%)	19%	(11–27%)
Intrusive aggressive images	1%	(0–3%)	19%	(11–27%)
Hallucinations (auditory, visual, olfactory, and tactile)	2%	(0–5%)	18%	(10–26%)
Intrusive images, other	1%	(0–3%)	10%	(4–16%)
Intrusive sexual images	1%	(0–3%)	6%	(1–11%)

Imagery



Intrusive Symptoms

- “Frightening, stabbing, horrific images -usually of death, dying or pain and suffering. Often gory and unreal as in a horror story. Faces mostly with blood or terror exaggerated awful expressions. Visions of stabbing or killing often of those close to you or familiar. Episodic, not continuous. Fleeting faces most usually of the worse possible situation Helpless stumped bodies perhaps close to death. These images don't seem to necessarily be associated with a particular occasion, place or time, but come and **invade the privacy of my mind.**”

Emotional				
Decreased frustration tolerance	5%	(1–9%)	80%	(72–88%)
Sudden mood swings	3%	(0–6%)	74%	(65–83%)
Anhedonia	3%	(0–6%)	64%	(55–73%)
Crying spells	0%	(0–0%)	50%	(40–60%)
Hypervigilance	1%	(0–3%)	45%	(35–55%)
Paranoia	1%	(0–3%)	26%	(17–35%)
Hyperarousal	no data			
Dissociative symptoms				
Depersonalization	2%	(0–5%)	64%	(55–73%)
Derealization	1%	(0–3%)	29%	(20–38%)
Dissociative Episodes	0%	(0–0%)	12%	(6–18%)

Behavioral				
Decreased job/school performance	2%	(0–5%)	78%	(70–86%)
Decreased social functioning	6%	(1–11%)	72%	(63–81%)
Compensatory compulsions	2%	(0–5%)	58%	(48–68%)
Dropping objects	2%	(0–5%)	52%	(42–62%)
Exaggerated startle reflex	1%	(0–3%)	49%	(39–59%)
Explosive anger	3%	(0–6%)	39%	(29–49%)
Marital/Family problems	4%	(0–8%)	39%	(29–49%)
Accident prone	4%	(0–8%)	35%	(26–44%)
Disinhibition	2%	(0–5%)	33%	(24–42%)
Suicidal	1%	(0–3%)	28%	(19–37%)
Substance abuse	1%	(0–3%)	12%	(6–18%)
Legal difficulties	1%	(0–3%)	8%	(3–13%)
Homicidal	0%	(0–0%)	1%	(0–3%)

Suicide and Lyme and Associated Diseases

- Suicidality seen in LAD contributes to causing a significant number of previously unexplained suicides and is associated with immune-mediated and metabolic changes resulting in psychiatric and other symptoms which are possibly intensified by negative attitudes about LAD from others. Some LAD suicides are associated with being overwhelmed by multiple debilitating symptoms, and others are impulsive, bizarre, and unpredictable.
- Negative attitudes about LAD from family, friends, doctors, and the health care system may also contribute to suicide risk. By indirect calculations, it is estimated there are possibly over 1,200 LAD suicides in the US per year.

Lyme, Opioid, Substance Use & Death from Overdoses

- Lyme can cause chronic pain & chronic anxiety with increased opioids and benzodiazepine use. [1,2]
- Some LYD/TBD patients self-medicate, become dependent upon and engage in drug-seeking behavior with benzodiazepines, hypnotics, alcohol, pain medication and marijuana. [3]
- Some die from overdoses. [3]

[1] Saito K, Takanishi T, Okuda Y, Kitajima T. [Long-term administration of large doses of oral morphine for chronic pain]. Masui. 1998 Jun;47(6):749-50.

[2] Zimering JH, Williams MR, Eiras ME, Fallon BA, Logigian EL, Dworkin. Pain. 2014. Aug;155(8):1435-8.

[3] Bransfield RC. Lyme/Tick-Borne Diseases and Addictive Disorders. ILADS Washington, 2014.

Psychiatric Syndromes



Psychiatric syndromes				
Depression	9%	(3–15%)	79%	(71–87%)
Generalized anxiety disorder	3%	(0–6%)	53%	(43–63%)
Panic disorder	2%	(0–5%)	49%	(39–59%)
Social anxiety disorder	7%	(2–12%)	36%	(27–45%)
Obsessive compulsive disorder	2%	(0–5%)	24%	(16–32%)
Posttraumatic stress disorder	6%	(1–11%)	16%	(9–23%)
Rapid cycling bipolar	3%	(0–6%)	11%	(5–17%)

Fatigue & Sleep Disorders



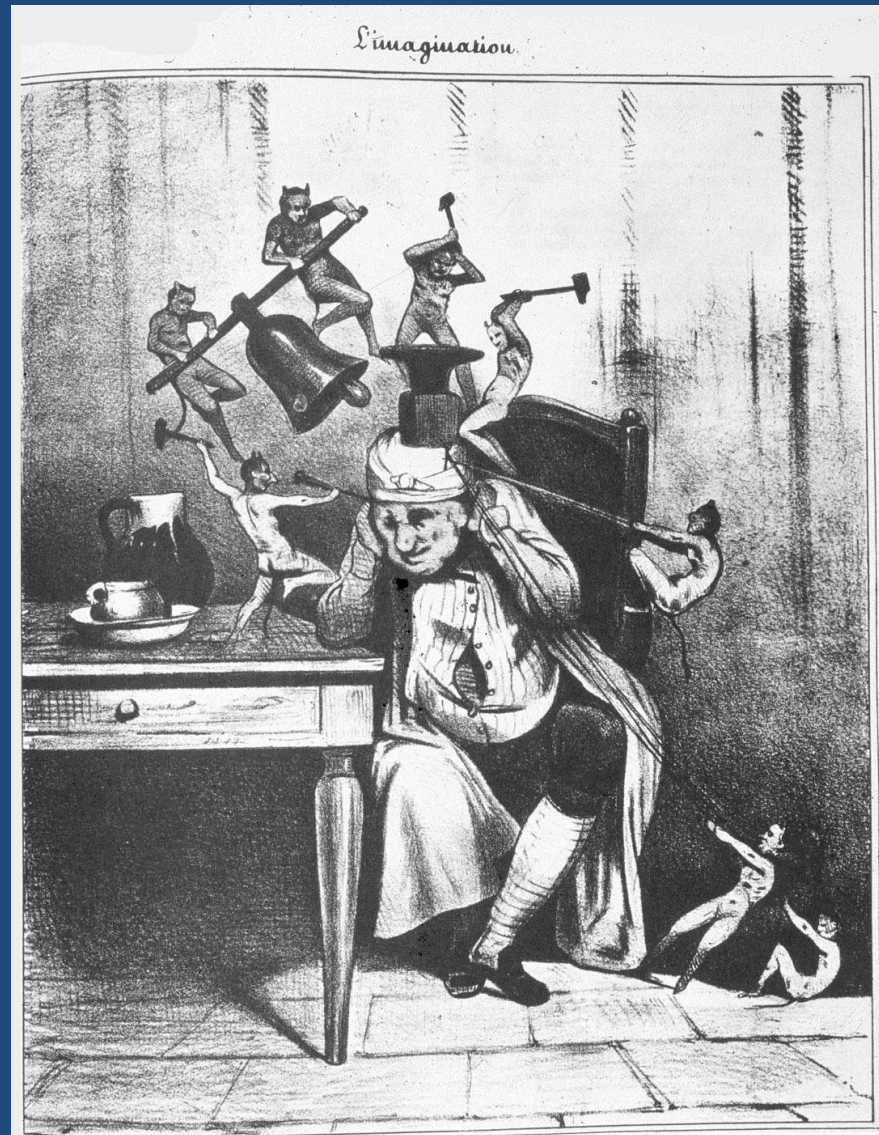
Vegetative				
Energy				
Fatigue	1%	(0–3%)	76%	(68–84%)
Sleep				
Non-restorative sleep	4%	(0–8%)	76%	(68–84%)
Insomnia				
Hypersomnia	2%	(0–5%)	73%	(64–82%)
Insomnia, mid	1%	(0–3%)	72%	(63–81%)
Insomnia, initial	5%	(1–9%)	70%	(61–79%)
Insomnia, late	1%	(0–3%)	58%	(48–68%)
Loss of circadian rhythm	5%	(1–9%)	44%	(34–54%)
Delayed sleep phase disorder	no data			
Sleep apnea, central	no data			
Sleep apnea, obstructive	no data			
Sleep paralysis	no data			
Cataplexy	no data			
Narcolepsy	no data			

Eating				
Anorexia	1%	(0–3%)	45%	(35–55%)
Weight loss	1%	(0–3%)	45%	(35–55%)
Non-appetite over-eating	2%	(0–5%)	34%	(25–43%)
Weight gain without increased food intake	1%	(0–3%)	27%	(18–36%)
Weight gain with increased food intake	2%	(0–5%)	22%	(14–30%)

Sexual functioning				
Decreased libido	4%	(0–8%)	60%	(50–70%)
Decreased arousal	1%	(0–3%)	42%	(32–52%)
Decreased orgasm	2%	(0–5%)	41%	(31–51%)
Increased libido	1%	(0–3%)	9%	(3–15%)
Altered sexual imagery	0%	(0–0%)	3%	(0–6%)

Temperature control				
Intolerance to cold	2%	(0–5%)	64%	(55–73%)
Body temperature fluctuations	3%	(0–6%)	63%	(54–72%)
Night sweats	2%	(0–5%)	60%	(50–70%)
Chills	2%	(0–5%)	59%	(49–69%)
Intolerance to heat	2%	(0–5%)	58%	(48–68%)
Decreased body temperature	5%	(1–9%)	52%	(42–62%)
Flushing	3%	(0–6%)	49%	(39–59%)
Low grade fevers	1%	(0–3%)	47%	(37–57%)

Headaches



Le mal de tête.

Holo! holo!... pan! pan!... dindrelindin— dindrelindin... holo! holo! holo!!

Neurological				
Headache (neurological and musculoskeletal)				
Headache	3%	(0–6%)	68%	(59–77%)
Tension	2%	(0–5%)	57%	(47–67%)
Cervical radiculopathy	0%	(0–0%)	43%	(33–53%)
Temporal mandibular joint	2%	(0–5%)	41%	(31–51%)
Sinus	5%	(1–9%)	41%	(31–51%)
Migraine	4%	(0–8%)	33%	(24–42%)
Cluster	0%	(0–0%)	10%	(4–16%)
Coital cephalgia	0%	(0–0%)	4%	(0–8%)
Thunderclap	no data			

Cranial Nerves I-XII



Cranial nerves				
I Olfactory: loss of smell, altered taste	2%	(0–5%)	22%	(14–30%)
II Optic (and ophthalmologic)				
Photophobia to bright light	3%	(0–6%)	61%	(51–71%)
Floaters	1%	(0–3%)	56%	(46–66%)
Blurred vision	2%	(0–5%)	50%	(40–60%)
Sensitivity to fluorescent and flicker	3%	(0–6%)	48%	(38–58%)
Eye pain	2%	(0–5%)	36%	(27–45%)
Night blindness	4%	(0–8%)	36%	(27–45%)
Dry eyes	0%	(0–0%)	32%	(23–41%)
Flashes	0%	(0–0%)	23%	(15–31%)
Conjunctivitis	0%	(0–0%)	19%	((11–27%)
Peripheral shadows	2%	(0–5%)	18%	(18–26%)
Blind spots	1%	(0–3%)	12%	(6–18%)
Optic neuritis	0%	(0–0%)	2%	(0–5%)
Papilledema	0%	(0–0%)	1%	(0–3%)
Iritis	0%	(0–0%)	1%	(0–3%)
Panopsia	no data			

III, IV, VI Double vision or eye drifts when tired, ptosis	2%	(0–5%)	36%	(27–45%)
V Sensory loss, pain	0%	(0–0%)	27%	(18–36%)
VII Bell’s palsy	2%	(0–5%)	16%	(9–23%)
VIII Dizziness	2%	(0–5%)	53%	(43–63%)
Tinnitus	1%	(0–3%)	51%	(41–61%)
Motion sickness	9%	(3–15%)	40%	(30–50%)
Vertigo	1%	(0–3%)	29%	(20–38%)
Hearing loss	1%	(0–3%)	26%	(17–35%)
Tullio’s	0%	(0–0%)	12%	(6–18%)
Mal de débarquement	no data			
IX, X Episodic loss of speech, choking on food, difficulty swallowing	0%	(0–0%)	36%	(27–45%)
XI. Sternocleidomastoid and trapezius pain and/or paresis	0%	(0–0%)	44%	(34–54%)
XII. Tongue deviates to side	0%	(0–0%)	5%	(1–9%)

Seizures

Partial

2%

(0–5%)

8%

(3–13%)

Grand mal

1%

(0–3%)

4%

(0–8%)

Other neurological				
Tingling	1%	(0–3%)	71%	(62–80%)
Paresis	2%	(0–5%)	66%	(57–75%)
Numbness	1%	(0–3%)	59%	(49–69%)
Twitching	1%	(0–3%)	56%	(46–66%)
Muscle tightness	0%	(0–0%)	56%	(46–66%)
Restless leg	5%	(1–9%)	50%	(40–60%)
Sensory loss	1%	(0–3%)	40%	(30–50%)
Tremor	3%	(0–6%)	40%	(30–50%)
Myoclonic jerks	1%	(0–3%)	38%	(28–48%)
Burning	1%	(0–3%)	36%	(27–45%)
Static electric sensation	0%	(0–0%)	35%	(26–44%)
Formication, crawling sensation	0%	(0–0%)	35%	(26–44%)
Stabbing sensation	0%	(0–0%)	28%	(19–37%)
Romberg positive	1%	(0–3%)	21%	(13–29%)
Herniated disc(s)	4%	(0–8%)	14%	(7–21%)
Ataxia	1%	(0–3%)	6%	(1–11%)
Other neurological	1%	(0–3%)	6%	(1–11%)
Extrapyramidal symptoms	0%	(0–0%)	3%	(0–6%)
Tourette’s	0%	(0–0%)	2%	(0–5%)
Torticollis	0%	(0–0%)	1%	(0–3%)
Spasticity	1%	(0–3%)	1%	(0–3%)
Sensation of wetness	no data			
Sensation of vibration	no data			

Musculoskeletal				
Joint pain, swelling, tightness, and crepitation (specify joints)	2%	(0–5%)	81%	(73–89%)
Myalgia	1%	(0–3%)	54%	(44–64%)
Chondritis (ear, nose, and costochondral)	0%	(0–0%)	38%	(28–48%)
Fibromyalgia	1%	(0–3%)	36%	(27–45%)
Plantar fasciitis	0%	(0–0%)	33%	(24–42%)
Epicondylitis	2%	(0–5%)	20%	(12–28%)
Tendonitis	3%	(0–6%)	17%	(10–24%)
Carpal tunnel	1%	(0–3%)	15%	(8–22%)
Bone thinning/fractures	1%	(0–3%)	7%	(2–12%)
Periostitis (tibia, ribs, iliac crest, sternum, clavicle,	4%	(0–8%)	7%	(2–12%)
Deep bone pain	no data			
Foot pain	no data			
Ehlers-Danlos	no data			

Cardiovascular



Cardiovascular				
Racing pulse	0%	(0–0%)	48%	(38–58%)
Chest pain	2%	(0–5%)	39%	(29–49%)
Episodes rapid and slow heart rate	0%	(0–0%)	34%	(25–43%)
Mitral valve prolapse	4%	(0–8%)	20%	(12–28%)
Murmur	7%	(2–12%)	16%	(9–23%)
Hypertension	2%	(0–5%)	15%	(8–22%)
Postural orthostatic hypotension	0%	(0–0%)	12%	(6–18%)
Heart block	2%	(0–5%)	11%	(5–17%)
Hypertensive crisis	1%	(0–3%)	3%	(0–6%)
Cardiomyopathy	0%	(0–0%)	2%	(0–5%)
Pericarditis	0%	(0–0%)	1%	(0–3%)
Postural orthostatic tachycardia	no data			

Upper respiratory, dental, and pulmonary				
Shortness of breath	1%	(0–3%)	43%	(33–53%)
Swollen glands	0%	(0–0%)	41%	(31–51%)
Allergies	7%	(2–12%)	35%	(26–44%)
Tooth pain	0%	(0–0%)	32%	(23–41%)
Cough	1%	(0–3%)	28%	(19–37%)
Periodontal disease	0%	(0–0%)	19%	(11–27%)
Asthma	4%	(0–8%)	14%	(7–21%)
Nose bleeds	1%	(0–3%)	7%	(2–12%)
Air hunger	no data			

Gastrointestinal

Irritable bowel	6%	(1–11%)	50%	(40–60%)
Abdominal bloating	1%	(0–3%)	42%	(32–52%)
Upper GI distress	6%	(1–11%)	25%	(17–33%)
Inflammatory bowel	0%	(0–0%)	2%	(0–5%)
Cholecystitis	0%	(0–0%)	2%	(0–5%)
Gastroparesis	0%	(0–0%)	1%	(0–3%)
Hepatitis	0%	(0–0%)	1%	(0–3%)
Pancreatitis	0%	(0–0%)	1%	(0–3%)
Gall stones	0%	(0–0%)	1%	(0–3%)
Non-calculous cholecystitis	no data			
Cyclic vomiting	no data			

Genitourinary				
Spastic bladder	1%	(0–3%)	47%	(37–57%)
Menstrual irregularity	3%	(0–6%)	30%	(21–39%)
Genital pain	1%	(0–3%)	27%	(18–36%)
Breast tenderness, pain	1%	(0–3%)	24%	(16–32%)
Urinary incontinence	1%	(0–3%)	18%	(10–26%)
Recurrent UTI	1%	(0–3%)	11%	(5–17%)
Lactation	0%	(0–0%)	8%	(3–13%)
Anesthesia of genitalia	0%	(0–0%)	6%	(1–11%)
Atrophy of genitalia	0%	(0–0%)	3%	(0–6%)
Interstitial cystitis	0%	(0–0%)	1%	(0–3%)

Other				
Hair loss	2%	(0–5%)	47%	(37–57%)
Chronic pain	0%	(0–0%)	41%	(31–51%)
Alcohol intolerance	3%	(0–6%)	41%	(31–51%)
Ecchymosis	1%	(0–3%)	34%	(25–43%)
Multiple chemical sensitivity	2%	(0–5%)	25%	(17–33%)
Thyroid dysfunction	1%	(0–3%)	20%	(12–28%)
Hypoglycemia	2%	(0–5%)	20%	(12–28%)
Ankle edema	1%	(0–3%)	20%	(12–28%)
Adrenal insufficiency	0%	(0–0%)	10%	(4–16%)
Vasculitis	0%	(0–0%)	5%	(1–9%)
Wilson syndrome	0%	(0–0%)	4%	(0–8%)
Splenomegaly	0%	(0–0%)	4%	(0–8%)
Lymphocytoma	3%	(0–6%)	3%	(0–6%)
Acrodermatitis chronicum atrophicans	0%	(0–0%)	1%	(0–3%)
Erythema of palms and soles	0%	(0–0%)	0%	(0–0%)
Mold sensitivity	no data			
Bartonella tracks	no data			

Symptom patterns				
Progression of symptoms	0%	(0–0%)	86%	(79–93%)
Fluctuation of symptoms	0%	(0–0%)	82%	(74–90%)
Stress increased symptoms	0%	(0–0%)	77%	(69–85%)
Herxheimer reaction	0%	(0–0%)	73%	(64–82%)
Antibiotic reduce symptoms	0%	(0–0%)	72%	(63–81%)
A 28 day or longer symptom cycle	0%	(0–0%)	43%	(33–53%)

Bartonella striae

18 y.o with Bartonella



Findings Compared to Other Studies



Psychiatric Syndromes	Post-Infection	Other Lyme Patient Studies (Reference [9])
Sustained attention	84%	(44%, 91%)
Distracted by frustration	79%	(82%)
Allocation of attention	66%	(98%)
Hypersensitivity to sound	66%	(58%, 88%)
Hypersensitivity to light	63%	(74%)
Working memory	78%	(98%)
Recent memory	77%	(94%)
Fluency of speech	62%	(46%, 75%, 79%, 82%)
Reading comprehension	59%	(79%)
Auditory comprehension	49%	(73%)
Brain fog	84%	(88%)
Abstract reasoning impairments	51%	(60%, 93%)

Vivid nightmares	38%	(58%, 70%, 82%)
Intrusive aggressive images	19%	(16%, 62%),
Intrusive sexual images	6%	(26%, 16%, 6%)
Hallucinations	18%	(42%, 45%, 47%)
Decreased frustration tolerance	80%	(80%, 98%)
Sudden mood swings	74%	(15%, 47%, 66%, 85%, 93%, 94%)
Anhedonia	64%	(56%, 59%, 71%, 72%, 85%)
Exaggerated startle reflex	49%	(66%, 75%, 84%)
Hypervigilance	45%	(35%, 54%, 55%, 69%, 72%, 84%)
Disinhibition	33%	(20, 32%, 35%, 58%, 80%, 84%)
Paranoia	26%	(10%, 25%, 36%, 62%, 76%, 88%)
Dissociative episodes	12%	(0%, 5%, 12%, 18%, 25%, 38%)

Dysphoria/depression	79%	(37%, 37%, 50%, 51%, 64%, 70%, 76%, 80%, 97%, 98%, 100%)
Generalized anxiety disorder	55%	(50%, 65%, 70%, 86%, 90%)
Panic disorder	49%	(35%, 50%, 54%, 80%, 82%)
Social anxiety disorder	36%	(20%, 55%, 65%, 66%, 68%, 70%)
Obsessive compulsive disorder	24%	(32%, 42%, 44%, 51%, 84%)
Posttraumatic stress disorder	16%	(15%, 15%, 24%, 30%, 36%)
Rapid cycling bipolar	11%	(5%, 10%, 19%, 20%, 21%, 28%)
Depersonalization	64%	(40%, 52%, 55%, 71%, 76%)
Derealization	29%	(24%, 31%, 37%)
Decreased school/job performance	78%	(94%)
Decreased social functioning	72%	(91%)
Explosive anger	39%	(52%, 72%, 91%)

Marital/family problems	39%	(48%, 80%)
Suicidal	28%	(20%, 43%, 46%, 63% 72%, 98%)
Substance abuse	12%	(5%, 10%, 10%, 28%, 33%)
Legal problems	8%	(4%, 42%)
Homicidal	1%	(9.6%)
Fatigue	73%	(85%, 85%, 92%, 97%)
Irritable bladder	47%	(44%, 50%, 56%)
Genital pain	26%	(24%, 28%, 32%)
Decreased libido	22%	(38%, 44%, 62%, 80%)
Urinary incontinence	18%	(18%, 28%, 38%)
Chronic pain	41%	(35%, 57%, 65%)
Alcohol intolerance	11%	(24%, 34%, 44%)

Screening questions

- Do you live, vacation, or engage in occupational or other activities in areas that may expose you to ticks?
- Have family members, neighbors, or the family dog been infected?
- Is there a history of a tick bite, possibly with a flu-like illness and/or a bull's eye or other rash?
- Is there a point at which your health declined, followed by a fluctuating progression and development of multi-systemic symptoms, including cognitive, psychiatric, neurological, and somatic symptoms adversely impacting school, social life, family life?
- Have you ever been treated for Lyme disease, suspected you had Lyme disease but was told it was ruled out?
- Have antibiotics ever caused a sudden worsening followed by an improvement of symptoms?"

Reduced set of 24 highly significant impairments. Suitable for pre-evaluation by patients

- Concentration impairment
- Short term memory problems
- Word finding difficulty
- Name recall difficulty
- Fluency of speech difficulties
- Brain fog
- Sudden mood swings
- Decreased social functioning
- Decreased job/school performance
- Depression
- Fatigue
- Insomnia
- Night sweats
- Low body temperature
- Headache
- Blurred vision
- Floaters
- Tinnitus (ringing in the ears)
- Sensitive to sound
- Dizziness
- Numbness
- Tingling
- Joint pain, swelling
- Fluctuation of symptoms
- Stress increases symptoms

61 Most Common Symptoms



Common symptoms in which $\geq 50\%$ or more have the clinical finding I

- **Attention span**
- Sustained attention
- Distracted by frustration
- Allocation of attention
- Hypersensitivity to sound
- Hypersensitivity to light
- **Memory**
- Working memory
- Recent memory
- Remote memory
- **Memory retrieval**
- Words
- Names
- Numbers
- **Processing**
- Fluency of speech
- Reading comprehension
- Spelling errors
- Word substitution errors
- Optic ataxia
- Calculation
- **Executive functioning**
- Brain fog
- Unfocused concentration
- Prioritizing multiple tasks
- Multitasking
- Mental apathy
- **Emotional**
- Decreased frustration tolerance
- Sudden mood swings

Common symptoms in which $\geq 50\%$ or more have the clinical finding II

- **Behavioral**
- Decreased job/school performance
- Decreased social functioning
- Dropping objects
- **Psychiatric syndromes**
- Depression
- Generalized anxiety disorder
- **Energy**
- Fatigue
- **Sleep**
- Non-restorative sleep
- **Insomnia**
- Hypersomnia
- Insomnia, mid
- Insomnia, initial
- Insomnia, late
- **Sexual functioning**
- Decreased libido
- **Temperature control**
- Intolerance to cold
- Body temperature fluctuations
- Night sweats
- Chills
- Intolerance to heat
- Decreased body temperature

Common symptoms in which $\geq 50\%$ or more have the clinical finding III

- **Neurological**
- Headache (neurological & other)
- Tension, pressure headache
- **Cranial nerves**
- II Optic/ophthalmologic
- Photophobia to bright light
- Floaters
- Dizziness
- VIII Tinnitus
- Blurred vision
- **Other neurological**
- Tingling
- Paresis
- Numbness
- Twitching
- Muscle tightness
- **Musculoskeletal**
- Joint pain, swelling, tightness, and crepitation (specify joints)
- Myalgia
- **Gastrointestinal**
- Irritable bowel
- **Symptom patterns**
- Progression of symptoms
- Fluctuation of symptoms
- Stress increased symptoms
- Herxheimer reaction
- Antibiotic reduce symptoms

Coinfection Screen

- Bartonella and “Bartonella-Like Organisms”
- Babesia Species
- Ehrlichia/Anaplasma
- DNA Viruses (HHV-6, EBV, CMV)
- Mycoplasma

Osler: Clinical Experience in Medicine

Sir William Osler, Father of American Medicine and Founder of Johns Hopkins School of Medicine, recognized the value of combining clinical experience with the best evidence available.

- "To treat patients without reading the literature is like sailing without maps; medicine without treating patients is like never going to sea at all."
- "If you listen long enough, the patient will give you the diagnosis."
- "There is no more difficult art to acquire than the art of observation."
- "The good observer is not limited to the large hospital."

Osler: Clinical Expertise in Medicine II

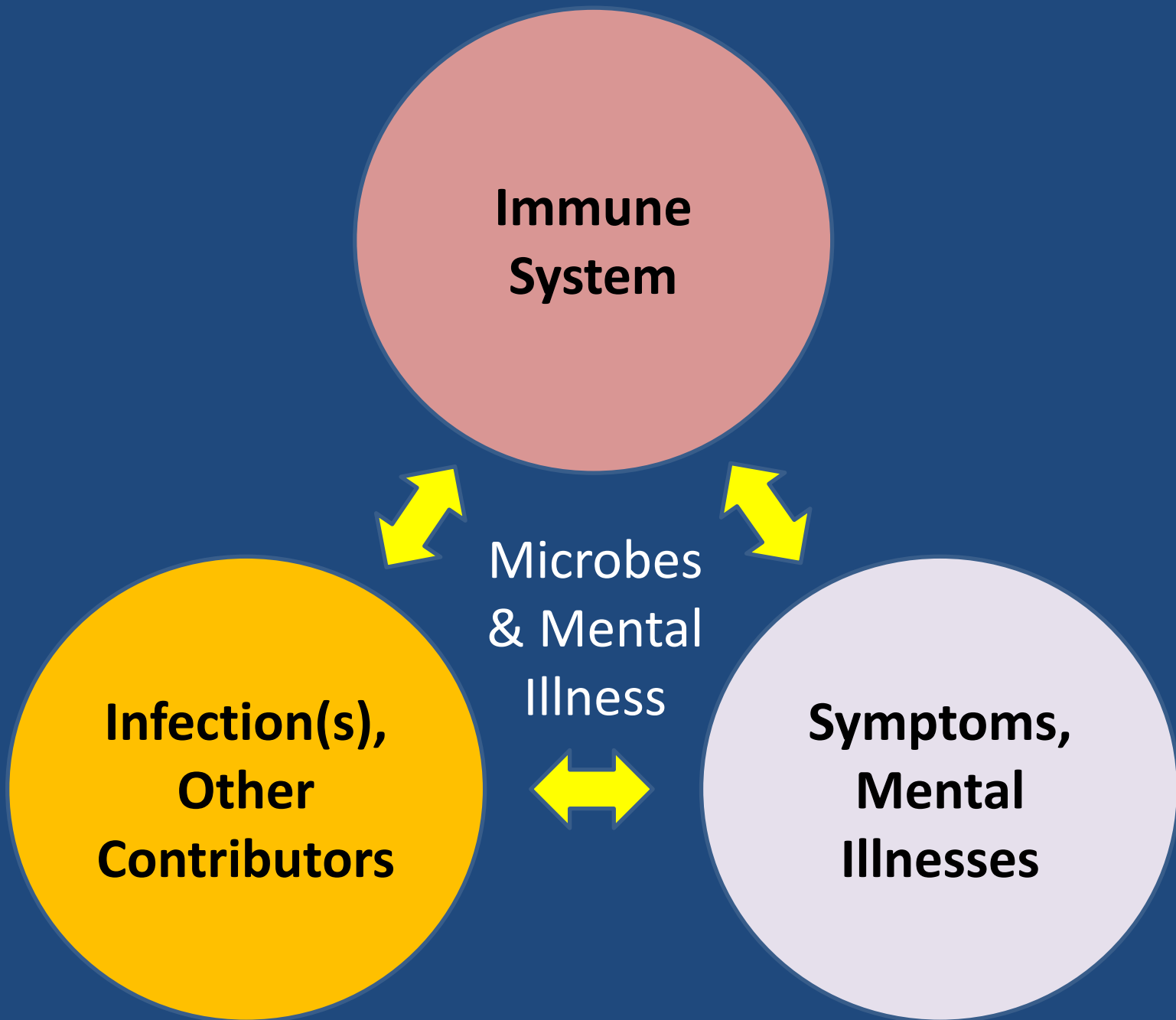
- "The practice of medicine is an art, not a trade, a calling, not a business; a calling in which your heart will be exercised equally with your head."
- "The practice of medicine is an art, based upon science."
- "There is no more difficult art to acquire than the art of observation, and for some men it is quite as difficult to record an observation in brief and plain language."
- "In taking histories, follow each line of thought; ask no leading questions; never suggest. Give the patient's own words in the complaint."
- "Learn to see, learn to hear, learn to feel, learn to smell and know that by practice alone can you become experts."

Osler: Clinical Expertise in Medicine III

- "Medicine is learned by the bedside and not in the class room. Let not your conception of manifestations of disease come from work heard in the lecture room or read from the book: see and then research, compare and control. But see first."
- "Observations are made with accuracy and care, no pains are spared, nothing is thought a trouble in the investigation of a problem. The facts are looked at in connection with similar ones, their relation to others is studied, and the experiences of the recorder are compared with that of others who have worked upon the question."
- "Our profession is to honor and patient to serve above all."

Treatment





Strategizing Treatment

- What causes a condition may be different from what perpetuates a condition.
- Chronic stress, non-restorative sleep and psychiatric symptoms often impede recovery.
- Treating symptoms that impede recovery and impair functioning with psychotropics can assist recovery.
- How do the symptoms interact with each other?

What Symptoms Impede Recovery?

- Non-restorative sleep, fatigue, cognitive impairments (the terrible triad).
- Emotional symptoms: depression, anxiety, depersonalization, mood swings, psychosis
- Chronic pain: headaches, neuropathy, radiculopathy, musculoskeletal
- Somatic symptoms: dysautonomia, GI, GU, cardiovascular
- Addiction

Sleep & Disease Progression

**Non-Restorative
Sleep**



Fatigue

**Cognitive
Impairments**

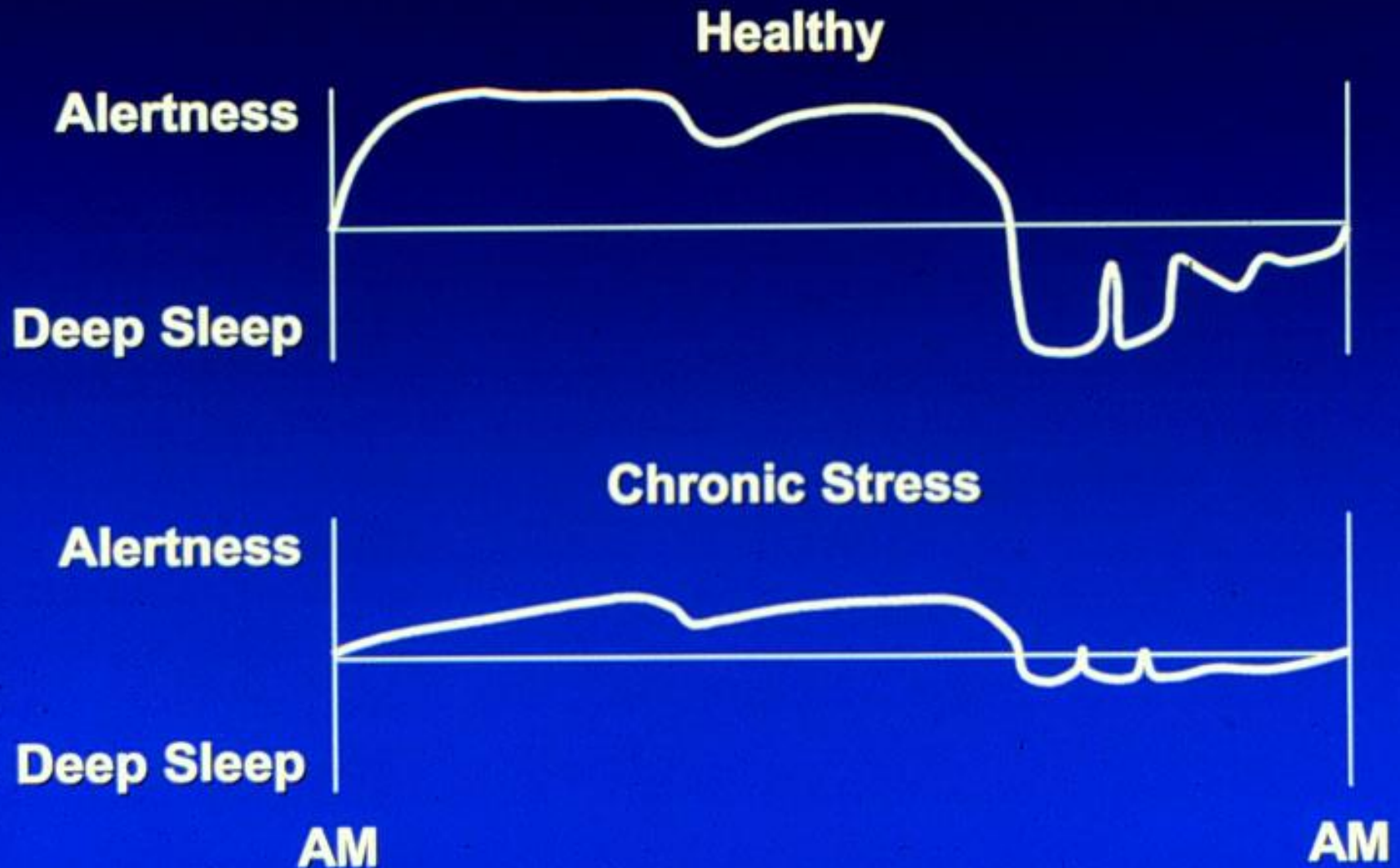
**Emotional
Impairments**

**Pain
Sensitivity**

**Endocrine
Dysfunction**

**Immune
Dysfunction**

Circadian Rhythms



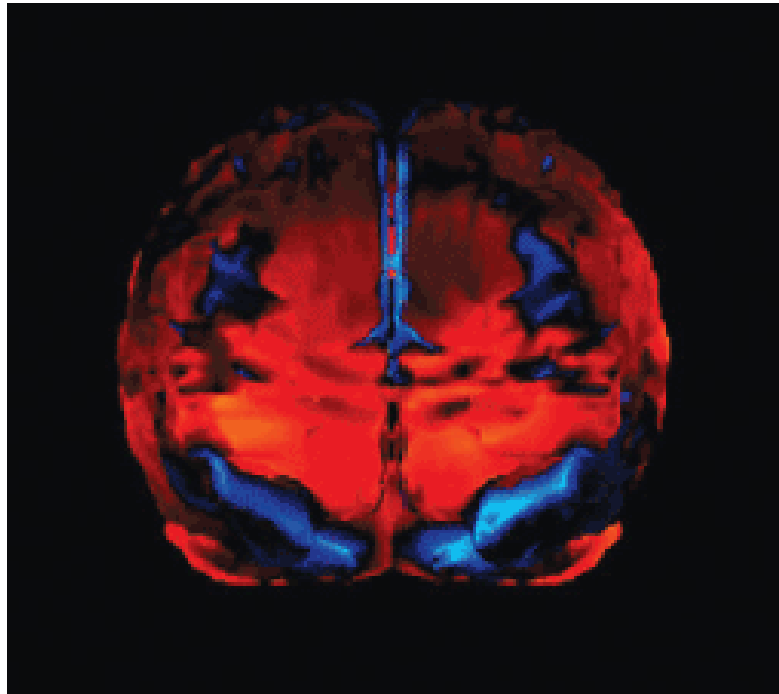
Clinical Assessment

- **Do you feel well rested in the morning?**
- **Do you have difficulty falling asleep?**
 - Difficulty shutting off your brain: silent episodic random thinking, worry, obsessing, racing thoughts, creative thoughts?
 - Difficulty calming down your emotions?
 - Hypervigilance? Insomnia phobia?
 - Difficulty relaxing physically? Restless leg?
 - Difficulty feeling sleepy?
- **Do you have difficulty staying asleep?**
 - Nightmares, PNLN, urinating, breathing, cardiac, pain, temperature control, alcohol, addiction, hyperarousal?
- **Do you have early morning awakening?**

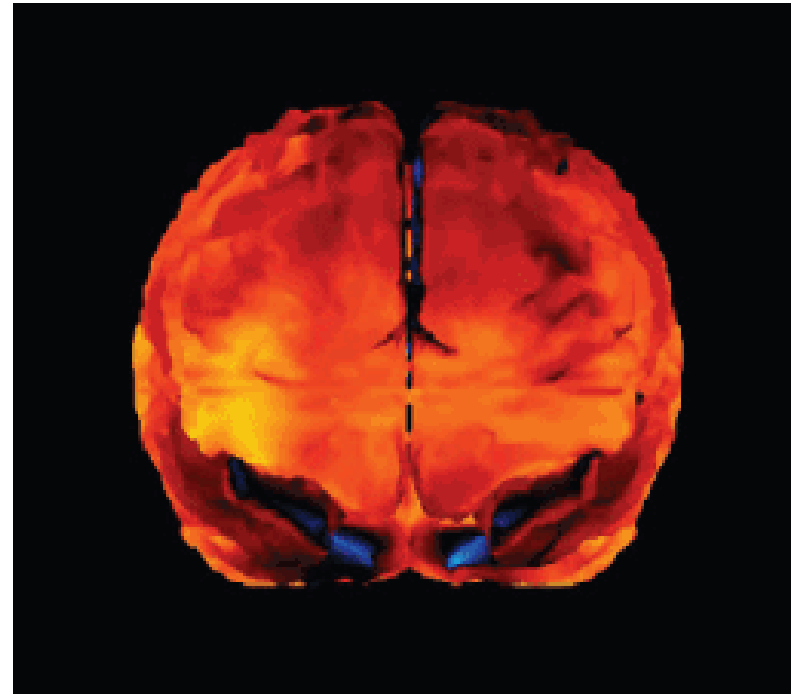
Figure

SPECT images of the brain before and after treatment with ceftriaxone

Before



After



Initial SPECT scan shows extensive hypoperfusion, predominantly in the frontal and temporal lobes and to a lesser degree in the parietal and occipital lobes. After treatment, there is marked improvement of the hypoperfusion pattern in the temporal, frontal, and parietal lobes; only small areas of the hypoperfusion pattern remain.

SPECT, single photon emission CT.

An International Clinical Perspective of Lyme Disease



Pt1: <https://youtu.be/fPpS7cODPX0>

Pt2: <https://youtu.be/0DZOcufFMUE?feature=shared>

THANK YOU FOR YOUR ATTENTION



ANY QUESTIONS?