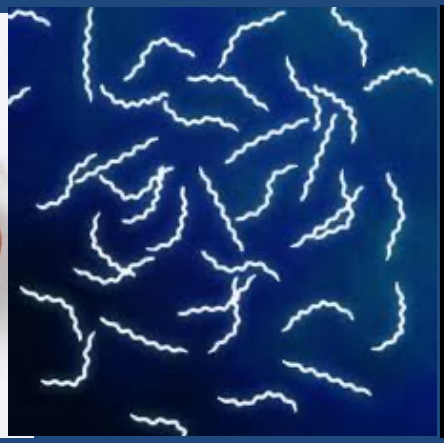
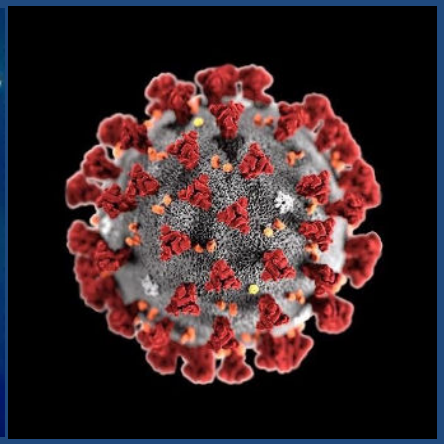
Chronic Neuropsychiatric Symptoms from Lyme/Tick-Borne Disease & COVID-19


Robert C Bransfield, MD, DLFAPA

Lyme Disease UK

March 12, 2021

Articles on Tick-Borne Disease and Autism Spectrum Disorders

- Bransfield RC, Fallon BA, Raxlen B, Shepler L, Sherr VT. A Modest Proposal, *Psychiatric News*, 31(18):16 (1998)
- Bransfield RC, Wulfman JS, Harvey WT, Usman AI. The association between tick-borne infections, Lyme borreliosis and autism spectrum disorders *Medical Hypotheses*. 70(5):967-974 (2008)
- Bransfield RC. Preventable cases of autism: relationship between chronic infectious diseases and neurological outcome *Pediatric Health*. 3(2):125-140. (2009)
- Bransfield R. Chronic Infections Contributing to Autism Spectrum Disorders. Neurology Psychiatry & Brain Research. Universitatsverlag. Heidelberg. 16, Suppl 1 (2009)
- Kuhn M, Grave S, Bransfield R, Harris S. Long term antibiotic therapy may be an effective treatment for children co-morbid with Lyme disease and autism spectrum disorder. *Med Hypotheses.* 78(5):606-15 (2012)
- Bransfield R. Kuhn M. Autism and Lyme Disease. JAMA. 310(8). (2013)
- Kuhn M, Bransfield R. Divergent opinions of Lyme disease diagnosis and implications for children co-morbid with Autism Spectrum Disorder. *Med Hypotheses.* 2014.

- Kuhn M, Grave S, Bransfield R, Harris S. Long term antibiotic therapy may be an effective treatment for children co-morbid with Lyme disease and autism spectrum disorder. *Med Hypotheses.* 78(5):606-15 (2012)

TBD Psychoimmunology Articles

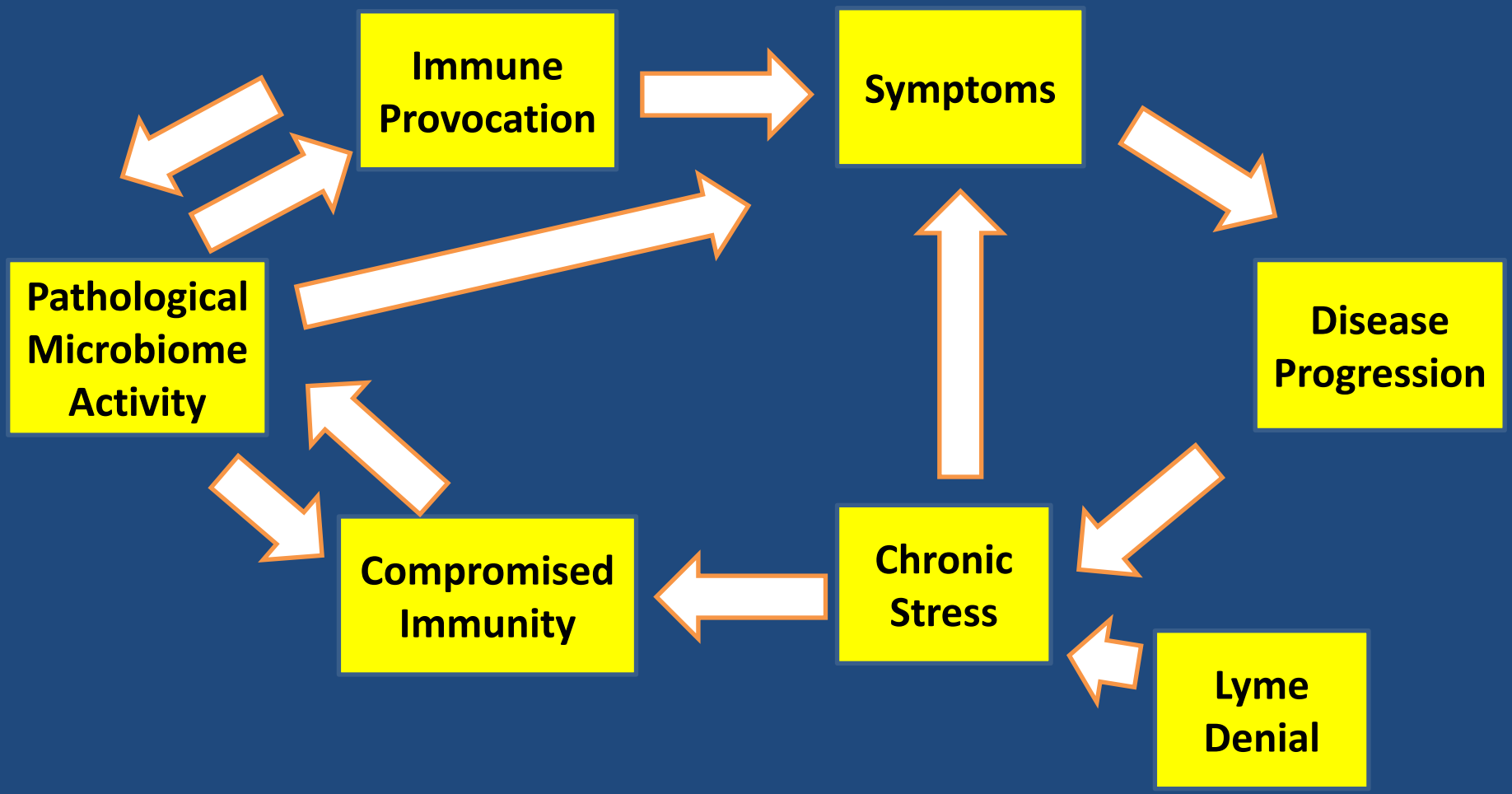
- Bransfield RC. Relationship of Inflammation and Autoimmunity to Psychiatric Sequelae in Lyme Disease. *Psychiatric Annals*. (2012) 42(9):337-341.
- Bransfield RC. The Psychoimmunology of Lyme/Tick-Borne Diseases and its Association with Neuropsychiatric Symptoms. The Open Neurology Journal. (2012) *6,* (Suppl 1-M3) 88-93.
- Bransfield RC. The psychoimmunology of Lyme and associated diseases. Neurology, Psychiatry & Brain Research. (2014) 20(1);8.

PET Imaging of Microglia Activation & Infection in Neuropsychiatric Disorders with Potential Infectious Origin

- The central nervous system (CNS) is an immune privileged location for the possible sequestration of latent infections. The presence of pathogens may be involved in the etiology of neuropsychiatric diseases by inducing classical inflammatory responses, hypersensitivity, cellular toxicity, or direct alteration of cellular processes. Infection, persistence, and activation of microbes in the brain are not easy to assess in vivo, and the relation with clinical disease is very difficult to prove. An elegant way to determine an inflammatory response in the brain in vivo is by molecular imaging of microglia activation with [11C]PK11195 and other radiopharmaceuticals that target the translocator protein (TSPO). In this chapter, we summarize the neuroimaging studies that target the TSPO in patients with neuropsychiatric diseases, and we propose positron emission tomography (PET) imaging with radiopharmaceuticals that target the metabolism of infectious agents directly.

Hans Christiaan Klein, Lot de Witte, Robert Bransfield, and Peter Paul De Deyn. In book: PET and SPECT in Neurology. © Springer Nature Switzerland AG 2021 873 R. A. J. O. Dierckx et al. (eds.). December 2020.

Disease Progression



Suicide

Suicide & Lyme & 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.

Bransfield RC. Neuropsychiatr Dis Treat. 2017 Jun 16;13:1575-1587.

Violence

Aggressiveness, Violence, Homicidality, Homicide and Lyme Disease

- Most aggression with LD was impulsive, sometimes provoked by intrusive symptoms, sensory stimulation or frustration and was invariably bizarre and senseless.
- *Conclusion:* LD and the immune, biochemical, neurotransmitter, and neural circuit reactions to them can cause impairments associated with violence. Many LD patients have no aggressiveness tendencies or only mild degrees of low frustration tolerance and irritability and pose no danger, however, a lesser number experience explosive anger, a lesser number experience homicidal thoughts and impulses and much lesser number commit homicides. Since such large numbers are affected, this very small percent of can be highly significant. Much of the violence associated with LD can be avoided with better prevention, diagnosis and treatment of LD.

Bransfield RC. Aggressiveness, Violence, Homicidality, Homicide and Lyme Disease

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.”

Intrusive Symptoms and Infectious Encephalopathies

- Intrusive symptoms occur in 34% of Late Stage Tick Borne Disease patients which can contribute to causing OCD, PTSD, obsessiveness, suicidal & violent tendencies. Trauma from chronic illness and other causes can further exacerbate symptoms. Antibiotics, anti-inflammatory strategies, psychotherapy and psychotropics can reduce symptoms and be lifesaving for some patients.

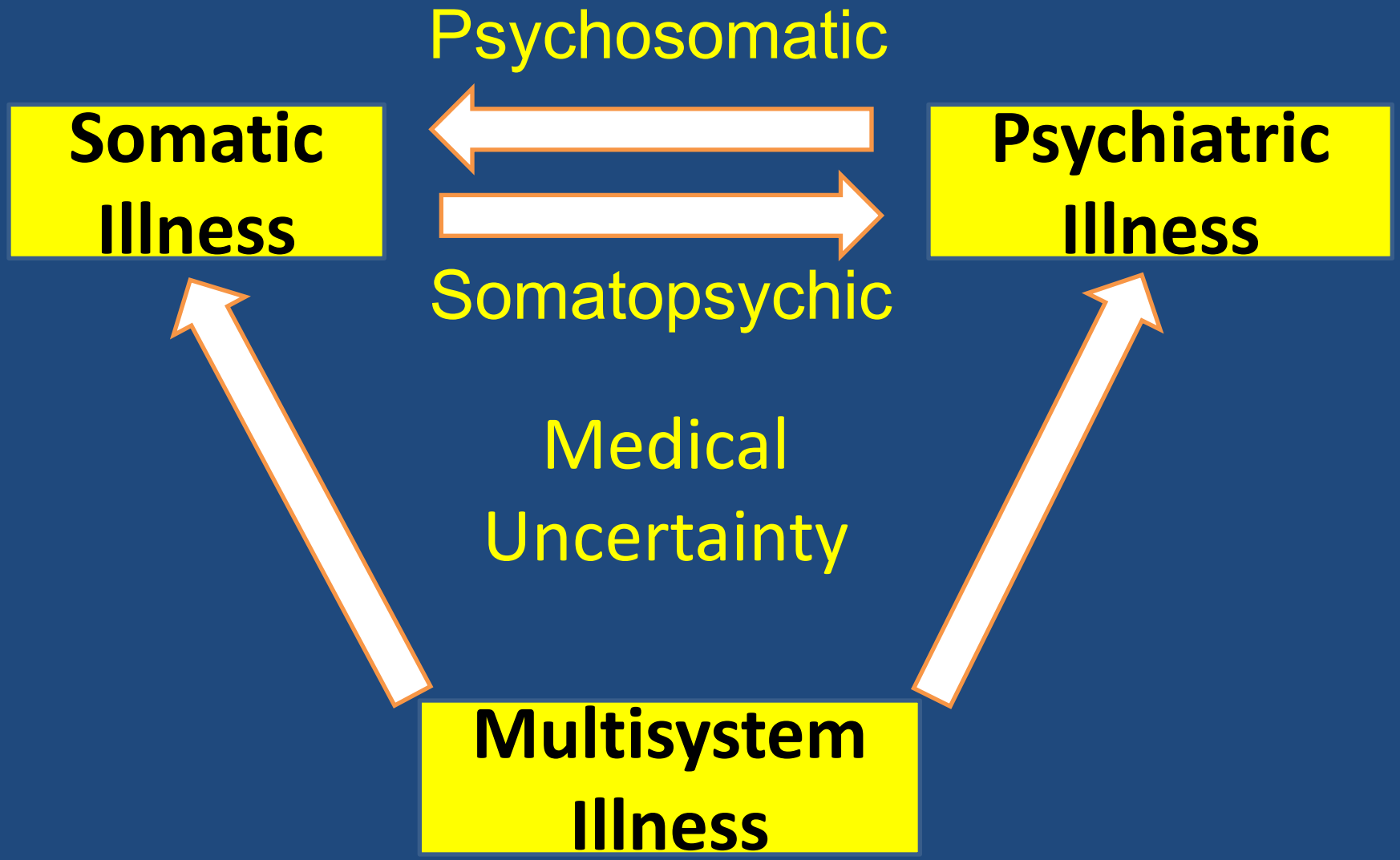
Bransfield.13th Psychoimmunology Expert Meeting Neurol, psych brain research 22 (2016) 1–25

doi: 10.3390/healthcare6030104

Neuropsychiatric Lyme Borreliosis: An Overview with a Focus on a Specialty Psychiatrist's Clinical Practice

- LB result in a gradually developing spectrum of neuropsychiatric symptoms which may include developmental disorders, autism spectrum disorders, schizoaffective disorders, bipolar disorder, depression, anxiety disorders (panic disorder, social anxiety disorder, generalized anxiety disorder, posttraumatic stress disorder, intrusive symptoms), eating disorders, decreased libido, sleep disorders, addiction, opioid addiction, cognitive impairments, dementia, seizure disorders, suicide, violence, anhedonia, depersonalization, dissociative episodes, derealization and other impairments.

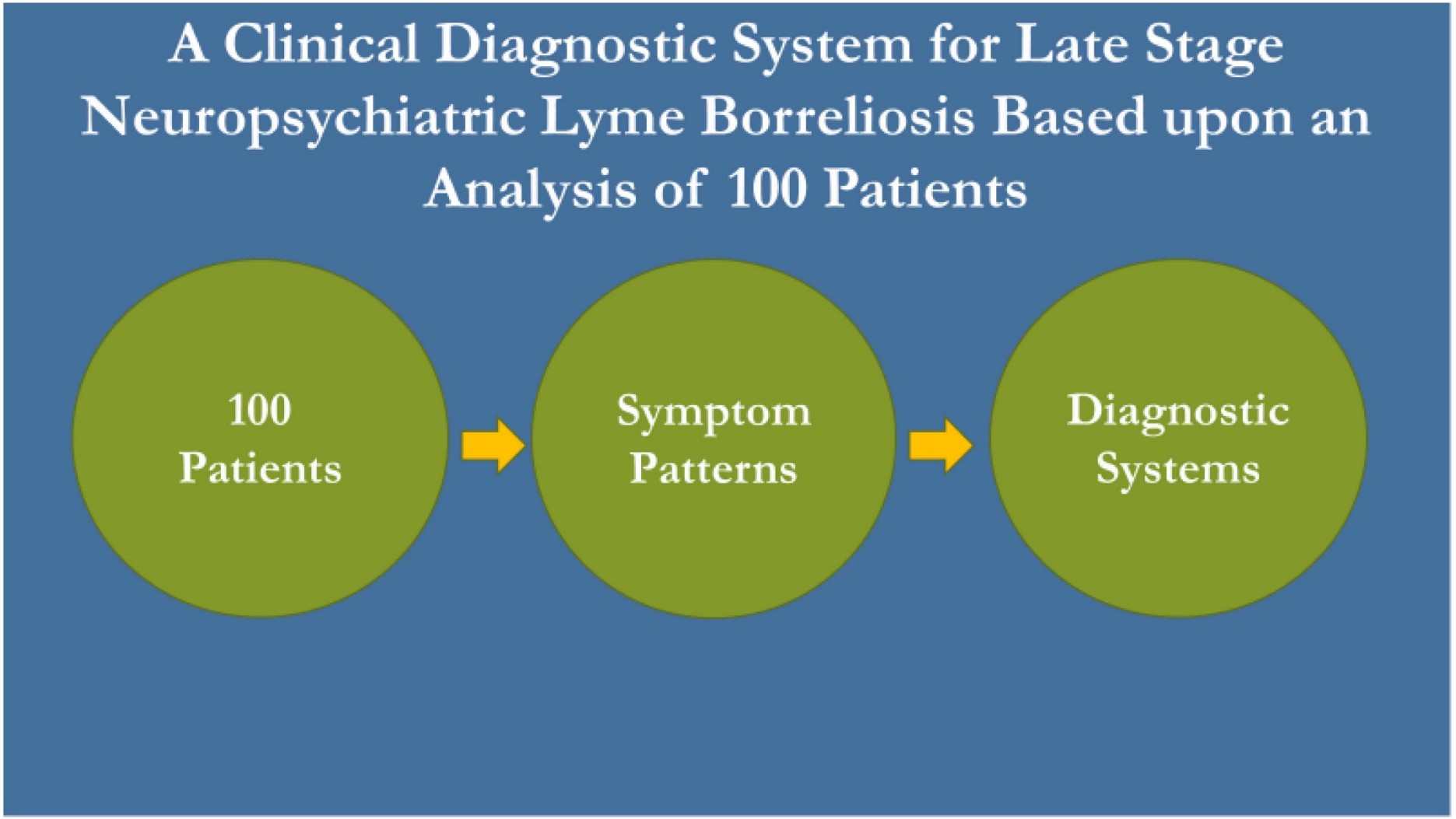
Healthcare (Basel). 2018 Aug 25;6(3):104. doi: 10.3390/healthcare6030104



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

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

Lyme Disease Symptoms



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

Bransfield RC. Neuropsychiatric Lyme Borreliosis: An Overview with a Focus on a Specialty Psychiatrist's Clinical Practice. Healthcare (Basel). 2018 Aug 25;6(3).

Proposed Lyme Disease Guidelines and Psychiatric Illnesses

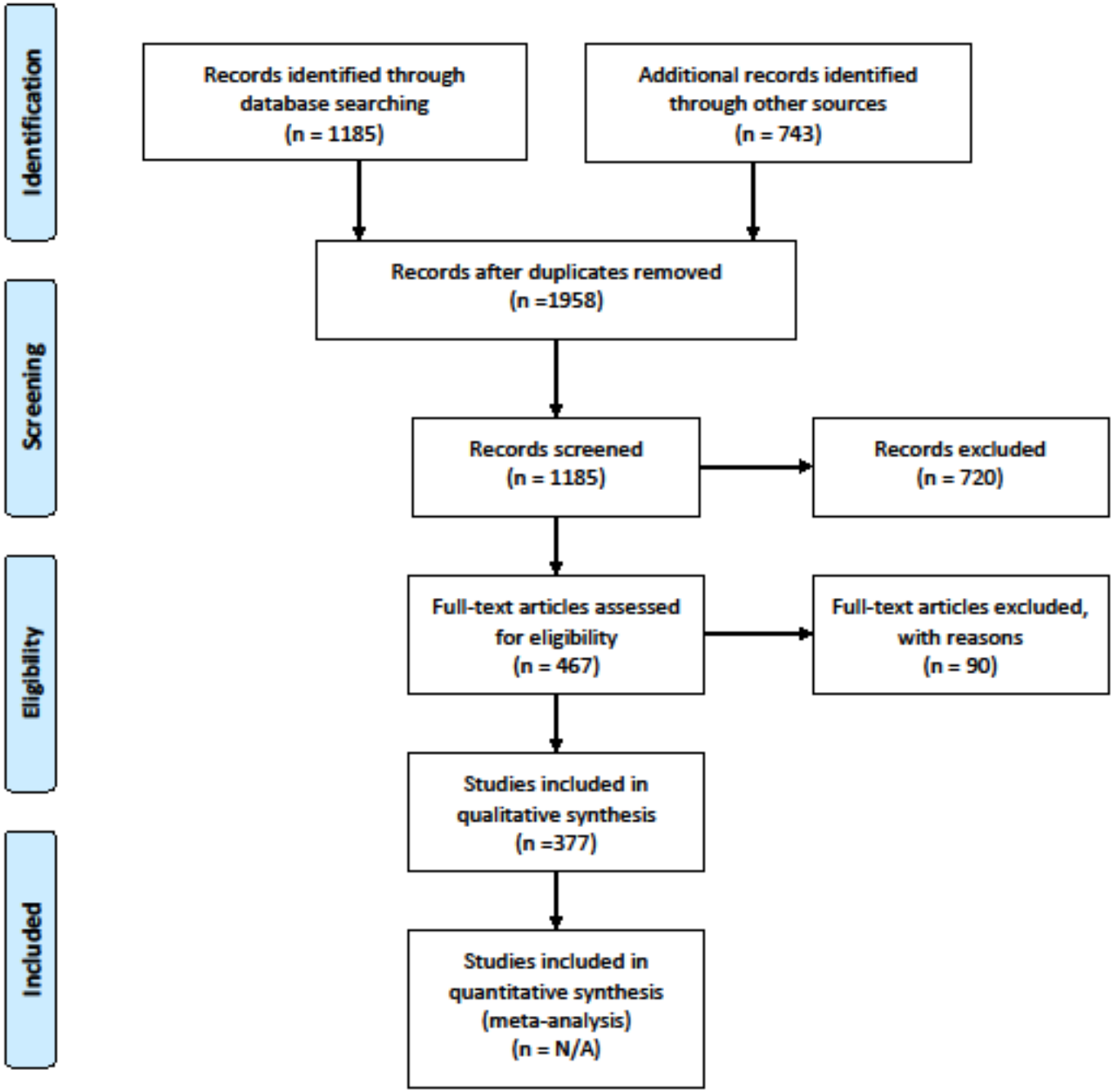
- The disclaimer and the manner these guidelines are implemented are insufficient to remove the authors and sponsoring organizations from liability for harm caused by these guidelines.
- The guidelines and supporting citations place improper credibility upon surveillance definition rather than clinical diagnosis criteria.
- The guidelines fail to address the clear causal association between Lyme disease and psychiatric illnesses, suicide, violence, developmental disabilities and substance abuse despite significant supporting evidence.

Proposed Lyme Disease Guidelines and Psychiatric Illnesses. Bransfield RC. Cook MJ. Healthcare (Basel) 2019. 9;7(3).

Proposed Lyme Disease Guidelines and Psychiatric Illnesses II

- If these guidelines are published without very major revisions, and if the sponsoring medical societies attempt to enforce these guidelines as a standard of care, it will directly contribute to increasing a national and global epidemic of psychiatric illnesses, suicide, violence, substance abuse and developmental disabilities and the associated economic and non-economic societal burdens.
- The guideline flaws could be improved with a more appropriate disclaimer, an evidence based rather than an evidence biased approach, more accurate diagnostic criteria, and recognition of the direct and serious causal association between Lyme disease and psychiatric illnesses.

Proposed Lyme Disease Guidelines and Psychiatric Illnesses. Bransfield RC. Cook MJ. Healthcare (Basel) 2019. 9;7(3).


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 1185)
Additional records identified through other sources (n = 743)
Records after duplicates removed (n =1958)
Records screened (n = 1185)
Records excluded (n = 720)
Full-text articles assessed for eligibility (n = 467)
Full-text articles excluded, with reasons (n = 90)
Studies included in qualitative synthesis (n =377)
Studies included in quantitative synthesis (meta-analysis) (n = N/A)

Systematic review of Lyme disease causing psychiatric illness

- The PubMed electronic search for citations:
- Lyme disease psychiatric illness: 1054
- Lyme disease causing psychiatric illness: 384
- Lyme disease causing mental illness: 413
- Lyme disease causing developmental disorders children: 134
- Lyme disease causing behavioral disorders children: 268
- Lyme disease psychiatric disorders children: 267
- ILADS Lyme/TBD causing psychiatric illness: 377 citations (304 psychiatry, 73 Dementia)
- My archives: 389

Proposed Lyme Disease Guidelines and Psychiatric Illnesses. Bransfield RC. Cook MJ. Healthcare (Basel) 2019. 9;7(3).

Citations in Perspective

- Lyme causing psychiatric symptoms: 387
- Lyme causing dementia: 73
- IDSA: 4 (only 2 failed to show an association)
- Citation total: 467 vs. 2, (0.4% of literature)
- Therefore the guidelines are evidence biased, not evidence based due to the selective reporting of outcomes

Proposed Lyme Disease Guidelines and Psychiatric Illnesses. Bransfield RC. Cook MJ. Healthcare (Basel) 2019. 9;7(3).

Chronic Lyme Disease: An Evidence-Based Definition by the ILADS Working Group

- ILADS defines chronic Lyme disease (CLD) as a multisystem illness with a wide range of symptoms and/or signs that are either continuously or intermittently present for a minimum of six months. The illness is the result of an active and ongoing infection by any of several pathogenic members of the *Borrelia burgdorferi sensu lato* complex (*Bbsl*). CLD has two subcategories, CLD, untreated (CLD-U) and CLD, previously treated (CLD-PT).

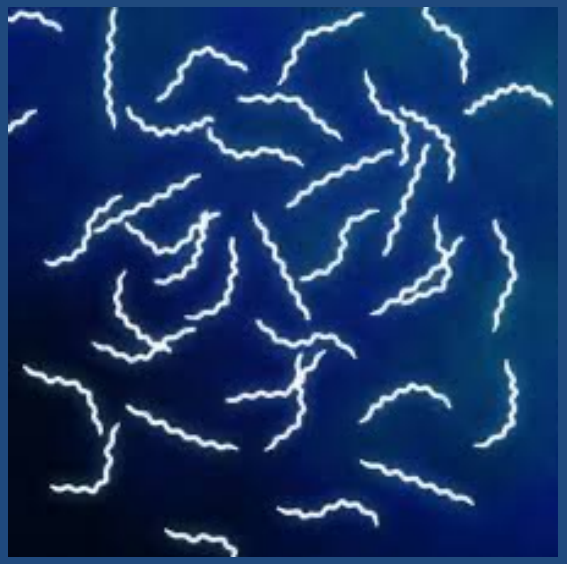
Shor S, Green C, Szantyr B, Phillips S, Liegner K, Burrascano JJ Jr, Bransfield R, Maloney EL. Antibiotics (Basel). 2019 Dec 16;8(4):269. doi: 10.3390/antibiotics8040269.

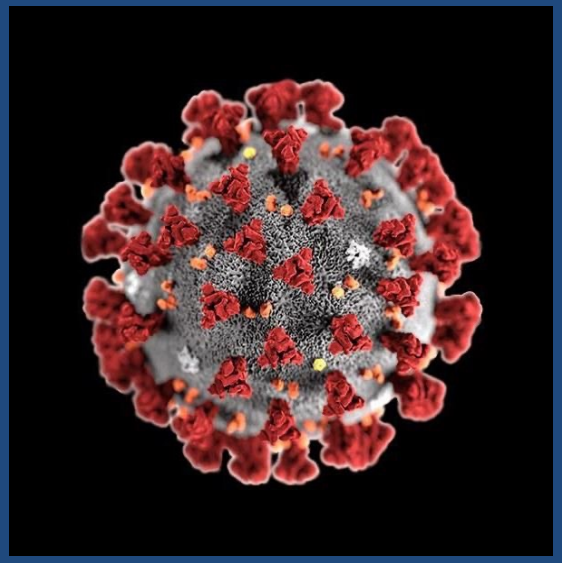
LAD and Addictive Disorders

Lyme & Addiction

- Inadequately treated patients may turn towards self-medicating with benzodiazepines, hypnotics, alcohol, pain medication, marijuana & other substances with drug abuse and drug-seeking behavior &/or they may develop process addictions such as sex, relationships, gambling, shopping, eating disorders, obsessiveness.
- Substance abuse/addiction combined with the underlying impairments from LAD further increases the severity of their symptoms. The consequences can be far-reaching & incredibly destructive.

Chronic COVID-19 & Chronic Lyme Disease





Syphilis: The Great Imitator

Lyme: The New Great Imitator

COVID: The Third Great Imitator

fatigue

SARS-CoV-2 RNA reverse-transcribed & integrated into the human genome

- Prolonged SARS-CoV-2 RNA shedding and recurrence of PCR-positive tests have been widely reported in patients after recovery, yet these patients most commonly are non-infectious.
- Human endogenous LINE-1 expression was induced upon SARS-CoV-2 infection or by cytokine exposure in cultured cells, suggesting a molecular mechanism for SARS-CoV-2 retro-integration in patients. This novel feature of SARS-CoV-2 infection may explain why patients can continue to produce viral RNA after recovery and suggests a new aspect of RNA virus replication.

Zhanng L et al.

Six-month Neurological and Psychiatric Outcomes in 236,379 Survivors of COVID-19 (UK)

- 33.6% of the coronavirus survivors received a neurological or psychiatric diagnosis including stroke, intracranial hemorrhage, dementia, psychotic disorders, terrifying hallucinations, coordination issues, & memory lapses
- Patients who've been hospitalized are especially susceptible to psychiatric complications.

Taquet M et al. In review

Mental Health Symptoms during COVID-19: A Comparison of the United Kingdom and Austria

- In total, 3.2% of the Austrian sample and 12.1% of the UK sample had severe depressive symptoms, 6.0% in Austria vs. 18.9% in the UK had severe anxiety symptoms, & 2.2% in Austria & 7.3% in the UK had severe insomnia.
- The prevalence of severe depressive, anxiety or insomnia symptoms was around three times higher in the UK than in Austria.

Budimir S, Pieh C, Dale R, Probst T. Severe *Healthcare*. 2021; 9(2):191.

Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact

- Participants 3,762 respondents from 56 countries completed the survey. 96% reported symptoms beyond 90 days. Prevalence of 205 symptoms in 10 organ systems was estimated. Respondents experienced symptoms in an average of 9.08 organ systems. The most frequent symptoms reported after month 6 were: fatigue (77.7%), post-exertional malaise (72.2%), and cognitive dysfunction (55.4%). Respondents with symptoms over 6 months experienced relapses, with exercise, physical or mental activity, and stress as the main triggers. 86.7% of unrecovered respondents were experiencing fatigue at the time of survey reported requiring a reduced work schedule compared to pre-illness and 22.3% were not working at the time of survey due to their health conditions. Conclusions Patients with Long COVID report prolonged multisystem involvement and significant disability. Most had not returned to previous levels of work by 6 months. Many patients are not recovered by 7 months, and continue to experience significant symptom burden.

Davis et al. Prepint

Bidirectional associations between COVID-19 and psychiatric disorder: retrospective cohort studies of 62 354 COVID-19 cases in the USA

- In patients with no previous psychiatric history, a diagnosis of COVID-19 was associated with increased incidence of a first psychiatric diagnosis in the following 14 to 90 days compared with six other health events. The HR was greatest for anxiety disorders, insomnia, and dementia. We observed similar findings, although with smaller HRs, when relapses and new diagnoses were measured. The incidence of any psychiatric diagnosis in the 14 to 90 days after COVID-19 diagnosis was 18·1%, including 5·8% that were a first diagnosis. The incidence of a first diagnosis of dementia in the 14 to 90 days after COVID-19 diagnosis was 1·6% in people older than 65 years.
- Survivors of COVID-19 appear to be at increased risk of psychiatric sequelae, and a psychiatric diagnosis might be an independent risk factor for COVID-19.

Taquet M et al. Lancet. VOLUME 8, ISSUE 2, P130-140, FEBRUARY 01, 2021

Coronavirus ‘altered the brain’ of NYC ER doc who killed herself, sister says

NY Post

Systematic Review & Meta-analysis

- 80% had chronic symptoms, >50 different symptoms
- 5 most common manifestations were fatigue (58%, 95% CI 42-73), headache (44%, 95% CI 13-78), attention disorder (27% 95% CI 19-36), hair loss (25%, 95%CI 17-34), dyspnea (24%, 95% CI 14-36) An abnormal chest X-Ray/CT in 34% (95% CI 27-42).
- Symptoms related to lung disease (cough, chest discomfort, reduced pulmonary diffusing capacity, sleep apnea, & pulmonary fibrosis), cardiovascular (arrhythmias, palpitations, myocarditis), neurological (dementia, depression, anxiety, attention disorder, OCD, confusion, vertigo, dizziness, tinnitus), and night sweat, sudden loss of body weight, ear pain, eye problems, sneezing, cold nose, burning feeling in the trachea & lungs, pain between the shoulder blades, Sicca syndrome, body aches

Lopez-Leon et al. BMJ Yale. In reveiw

Do Vaccines Help COVID Long-Haulers?

- Anecdotal reports say some get relief from their long COVID symptoms after just one dose
- Some people suffering from long COVID have found significant symptom relief after the first dose of their COVID-19 vaccine, though the jury's still out as to whether that's the case for the majority

Kristina Fiore, Director of Enterprise & Investigative Reporting, MedPage Today March 4, 2021

Common Chronic COVID vs. Lyme

COVID-19 (Lambert)

- Fatigue
- Muscle or body aches
- Shortness of breath or difficulty breathing
- Difficulty concentrating
- Inability to exercise or be active
- Headache
- Difficulty sleeping
- Anxiety
- Memory problems
- Dizziness
- Persistent chest pain or pressure
- Cough
- Joint pain
- Heart palpitations
- Diarrhea

Lyme Disease (Bransfield et al)

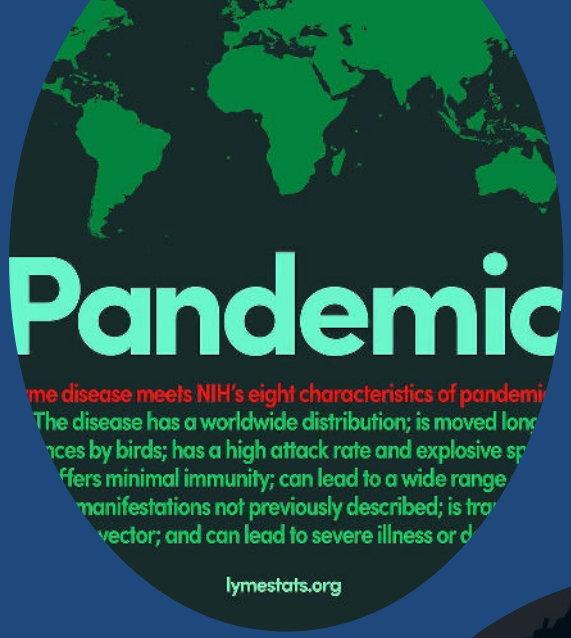
- Sustained attention 84%
- Brain fog 84%
- Unfocused concentration 81%
- Joint symptoms 81%
- Low frustration tolerance 80%
- Distracted by frustration 79%
- Depression 79%
- Working memory 78%
- Recent memory 77%
- Fatigue 76%
- Non-restorative sleep 76%
- Multitasking 74%
- Sudden mood swings 74%
- Hypersomnia (daytime) 73%
- Insomnia 72%
- Apathy 72%
- Tingling 71%
- Word retrieval 70%
- Headache 68%

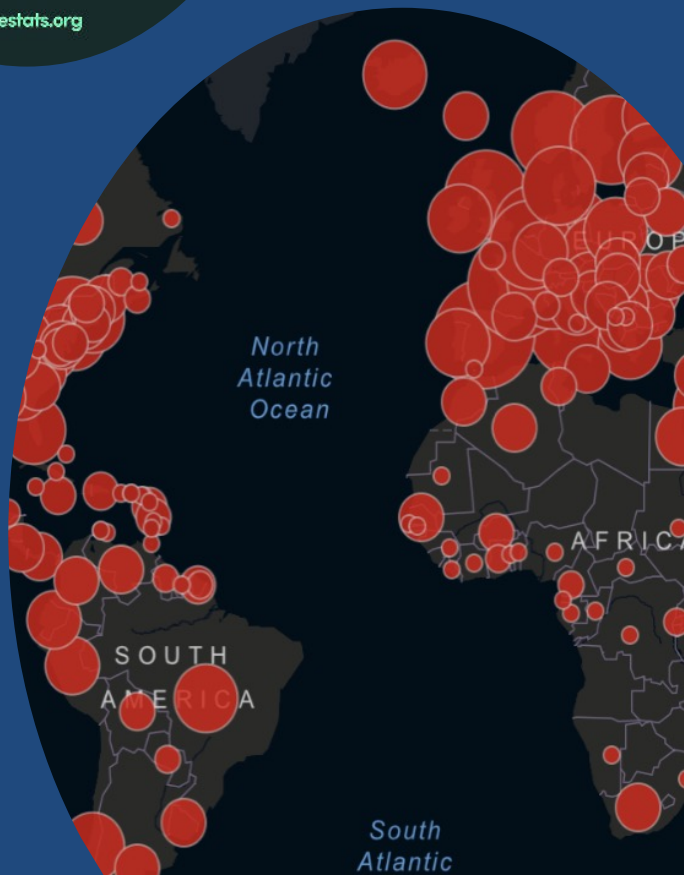
How Are Lyme & COVID-19 Similar?

- Zoonotic, global diseases
- Both are emerging infectious diseases
- Multiple genetic variants & coinfections
- No symptoms or spectrum of symptoms
- Immune reactions, cytokine storm cause multisystem disease
- Chronic symptoms in some
- Reinfection vs reactivation?
- Some of the same off-label treatments
- Similar conflicts of interest

Lyme & COVID-19 Comorbidity

- How does COVID-19 effect Lyme disease?
- How does Lyme effect COVID-19?





Lyme Disease in the Era of COVID-19: A Delayed Diagnosis and Risk for Complications

- We describe a patient with fever and myalgia who did not have COVID-19 but instead had Lyme disease. We propose that the co-occurrence of COVID-19 and Lyme disease resulted in a delayed diagnosis of Lyme disease due to COVID-19 pandemic-related changes in healthcare workflow and diagnostic reasoning.
- We present the use of telemedicine to aid in the diagnosis of Lyme disease and to provide prompt access to diagnosis and care during the ongoing COVID-19 pandemic and in the future.

Novak CB et al. case Reports in Infectious Disease. 2021

Lyme & COVID-19: Preliminary Hypothesis

- 1. If someone has a latent or active case of Lyme/TBD and is not in treatment and they acquire COVID-19, there may be an initial exacerbation of Lyme/TBD symptoms in addition to the COVID-19 symptoms, however some who have fever report a later improvement in Lyme/TBD symptoms, possibly from immune activation.
- 2. If someone is in treatment for Lyme/TBD and they acquire COVID-19, it is a milder infection and adaptive immunity to COVID-19 may be acquired. However some Lyme/TBD treatments my be more effective than others.

Lyme Treatments with COVID-19 Therapeutic Potential

- Ivermectin
- Fluvoxamine
- Hydroxychloroquine, Mepron, other anti-malaria treatments
- Zithromax, other antibiotics
- Disulfiram
- Quercetin
- Treatments that improve immune functioning
- Vitamin A, B-3, C, D, zinc, NAC
- Methylene blue

A Novel Plan to Deal with SARS-CoV-2 and COVID-19 Disease

- None of our active patients on antibacterial treatments have come down with severe COVID-19 disease which suggests being on antibacterial treatment somehow protects against SARS-CoV-2 and severe COVID-19 disease
- If a person develops symptoms associated with SARS-CoV-2 and/or the pulse oximeter drops below 92mmHg (normal, >95mmHg), immediately start treatment with doxycycline or minocycline at 100mg twice daily and continue for one week with oximeter monitoring

Stricker and Fesler. J Med Virol. 2020 Apr 28. doi: 10.1002/jmv.25945.

POST-ACUTE OR PROLONGED COVID-19: TREATMENT WITH IVERMECTIN FOR PATIENTS WITH PERSISTENT, OR POST-ACUTE SYMPTOMS

- 33 adult patients with Persistent or Post-Acute Symptoms of COVID-19 were treated with Ivermectin. In 94% of the 33 patients, clinical improvement to some degree (partial or total) was observed after 2 doses of Ivermectin. Total improvement (without any symptoms) was observed in 87.9% of the patients after the 2 daily doses of Ivermectin. In 12.1% of patients whose symptoms had not been completely resolved after the first 2 doses, additional doses of Ivermectin treatment were administered according to the protocol, and total clinical resolution of symptoms was observed in 94% of cases.

Aguirre-Chang et al. Research Gate. July 11, 2020.

How Effectively Have We Approached Emerging Diseases?

- Lyme Disease
- Chronic Fatigue/Myalgic Encephalitis, Autism, Fibromyalgia, AIDS, Gulf War Syndrome, Morgellons, PANDAS/PANS, Bartonellosis, Mycoplasma infections, Multiple Chemical Sensitivity, Mold Sensitivity, etc.
- Medical bureaucracies have consistently failed with complex, chronic, costly diseases.

Can our healthcare system meet the runaway demand for a specialty that is already experiencing acute shortages?

- According to multiple surveys, the number of Americans reporting at least one of the following conditions has doubled from 20% to 40% since the start of the pandemic:
- Anxiety
- Depression
- Substance use
- Suicidal ideation
- Stress
- Trauma

Psychiatric Times 2021

Did Infections Caused by World War I Contribute to Causing World War II?

- How many of those who recovered from WWI-associated infections had residual neurological impairments that increased their risk for violence?

Bransfield R. ContagionLive. 2018

Will these pandemics cause a chronic mental illness epidemic &/or WWIII?

- The COVID-19 & TBD pandemics are causing chronic neuropsychiatric impairments in millions, possibly billions globally.
- The losses from the pandemic & shutdowns have caused great socioeconomic damage.
- Will the combination of neuropsychiatric impairments and socioeconomic damage result in conflicts and possibly WWIII?

Action Plan

- Although competing with special interests, a greater recognition of the symptoms of Lyme diseases & COVID-19 and effective treatment can help prevent needless suffering, disability, death, developmental impairments, learning disabilities, mental illnesses, suicides, general medical illnesses and economic and non-economic costs.
- Let’s develop a protective legacy.

Recent Articles I

- **Suicide and Lyme and associated diseases**. Neuropsychiatr Dis Treat. 2017 16;13:1575-87.
- **Did Infections Caused by World War I Contribute to Causing World War II?** Contagion Live. January 5, 2018.
- **Aggressiveness, Violence, Homicidality, Homicide and Lyme Disease**. Neurol Disease and Treatment. 2018:14; 693—713
- **Neuropsychiatric Lyme Borreliosis: An Overview with a Focus on a Specialty Psychiatrist's Clinical Practice.** Healthcare (Basel) 2018. 6(3), 104
- **Proposed Lyme Disease Guidelines and Psychiatric Illnesses**. Bransfield RC, Cook MJ, Bransfield DR. Healthcare (Basel). 2019. 9;7(3).
- **A Tale of Two Pandemics** https://aonm.org/wp-content/uploads/2020/07/18-25-1.pdf
- **(Published in IHCAN Magazine)** https://www.ihcan-mag.com/

Recent Articles II

- **Differentiating Psychosomatic, Somatopsychic, Multisystem Illnesses and Medical Uncertainty**. Bransfield RC. Friedman KJ. Healthcare (Basel). 2019 8;7(4). pii: E114.
- **Chronic Lyme Disease: An Evidence-Based Definition by the ILADS Working Group** Shor S, Szantyr B, Green C, Bransfield RC, Phillips S, Liegner K, Burrascano, J, Maloney E. Antibiotics. 2019. 8(4), 269.
- **A Clinical Diagnostic System for Late Stage Neuropsychiatric Lyme Borreliosis Based upon an Analysis of 100 Patients** Bransfield RC , Cook MJ, Aidlen DM, Javia S. Healthcare (Basel). 2020, *8*(1), 13
- Hans Christiaan Klein, Lot de Witte, Robert Bransfield, and Peter Paul De Deyn. **PET Imaging of Microglia Activation and Infection in Neuropsychiatric Disorders with Potential Infectious Origin**. In book: PET and SPECT in Neurology. © Springer Nature Switzerland AG 2021 873 R. A. J. O. Dierckx et al. (eds.). December 2020.

Recent Videos I

- **Dr Bransfield: A Tale of Two Pandemics - Lyme & Covid** May 26, 2020 https://www.youtube.com/watch?v=5InnIiPUfP8&feature=youtu.be&fbclid=IwAR0Vbwhp_FE5vWSruatn4kNuCZuE2XQ3bH1KxMJVhMcw7WfQn06-NDvccXE
- **Dr. Robert Bransfield Q & A session - YouTube** https://www.youtube.com/watch?v=kL2Zt_p_0LE&fbclid=IwAR0LtGoEetrzXMEY4Hmq5QoKVL10OPvZzgnV3RY0eQTAZiic9r1_BhCDQR8
- **Dr. Robert Bransfield on using Disulfiram for Lyme, depression and suicide prevention** June 1, 2020 https://www.youtube.com/watch?v=9iYaIHaGE7g&feature=emb_logo
- **Special Interview with Lyme Expert, Dr. Robert C. Bransfield - YouTube** Charles E Holman Foundation August 7, 2020 https://www.morgellonssurvey.org/special-interview-with-lyme-expert-dr-robert-c-bransfield/ https://www.youtube.com/watch?v=wpeKTEvdKvE&feature=share&fbclid=IwAR0f2F6Vgcs6Q3teFYIpfGoB1pRGcLY3NPvNqdkFBmP9K_JDEZJauV7GyWI

Recent Videos II

- **Part 1 - Lyme & Associated Diseases & Addictive & Substance Abuse Disorders: the Hijacked Brain - YouTube** August 2020 https://www.youtube.com/watch?v=YLfmfwK4V7M
- **Part 2 – Q&A Lyme & Associated Diseases & Addictive & Substance Abuse Disorders: the Hijacked Brain – YouTube** 2020 https://www.youtube.com/watch?v=AFDI1O1wiAU
- **Expert Opinions: IDSA Guidelines** Project Lyme. Dec 17, 2020. https://www.youtube.com/watch?fbclid=IwAR3oGtaNjfGt4RaoUKKtsS3fVmNmdM1u_HoSvC5fKVaEqbK2Szd_Aqy2oQA&v=n9JNZO-B64E&feature=youtu.be
- **The Monster Inside Me | Lyme Disease Documentary (Trailer)** https://www.themonsterinsideme.com/?fbclid=IwAR04G8qahIU3rl6KCIGj-4hyFuG9jvGa9eNzo7f27e5w1LQKS1kdejzrQnQ
- **Lyme/Tick-Borne Diseases and Neuropsychiatry.** PA Lyme Disease Resource Center. January 19, 2020. **Virtual Lyme Impact Series Videos - PA Lyme Resource Network** https://palyme.org/virtual-lyme-impact-series/

Thanks for your attention

Discussion and Questions?