

# IEP or 504 Plan for Students with Disabilities



The following information is from the District of Columbia (DC) state board of education regarding differences between an Individualized Education Program (IEP) and a 504 plan for a disabled student. This document can provide some beginning guidance for parents of children with Lyme disease as a basis for what schools may need to provide. Different states can have additional safeguards.

**See Office of the Student Advocate: *Understanding the Differences: IEP vs. 504 Plan***

In addition, see article by Alfred C. Tagliabue, M. Ed., Director of Student Personnel and Community Services, Jackson Township, New Jersey (Retired):

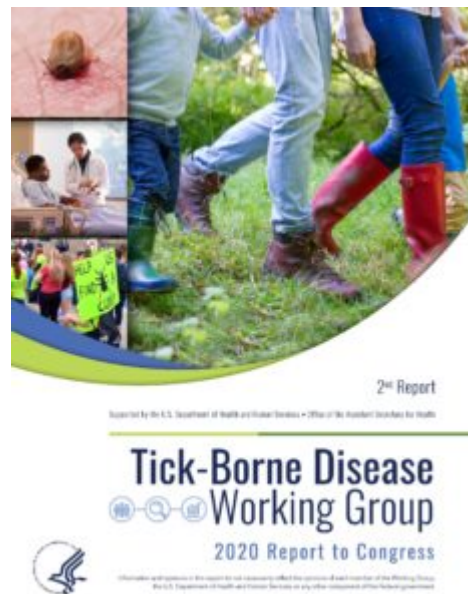
***504, IDEA & IEPs: I know what my child needs to be successful in school, but what are these numbers and letters all about?***

---

# Government Refuses to Address Geographic Boundary Restriction Preventing Lyme Diagnosis

## How this happened on the Working Group

The Access to Care Subcommittee unanimously recommended the Potential Action below.



## *Working Group Access to Care Subcommittee Report*

**Potential Action 4:** Recommend that CDC provide input to the Council of State and Territorial Epidemiologists, CSTE, that the Lyme disease surveillance case definition be revised such that it abandons the use of geographic parameters for Lyme disease.

The above potential action was altered and removed from Access Chapter to the Surveillance Chapter without any sustainable reason given by the WG agencies for not supporting it. The below change was accepted and voted on by the WG. Pat Smith voted no to the change.

## *Tick-Borne Disease Working Group 2020 Report to Congress*

**Chapter 8 Recommendation:** Recommend that CDC work with Council of State and Territorial Epidemiologists, CSTE, to streamline the surveillance process and reduce the burden on

*clinicians and public health departments by permitting direct laboratory reporting of positive cases.*

---

---

### **How Pat Smith Countered the action**

By virtue of voting no, Pat Smith was able to insert a Minority Response. She developed the following minority response, which can be found in the *Tick-Borne Disease Working Group 2020 Report to Congress*, pp.91, 92

### **Minority Response: Effect of Geographic Restrictions on Lyme Diagnosis**

Access to care, as defined by the National Academy of Medicine, is “the timely use of medical care to obtain the best possible outcome.” With regard to Lyme disease, the Training, Education, Access to Care, and Reimbursement Subcommittee was concerned that additional geographic restrictions added to the surveillance case definition in 2017, have lulled clinicians in “low-incidence” states into mistakenly discounting a potential Lyme disease diagnosis. The resultant diagnostic and therapeutic delays that patients in those states have already reported have subsequently limited their ability to obtain their best possible outcome. To reduce this diagnostic hurdle, the subcommittee recommended that “CDC provide input to the Council of State and Territorial Epidemiologists, CSTE, that the Lyme disease surveillance case definition be revised such that it abandons the use of geographic parameters for Lyme disease” and that “CDC, NIH, and other government agency websites, brochures, and educational materials abandon the use of geographic parameters for the diagnosis of Lyme disease and inform clinicians and the public that Lyme disease has been reported in all states” (Training, Education, Access to Care, and Reimbursement Subcommittee, 2020). This Minority Report specifies why the geographic proviso should not have been removed from the Working Group report as a recommendation to Congress.

In moving to a state-based designation, the surveillance case definition has misled clinicians regarding the risk of Lyme disease in their area. Lyme disease exposure is largely driven by geographical terrain and climatic factors. Because these elements vary within a state, state-based incidence definitions obscure the risk for patients exposed in localized "hot spots." As detailed in the subcommittee's report, outside data sources Quest and Fair Health, the latter with a database of 23 billion healthcare insurance claims, show that CDC statistics on low-incidence states are inaccurate (Lee-Lewandrowski, Chen, Branda, Baron, & Kaurman, 2019; McGinty, 2018). Additionally, instituting more stringent requirements for what constitutes a confirmed erythema migrans case in low-incidence states results in undercounting of cases and sets up a self-perpetuating cycle for a low-incidence designation as doctors there often are not diagnosing and treating. They are frequently concerned about the ramifications from medical boards who have sanctioned physicians in some circumstances.

Additionally, when clinicians underestimate their patients' risk of Lyme disease, they may mistakenly discount true cases of the infection and lengthen the time to diagnosis and treatment. Patients misdiagnosed because of geographically-based misconceptions often have to travel to distant states for a willing and knowledgeable clinician and are likely to experience treatment delay, which increases their risk of developing persistent Lyme disease. As noted in the subcommittee's report, a survey of patients with persistent Lyme disease documented that 70% reported substantial diagnostic delays (Johnson, Shapiro, & Mankoff, 2018). Diagnostic delays can be costly; the total averaged cost of treating late Lyme disease is approximately \$24,000 per year, which is 12 times higher than the cost of treating early Lyme disease (Johnson, 2019; Zhang et al., 2006). The report also details the substantial 92 consequences that persistent Lyme disease has on patients' lives: 72% of patients with chronic

Lyme disease reported their health status as fair or poor and 75% experienced severe or very severe symptoms; many are unable to regularly attend school or hold down a job (Johnson, Wilcox, Mankoff, & Stricker, 2014).

Given the negative impacts on access to care for Lyme disease that geographic parameters in the surveillance case definition impose on clinicians and patients, the subcommittee's initial recommendation on CDC recommending review of the geographic diagnostic restrictions should have remained intact. **Patricia V. Smith, BA**

References Johnson, L. (2019, August 23). MyLymeData 2019 Chart Book. Retrieved from <https://doi.org/10.6084/m9.figshare.8063039.v1> Johnson, L., Shapiro, M., & Mankoff, J. (2018). Removing the Mask of Average Treatment Effects in Chronic Lyme Disease Research Using Big Data and Subgroup Analysis. *Healthcare (Basel)* 6. doi:10.3390/healthcare6040124 Johnson L., Wilcox S., Mankoff J., & Stricker R. B. (2014). Severity of chronic Lyme disease compared to other chronic conditions: a quality of life survey. *PeerJ*, 2. doi: 10.7717/peerj. Lee-Lewandrowski, E., Chen, Z., Branda, J., Baron, J., & Kaufman, H. W. (2019). Laboratory BloodBased Testing for Lyme Disease at a National Reference Laboratory: A 7-Year Experience (2010-2016). *American Journal of Clinical Pathology*, 152(1), 91-6. doi:10.1093/ajcp/aqz030 McGinty, J. C. (2018, June 22). Lyme Disease: An Even Bigger Threat Than You Think. *The Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/lyme-disease-an-even-bigger-threat-than-youthink-1529672401> Training, Education, Access to Care, and Reimbursement Subcommittee. (2020). Report to the Tick-Borne Disease Working Group. Retrieved from <https://www.hhs.gov/ash/advisory-committees/tickbornedisease/reports/training-education-access-to-care-and-reimbursement-subcomm-2020/index.html> Zhang, X., Meltzer, M. I., Peña, C. A., Hopkins, A. B., Wroth, L., & Fix, A. D. (2006). Economic Impact of Lyme Disease. *Emerging Infectious*

**Other links:**

**2020 TBDWG Report to Congress – PDF**

**2020 TBDWG Subcommittee Reports**

---

# **FDA Clears Expanded Access IND for PhageBank: COVID-19-Related Infections**

Adaptive Phage Therapeutics (APT) announced the US Food and Drug Administration (FDA) clearance of the Expanded Access IND for PhageBank™ treatment for pneumonia or bacteremia/septicemia due to *Acinetobacter baumannii*, *Pseudomonas aeruginosa* or *Staphylococcus aureus* in COVID-19 patients.

APT's PhageBank™ therapy has been used to treat 9 COVID-19 patients in South Texas with co-infections due to multi-drug resistant *Acinetobacter baumannii* under the emergency IND mechanism since September 2020. Phage therapy apparently reduced the burden of multi-drug resistant *Acinetobacter baumannii* infection in these patients. Phages have demonstrated broad coverage having been screened against panels of over 200 multidrug resistant isolates created from WRAIR's Multidrug Resistant Organism Repository and Surveillance Network (MRSN) repository.

The article states:

- *“A significant increase in mortality has been seen in COVID-19 patients with antibiotic resistant bacterial*

*infections.*

- *APT has made available therapeutic phage treatment to physicians in the Rio Grande Valley of Texas who are treating COVID-19 patients with secondary Carbapenem Resistant Acinetobacter baumannii (CRAB) on an emergency basis*
- *Now the FDA has granted APT an Expanded Access IND (EA IND) to facilitate the nationwide treatment of COVID-19 patients who develop bacterial infections*
- *APT and its partners are currently making therapy available to COVID-19 patients free for the public good and are seeking financial support from the government or non government organizations in order to enable continuing access to PhageBank™ treatment for these patients.”*

**Read full article here**

**Read additional COVID Articles here**

---

**US Naval War College  
Professor Combats Harmful  
Lyme Myths**



SrA Dennis Sloan Joint Base  
Charleston Public Affairs

Dr. Montgomery McFate, Professor, U.S. Naval War College, published, "The Myths of Lyme Disease: Separating Fact from Fiction for Military Personnel," in *Joint Force Quarterly*, 100, Feb. 16, 2021.

Dr. McFate addresses, in the well-cited article, many damaging myths regarding Lyme that have proliferated in the medical system since its discovery over 40 years ago. She describes how these myths harm military personnel, a population that is particularly at risk for exposure to Lyme disease. She presents several stories of military personnel harmed by Lyme and tick-borne diseases.

Military members are at higher risk of exposure to Lyme disease because service members, along with their families, live, work, and play on bases where Lyme is rampant. McFate writes, "Some 75 percent of all U.S. military installations are located in states where 99 percent of the approximately 500,000 tickborne disease cases reported to the Centers for Disease Control and Prevention (CDC) from 2004 to 2016 occurred." Additionally, veterans often retire in rural counties where Lyme disease incident rates are higher due to ample forestation, damp conditions, and mid-range temperatures.

According to McFate, "In short, Lyme disease has already reached epidemic proportions in the United States, and the



situation will certainly get worse. As the disease spreads, military personnel, veterans, and their families will be at even higher risk for contracting the disease.”

The author tackles the myth, “Lyme is not that severe,” and elaborates on the serious potential impacts that *Borrelia burgdorferi* can have such as penetrating the heart, crossing the blood-brain barrier, infecting the central nervous system, as well as the serious complications caused by transmission from pregnant mother to unborn baby. McFate also addresses the serious issue of increased risk of suicide amongst military members and veterans.

When it comes to “Lyme is easy to diagnose,” McFate emphasizes the lack of knowledge many VA doctors have regarding Lyme disease as well as inadequacies with the two-tier testing used by most doctors. She explains, “This two-tier diagnosis system was never intended to be used for the diagnosis of Lyme disease. Rather, it was developed by the CDC as a ‘surveillance case definition,’ which is ‘a set of uniform criteria used to define a disease for public health surveillance’.”

The common misconception, “Lyme is easy to treat” with the standard medical practice prescribing 28 days of antibiotics is also addressed. “Unfortunately,” McFate writes, “In more than 50 percent of cases, Lyme disease is not cured by a single round of antibiotic therapy.” She goes on to explain a common phenomenon that those with chronic Lyme disease know all too well, “Individuals may appear to respond well to the initial treatment with antibiotics and experience a relief of symptoms, but then relapse either months or years later.” It has been estimated that the number of people in the US suffering from PTLTD exceeded 2 million at the end of 2020.

McFate calls attention to the work of the Tick-Borne Disease Working Group (TBDWG) and their 2018 report to Congress noting that, “progress has been hampered by a lack of attention at

the Federal level and by divisions within the field.” She explains that, despite the widespread proportion of Lyme disease in the US, Federal funding for tick-borne diseases is considerably less per new case than for other diseases.

The author concludes that new basic research into Lyme and the repurposing of existing drugs such as disulfiram provide hope for patients. She emphasizes that, currently, there is no cure and no simple treatment for this serious and often debilitating disease. McFate writes, “Given the dire health consequences, the poor diagnostic tools, the effects of climate change in increasing tick habitats, and the endemic nature of the disease in geographical areas where the military lives, works, and plays, Lyme should be a serious concern for the entire joint force.”

Read “The Myths of Lyme Disease: Separating Fact from Fiction for Military Personnel” on The Sixteenth Air Force (Air Forces Cyber) website.

Read more about the Tick-Borne Disease Working Group (TBDWG).

Read more about the Military and Lyme disease.

---

## **Carl Tuttle’s Statement to NH Commission to Study Testing for Lyme & TBD**

Carl Tuttle is a long time New Hampshire advocate. He is a member of the New Hampshire *Commission to Study Testing For Lyme & Other Tick-Borne Diseases*. The charter is to “study the use and limitations of serological diagnostic tests to determine the presence or absence of Lyme and other tick-borne diseases and the development of appropriate methods to educate physicians and the public with respect to the inconclusive nature of prevailing test methods.” Below is a statement he read at the last meeting, which he then shared with the LDA.



### **COMMISSION TO STUDY TESTING FOR LYME AND OTHER TICK-BORNE DISEASES**

<http://www.gencourt.state.nh.us/statstudcomm/details.aspx?id=1515&rbl=1&txtbillnumber=hb490>

Since the last meeting I have sent nine emails with topics to discuss in our meetings. The emails have contained many supporting references to my claim that serology is no better than a coin toss, harm caused by false negative Elisa tests reported to the NH Dept of Health ten years ago, comments from 340 NH residents with many reporting delayed diagnosis due to false negative serology and a list of references identifying seronegative disease. A recent Johns Hopkins study reveals that if you're not treated within the very narrow window of 30 days, you run the risk of ending up with chronic Lyme disease [1] and yet humans won't produce antibodies to the infection for 4-6 weeks after a tick bite. So, by the time serology is positive, if ever, it's already too late as the spirochete responsible for Lyme disease were just recently identified in the brains of mice one week after infection. [2]

The possibility of missing a timely diagnosis is extremely high in a state with one of the highest rates of Lyme in the country especially in the absence of a bulls-eye rash. This was the case with all Tuttle family members. None of us developed the bulls eye rash, none of us met the strict CDC

criteria for positive test results and as I mentioned previously, if we had not met Dr. Sam Donta, none of us would have been treated.

The sobering fact about this travesty is that it has been going on for over three decades and no matter how many complaints are submitted, nothing changes and lives continue to be ruined by an infection misclassified as a simple nuisance disease; "hard to catch and easily treated." Everyone here is a single tick bite away from experiencing this health disaster as tick-borne disease infection rates in the ticks found in Litchfield for example are as high as **77%** as indicated in the 2009 UMass tick study I sent to all of you yesterday. Of course, all these details are well hidden from the public. So I hope that we can make a difference here, get the truth out to the public and save lives that otherwise would have been upended by this life-altering/life threatening infection.

Ben Franklin once said, *"Justice won't be served until those unaffected are as outraged as those who are."*

Carl Tuttle  
Hudson, NH

## **References**

### **1. Treatment Delays Increase Risk of Persistent Illness in Lyme Disease**

<https://www.hopkinslyme.org/news/treatment-delays--increase-risk-of-persistent-illness-in-lyme-disease/>

### **2. A murine model of lyme disease demonstrates that *Borrelia burgdorferi* colonizes the dura mater and induces inflammation in the central nervous system**

<https://journals.plos.org/plospathogens/article/authors?-id=10.1371/journal.ppat.1009256>

---

# LDA Board of Directors – Timothy (Tim) Lynagh, MBA

## Lyme Disease Association Inc. Board of Directors 2021

Timothy (Tim) Lynagh, MBA



### **Board Member (Policy Advisor)**

Tim received an MBA degree from George Washington University in Washington, DC, and held several analytical positions within the Federal government. At the Department of Labor, Tim was as an Economist in the Bureau of Labor Statistics and a Loss Prevention Analyst/Operational Auditor in the Office of Inspector General. He helped set up an Information Resources Management Review Program in the General Services Administration, working closely with OMB to design the program. Tim wrote a significant portion of the guidance for Federal agencies to follow in establishing and operating an IRM Review Program.

Tim worked for fifteen years in DHHS, first as a team leader in helping to oversee HHS' operating divisions' activities relating to information technology, including planning and procurement. Tim was a Supervisory Analyst in FDA's Office of Legislation, serving as a one-person team as the liaison for the Center for Veterinary Medicine, and later working for the CFSAN-CVM team, handling dietary supplements as well as CVM issues. Tim was the principal liaison to Congress for a number of cross-cutting issues, including antimicrobial resistance and transmissible spongiform encephalopathies. Tim worked closely with CVM in developing animal feed regulations to control the possible spread of BSE, and also was the liaison to Congress in developing and passing animal drug user fee legislation, as well as legislation for Minor Use, Minor Species drug approvals.

After serving a Brookings fellowship on Capitol Hill, Tim returned to the Hill to work as Deputy Chief of Staff and Legislative Director for Congressman Chris Smith (NJ). Congressman Smith did and does chair House caucuses on Alzheimer's disease, autism, Lyme disease, and numerous international affairs caucuses, and did chair the foreign affairs subcommittee with jurisdiction for global health. Tim had the staff lead in successfully moving Congressman Smith's autism legislation and getting autism placed in the Congressionally Directed Medical Research Program. Tim also helped to develop several bills for Congressman Smith to try to improve the seriously impaired environment for making progress in the ability to manage Lyme and other tick-borne diseases. Since leaving Capitol Hill, he works part-time for the Franciscan Foundation for the Holy Land and helped the Lyme Disease Association. He has served on the LDA Board of Directors for 6 years.

[Back to LDA Board Members](#)

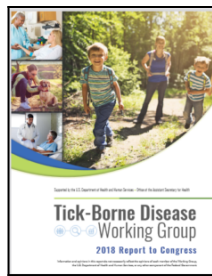
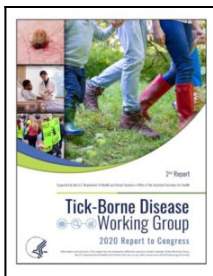
---

# Tick-Borne Disease Working Group Reports (2018 – 2020)

The Tick-Borne Disease Working Group (TBDWG) was established by the 21st Century Cures Act to improve federal coordination of efforts related to tick-borne diseases. The TBDWG's purpose is to review federal activities and research related to all tick-borne diseases and provide a summary of its findings and any recommendations regarding changes or improvements to such findings to the HHS Secretary and Congress every two years.

To date:

- The first report was submitted to Congress in November 2018; the second report was submitted in January 2021, both authored by the TBDWG members.
  - Subcommittee Reports were also written in 2018 and 2020, some coauthored by Working Group member and LDA President, Pat Smith.
    - Each subcommittee of the Working Group identified priorities and developed a report to the TBDWG that described current efforts, gaps in research, and potential actions relevant to their topic.
  - Topic development briefs were also developed by the first term Working Group
-



**See HHS -TBDWG webpage for all of the reports or click below**

**2020 TBDWG Report to Congress**

**2018 TBDWG Report to Congress**

---

### **2020 Subcommittee Reports:**

2020 Alpha-Gal Syndrome Subcommittee Report to the Tick-Borne Disease Working Group

2020 Babesiosis and Tick-Borne Pathogens Report to the Tick-Borne Disease Working Group

2020 Clinical Aspects of Lyme Disease Report to the Tick-Borne Disease Working Group

2020 Ehrlichiosis and Anaplasmosis Subcommittee Report to the Tick-Borne Disease Working Group

2020 Pathogenesis and Pathophysiology of Lyme Disease Subcommittee Report to the Tick-Borne Disease Working Group

2020 Rickettsiosis Subcommittee Report to the Tick-Borne Disease Working Group

2020 Tick Biology, Ecology, and Control Subcommittee Report to the Tick-Borne Disease Working Group

2020 Training, Education, Access to Care, and Reimbursement Subcommittee Report to the Tick-Borne Disease Working Group



---

## **2018 Subcommittee Reports:**

Report of the Access to Care Services and Support to Patients Subcommittee

Report of the Disease Vectors, Surveillance, and Prevention Subcommittee

Report of the Other Tick-Borne Diseases and Co-Infections Subcommittee

Report of the Pathogenesis, Transmission and Treatment Subcommittee

Report of the Testing and Diagnostics Subcommittee

Report of the Vaccine and Therapeutics Subcommittee

---

## **2019 Topic Development Briefs**

Increases in Tick-Borne Diseases

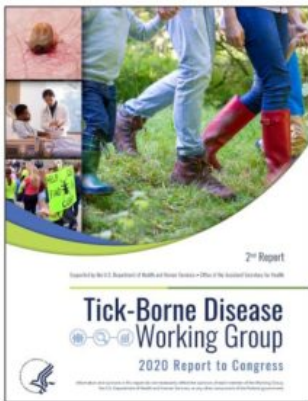
Diagnostic Tests for Tick-Borne Diseases

Persistent Symptoms of Lyme Disease

---

# **HHS Tick-Borne Disease Working Group 2020 Report to**

# Congress Now Available



The *Tick-Borne Disease Working Group 2020 Report to Congress* is now available (Report). The Report was presented to the Secretary of Health & Human Services in December 2020 by the Working Group (WG). The Secretary sent the Report to the Energy & Commerce Committee in the House of Representatives and the Health, Education, Labor, and Pensions Committee in the Senate at the end of January 2021. As required, the Report is now on the HHS website [click here](#). The above process is required by the portion of the *21st Century Cures Act* that created the WG.

This second term of the WG often had contentious meetings primarily focusing on material on chronic Lyme disease (CLD) and the problems with patients who have CLD in obtaining treatment and reimbursement in Chapter 7. The federal agencies charged with healthcare do not accept CLD as an entity, thus coming to consensus was often difficult for the WG. Several Minority reports are contained within the WG report that deal with those Lyme disease patient issues, including diagnosis.

The Report has chapters which include Tick Biology, Ecology & Control; Clinical Manifestations, Diagnosis & Diagnostics; Causes, Pathogenesis & Pathophysiology; Treatment; Clinical & Public Education & Access to Care; Epidemiology & Surveillance. The report contains a significant amount of information on other tick-borne diseases.

LDA President Pat Smith served two terms as a public member of the Working Group in the advocate/family member of patient categories as delineated in the legislation.

## **Other links:**

**2020 TBDWG Report to Congress – PDF**

**2020 TBDWG Subcommittee Reports**

**LDA TBDWG Posts**

---

# Johns Hopkins Lyme Research Center Challenges IDSA Guidelines & Addresses Lyme- COVID



John Aucott, MD;  
Associate  
Professor of  
Medicine, Johns  
Hopkins University  
School of  
Medicine;  
Director, Johns  
Hopkins  
Rheumatology Lyme  
Disease Clinical  
Research Center

Johns Hopkins Lyme Disease Research Center's recently released *Winter 2021 Newsletter* addresses the confusing new IDSA

guidelines and calls attention to the similarities between common COVID-19 long hauler symptoms and persistent Lyme disease symptoms. It also provides insights into significant advances made by their Lyme disease clinical research program, despite challenges brought by the COVID-19 pandemic.

Provided is an overview of how the new IDSA guidelines fail to clarify confusion regarding the diagnosis and effective treatment of persistent symptoms in Lyme disease or how to productively approach the various divergent subsets of chronic Lyme disease (CLD). The authors cite extensive peer-reviewed, evidence-based research, led by the Johns Hopkins SLICE studies, “that elucidate clinically significant persistent symptoms and reveal measurable biologic differences in patients with post treatment Lyme Disease (PTLD), a clearly defined and diagnosable subgroup of CLD patients.”

Drawing on the similarities between COVID-19 long haulers and persistent symptoms in Lyme disease, such as severe fatigue, cognitive symptoms, and pain, the Hopkins authors call attention to potential common mechanisms of illness, such as infection-induced changes in the autonomic nervous system and immune system.

Also included is an outline “connecting the dots” in Lyme disease research with an overview of the multiple deleterious impacts that Lyme patients often struggle with, including disrupted immune function, and impacts on the gut microbiome and metabolic response. The authors emphasize the important role these findings play in better understanding the disease’s complex biologic mechanisms in providing innovative, targeted, and improved diagnostics and treatment approaches.

Read Johns Hopkins Lyme Disease Research Center’s *Winter 2021 Newsletter*

Visit the Johns Hopkins Lyme Disease Research Center website.

***LDA has been given permission to share Johns Hopkins Lyme***

# Study Provides Insights into Neuropathologies Associated with Lyme Disease

The study, "A murine model of Lyme disease demonstrates that *Borrelia burgdorferi* colonizes the dura mater and induces inflammation in the central nervous system," was published in the journal *PLoS Pathogens*.



Prior to this, studies using inbred laboratory mice to observe *B. burgdorferi* infection and host immune responses in the central nervous system (CNS) were lacking, creating a major barrier to understanding the neuropathologies associated with Lyme disease.

The researchers developed a tractable animal model for investigating host-*Borrelia* interactions in the CNS and CNS pathogenesis. Using fluorescence-immunohistochemistry, intravital microscopy, bacterial culture, and quantitative PCR, they observed *B. burgdorferi* routinely colonized the dura mater of C3H mice, with peak spirochete burden at day 7 post-infection. Dura mater colonization was observed for *B. burgdorferi*, *B. garinii*, and *B. mayonii*.

RNA-sequencing and quantitative RT-PCR showed *B. burgdorferi* infection to be associated with increased expression of inflammatory cytokines and a robust interferon (IFN) response in the dura mater. The meninges showed

histopathologic changes such as leukocytic infiltrates and vascular changes. The researchers did not find *B. burgdorferi*, infiltrating leukocytes, or large-scale changes in cytokine profiles in the cerebral cortex or hippocampus. However, both brain regions showed comparable changes in the expression of IFN-stimulated genes as was observed in peripheral tissues and meninges.

The paper reads, "Taken together, *B. burgdorferi* is capable of colonizing the meninges in laboratory mice, and induces localized inflammation similar to peripheral tissues. A sterile IFN response in the absence of *B. burgdorferi* or inflammatory cytokines is unique to the brain parenchyma, and provides insight into the potential mechanisms of CNS pathology associated with this important pathogen."

The authors summarize, "Overall, these findings characterize the central nervous system responses to *Borrelia burgdorferi* infection in a cost-effective and genetically robust animal model, and provide insights into the mechanisms of neuropathologies associated with Lyme disease."

Read "A murine model of Lyme disease demonstrates that *Borrelia burgdorferi* colonizes the dura mater and induces inflammation in the central nervous system" in *PLoS Pathogens*.