PeerReviewedEvidenceofPersistenceofLymeDiseaseSpirochete

* Borrelia burgdorferi * and Tick-Borne Diseases

The following is a list of over 700 peer-reviewed articles that support the evidence of persistence of Lyme and other tick-borne diseases. It is organized into different categories—general, psychiatric, dementia, autism and congenital transmission.

**General: Persistence of Lyme Disease Spirochete *Borrelia burgdorferi***

The following section of references for persistence of Lyme disease (Lyme borreliosis) are listed alphabetically and chronologically:

1. Aalto A, Sjowall J, Davidsson L, Forsberg P, Smedby O. Brain magnetic resonance imaging does not contribute to the diagnosis of chronic neuroborreliosis. Acta Radiol 2007; 48: 755-762. [white matter hyperintensities or basal ganglia lesions].
21. Bayer ME, Zhang L, Bayer MH. *Borrelia burgdorferi* DNA in the urine of treated patients with chronic Lyme disease symptoms. A PCR study of 97 cases. Infection 1996; 24: 347-353. [97 patients who had been treated with antibiotics for extended periods of time and had symptoms of chronic Lyme were PCR-positive.]


Chmielewski T, Tylewlska-Wierzhanowska S. Inhibition of fibroblast apoptosis by Brorson O and Brorson SH. Transformation of cystic forms of Borrelia burgdorferi to normal mobile spirochetes. Infection; 25: 240-246. [change in physical characteristics; change of spirochetes to other pleomorphic forms, i.e., cell wall deficient forms, namely cysts.]

Borrelia burgdorferi Brorson O and Brorson S. In vitro conversion of Borrelia burgdorferi to cystic forms in spinal fluid, and transformation to mobile spirochetes by incubation in 15K-H medium. Infection. 1998; 26: 144-150. [change in physical characteristics; change of spirochetes to other pleomorphic forms, i.e., cell wall deficient forms, namely cysts.]


Borrelia burgdorferi Chmielewski T, Tylewlska-Wierzhanowska S. Inhibition of fibroblast apoptosis by Borrelia afzelii, Coxiella burnetii and Bartonella henselae. Poll Microbiol 2011; 60(3); 269-272.


58. Cleveland CP, Demler PS, Duray PH. Recurrence of Lyme disease presenting as a chest mass: *Borrelia burgdorferi* was present despite five months of IV ceftriaxone 2 g, and three months of oral cefixime 400 mg BID. The presence of *Borrelia burgdorferi* confirmed by biopsy and culture. Poster presentation at V. Lyme Disease Foundation International Scientific Conference. Stamford, CT. April 10-11, 1992.


http://dx.doi.org/10.1016/j.cct.2012.08.009 [refutes Klempers (2001) conjecture that long-term antibiotics don’t work]


128. James FM, JB Engiles, and J Beech. Meningitis, cranial neuritis, and radiculoneuritis associated with Borrelia burgdorferi infection in a horse. J Am Vet Med Assoc 2010; 237: 1180-1185. [Horse was seropositive for Bb, and PCR assay of CSF for B. burgdorferi DNA was positive; horse was treated with doxycycline, responded well, then relapsed, treated with oxytetracycline and later died; diagnosis consistent with neuroborreliosis.]


[Eleven months following treatment, T-cell stimulation test with Bb antigens were strongly positive; a year later, paired serum and CSF samples were strongly positive.]


MacDonald AB. Intraneuronal spirochetes. Med Hypotheses 2007; 68: 822-825. [7 of 10 cases of Alzheimer’s disease had B. burgdorferi in their brains].


Masters EL, Lynxwiler P, and Rawlings J. Spirochecemia after continuous high-dose oral amoxicillin therapy. Infect Dis Clin Practice 1995; 3: 207-208. [Following six months of treatment, patient relapsed and Bb was cultured from blood.]


Miklossy, J. 2011. Alzheimer’s disease – a neurospirochoptosis. Analysis of the evidence following Koch’s and Hill’s criteria. 2011: 8: 90 [http://www.jneuroinflammation.com/content/8/1/90] [91% of the brains of Alzheimer’s patients sampled were positive for spirochetes; 25% of Alzheimer’s patients analyzed had *B. burgdorferi* spirochetes in their brains. Persistence occurs when spirochetes change physical characteristics by converting to dormant cysts.]


Nocton JJJ, Dressler F, Rutledge BJ, Rys PN, Persing DH, and Steere AC. Detection of *Borrelia burgdorferi* DNA by polymerase chain reaction in synovial fluid from patients with Lyme arthritis. N Engl J Med 1994; 330: 229-234. [Of 19 Lyme arthritis patients treated with either parenteral antibiotics or long courses of oral antibiotics, PCR confirmed Bb detected in synovial fluid of 37% of patients.]


Preac Mursic V, Marget W, Busch U, Rigler DP, Hagl S. Kill kinetics of Borrelia burgdorferi spheroplast-L-form variants. Infection 1996; 24(1): 9-16. [Bb was isolated by culture in five patients, four of whom had previously been treated with antibiotics.]


Oksi J, Marjamäki M, Nikoskelainen J, and Viljanen MK. Borrelia burgdorferi detected by culture and PCR in clinical relapse of disseminated Lyme borreliosis. Ann Med 1999; 31(3): 225-232. [40% (13/32) patients had clinical relapses that were PCR or culture confirmed.]


269. Singh SK and HJ Girschick. Molecular survival strategies of the Lyme disease spirochete Borrelia burgdorferi. Lancet Infect Dis 2004; 4: 575-583. [B. burgdorferi survives in brachytophic tissue (ligament, tendon), fibroblasts, synovial cells, endothelial cell (linings of blood and heart vessels, and lymph vessels), deep invaginations of cell membranes, myocytes, joints, eyes, and bones.]


273. Straubinger RK, Straubinger AF, Jacobson RH, Chang Y, Summers BA, Erb HN, and Appel MJG. Two lessons from the canine Lyme model of Lyme disease: migration of Borrelia burgdorferi in tissues and persistence after antibiotic treatment. J Spir Tick-Borne Dis 1997; 4: 24-31. [In dogs: 30-day treatment diminished but failed to eliminate persistent infection in dogs. Antibody titers fell, but after antibiotic treatment was discontinued antibody levels began to rise again, presumably in response to proliferation of the surviving pool of spirochetes.]


275. Straubinger RK. PCR-based quantification of Borrelia burgdorferi organisms in canine tissues over a 500-day postinfection period. J Clin Microbiol 2000; 38: 2191-2199. [All 8 infected dogs previously treated with 30-day antibiotics were PCR positive from tissue samples after necrosis; 25 tissue samples per dog were used. Interestingly, the number of B. burgdorferi organisms detected in skin biopsy samples was inversely to the antibody levels measured by enzyme-linked immunosorbent assay.]


Zhang JR, Hardham JM, Barbour AG, and Norris SJ. Antigenic variation in Lyme disease borreliae by promiscuous recombination of


Sung SY, McDowell JV, Carlyn JA, and Marconi RT. Mutation and recombination in the upstream homology box-flanked ospE-related genes of the Lyme disease spirochetes result in the development of new antigenic variants during infection. Infect Immun 2000; 68; 1319-1327.


Sung SY, McDowell JV, Carlyn JA, and Marconi RT. Mutation and recombination in the upstream homology box-flanked ospE-related genes of the Lyme disease spirochetes result in the development of new antigenic variants during infection. Infect Immun 2000; 68; 1319-1327.


Psychiatric Symptoms and Lyme/Tick-Borne Diseases

This section is organized alphabetically by the title of the article.


Acute Lyme Neuroborreliosis With Transient Hemiparesis and Aphasia AUTHORS: Sokolov A, Liendard R, Du Pasquier R, Véronique Erard V


Altered mental status, an unusual manifestation of early disseminated Lyme disease: A case report. AUTHORS: Chabria SB, Lawrason J.


Alzheimer's disease: Braak Stage progressions: reexamined and redefined as Borrelia infection transmission through neural circuits. AUTHOR: MacDonald AB.

SOURCE: Alzheimer's and Dementia. Vol 5;4, July 2009, p 348-360

Alzheimer's neuroborreliosis. Analysis of the evidence following Koch's and Hill's criteria. AUTHORS: Miklossy J.


Alzheimer's disease Braak Stage progressions: reexamined and redefined as Borrelia infection transmission through neural circuits. AUTHORS: MacDonald AB.

SOURCE: NEJM. May 22nd, 2015


Antoni-neutral antibody reactivity in patients with a history of Lyme borreliosis and persistent symptoms. AUTHORS: Strirer RB, Johnson L

SOURCE: Brain, Behavior, and Immunity 2010; 1-1025

Anti-neutral antibody reactivity in patients with a history of Lyme borreliosis and persistent symptoms. AUTHORS: Volkman D.


The association between tick-borne infections, Lyme borreliosis and autism spectrum disorders. AUTHORS: Bransfield RC, Wulfman JS, Harvey WT, Usman AI.

SOURCE: Medical Hypotheses. 5 Nov 2007


Audiologic manifestations of patients with post-treatment Lyme disease syndrome. AUTHORS: Shotland LI, Mastrioanni MA, Choo DL, Szymko-Bennett YM, Dally LG, Pikus AT, Stricker RB, Johnson L, Miklossy J.


http://dx.doi.org/10.1186/1756-3305-6-101


SOURCE:

Breitschwerdt EB. Maggi RG, Nicholson WL, Cherry NA, Woods CW.

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McIntyre, EB. Maggi RG, Cadenas MB, Vissotto de Paiva Diniz PP.

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Behavioral Consequences of Infections of the Central Nervous System: With Emphasis on Viral Infections. AUTHORS: Tsolis A, MD, Booss J


Bell's Palsy of the Gut and other Manifestations of Lyme and Associated Diseases. AUTHOR: Sherr VT
SOURCE: Practical Gastroenterology April 2006

http://www.dovepress.com/articles.php?article_id=8224

Bilateral dorsolateral thalamic lesions disrupts conscious recollection. AUTHORS: Edelstyn NM, Hunter B, Ellis SJ

http://www.consultant360.com/articles/borrelia-burgdorferi-clinical-chameleon


Chronic ehrlichiosis. AUTHORS: Ratnasamy N, Everett ED, Roland WE, McDonald G, Caldwell CW.


**Chronic neurologic manifestations of *erythema migrans* borreliosis.** **AUTHORS:** Ackermann R, Rehse-Kupper B, Gollmer E, Schmidt R. **SOURCE:** Ann N Y Acad Sci. 1988;539:16-23.

**Chronic neurologic manifestations of *lyme* disease.** **AUTHORS:** Logigian EL, Kaplan RF, Steere AC. **SOURCE:** N Engl J Med. 1990 Nov 22;323(21):1438-44.

Chronic or late Lyme neuroborreliosis: analysis of evidence compared to chronic or late neurosyphilis. **AUTHORS:** Miklossy J. **SOURCE:** Open Neurol J 2012; 6: 146-57.


**Cognitive processing speed in *lyme* disease.** **AUTHORS:** Pollina DA, Sliwinski M, Squires NK, Krupp LB. **SOURCE:** Neuropsychol Behav Neurol. 1999 Jan;12(1):72-8.


Concurrent infection of the central nervous system by *Borrelia burgdorferi* and *Bartonella henselae*: evidence for a novel tick-borne disease complex. **AUTHORS:** Eskow E, Rao RV, Mordechai E. **SOURCE:** Arch Neurol. 2001 Sep;58(9):1357-63.


**Concurrent medical conditions with pediatric bipolar disorder.** **AUTHORS:** Scheffer RE, Linden S. **SOURCE:** Curr Opin Psychiatry. 2007 Jul;20(4):398-401. Review.

**Consequences of treatment delay in *lyme* disease.** **AUTHORS:** Cameron DJ. **SOURCE:** J Evol Clin Pract. 2007 Jun;13(3):470-2.

**Constipation Heralding Neuroborreliosis**. **AUTHORS:** Shamin A, Shamin S; Liss G; Nylen E; Pincus J; Yepes M. **SOURCE:** Arch Neurol. 2005;62:671-673.


**Correlates of Perceived Health-Related Quality of Life in Post-treatment Lyme Encephalopathy.** **Authors:** Chandra AM, Keilp JG, Fallon BA **Source:** Psychosomatics 2013(Jul) **Full Text:** [http://www.lymmedicasesassociation.org/Tager.pdf](http://www.lymmedicasesassociation.org/Tager.pdf)

Delirium and *lyme* disease. **AUTHORS:** Caliendo MV, Kushon DJ, Helz JW. **SOURCE:** Psychosomatics. 1995 Jan-Feb;36(1):69-74.


**Dementia associated with infectious diseases.** **AUTHOR:** Almeida OP, Lautenschlager NT. **SOURCE:** Int Psychogeriatr. 2005;17 Suppl 1:S65-77. Review.


Human babesiosis—an unrecorded reality. **AUTHOR:** Sherr VT. **SOURCE:** Med Hypotheses. 2004;63(4):609-15


Infectious Agents in Schizophrenia and Bipolar Disorder. **AUTHORS:** Yolken RH, Torrey EF. **SOURCE:** 2006 June 43(7)


Inflammatory brain changes in Lyme disease: A report on three patients and review of literature; **AUTHORS:** Oksi J, Kalimo H, Marttila RJ, Marjarnaki M, Sonninen P, Nikoskelainen J, Viljanen MK. **SOURCE:** Brain, 1996 Dec; 119 (Pt 6) : 2143-2154


Inflammatory brain changes in Lyme disease: A report on three patients and review of literature; **AUTHORS:** Oksi J, Kalimo H, Marttila RJ, Marjarnaki M, Sonninen P, Nikoskelainen J, Viljanen MK. **SOURCE:** Brain, 1996 Dec; 119 (Pt 6) : 2143-2154


Outcomes of cases of chronic disseminated Lyme disease for 3 infected physicians, described in their own essays. AUTHORS: Sherr V SOURCE: 2000. Available online at www.thehumansideoflyme.net


PET imaging of microglia activation in neuropsychiatric disorders with potential infectious origin. AUTHORS: Klein HC, de Witte L, Bransfield RC, De Deyn PP. SOURCE: In Print. 2014. Copyright Holder Springer-Verlag Berlin Heidelberg


SPECT Brain Imaging in Chronic Lyme Disease. **AUTHORS:** Ona ST, Noto RB, Vento JA. **SOURCE:** Clinical Nuclear Medicine & Volume 37, Number 9, September 2012


Subarachnoid hemorrhage in a patient with Lyme disease. **AUTHORS:** Cheherama M, Zagardo MT, Koski CL. **SOURCE:** Neurology (1997);48:520-523

**Successful treatment of Lyme encephalopathy with intravenous ceftriaxone.** **AUTHORS:** Logigian EL, Kaplan RF, Steere AC. **SOURCE:** J Infect Dis. 1999 Aug;180(2):377-83.


The neuropsychiatric assessment of Lyme disease **AUTHORS:** Bransfield, R. **SOURCE:** Available online at www.mentalhealthandillness.com

The neuropsychiatric manifestations of Lyme Borreliosis. **AUTHORS:** Fallon BA, Niels J, Burrascano JJ, Liegner K, DeBene D, Liebowitz MR. **SOURCE:** Psychiatric Quarterly 1992; 63: 95-117


Tick-borne infections—a growing public health threat to school-age children. Prevention steps that school personnel can take. **AUTHORS:** Hamlen R **SOURCE:** NASN Sch Nurse 2012(Mar); 27(2): 94-100. http://nas.sagepub.com/content/27/2/94


Tick-borne infections—a growing public health threat to school-age children. Prevention steps that school personnel can take. **AUTHORS:** Hamlen R **SOURCE:** NASN Sch Nurse 2012(Mar); 27(2): 94-100. http://nas.sagepub.com/content/27/2/94

Wann ist eine Borreliose eine Neuroborreliose? Die Borreliose und ihre neuro-psychiatrischen Symptome. AUTHORS: Lorenz M, Redecker H


A 25-year-old woman with hallucinations, hypersexuality, nightmares, and a rash. AUTHORS: Stein SL, Solvason HB, Biggart E, Spiegel D.


Additional Articles:
Aggression and Lyme Disease, Bransfield R.
All In Your Head?, Bransfield R.
A Tale of Two Spirochetes, Bransfield R.
Lyme Disease and Cognitive Impairments, Bransfield R.
Lyme, Depression, and Suicide, Bransfield R.

Lyme Neuroborreliosis and Aggression, Bransfield RC.

14th International Scientific Conference on Lyme Disease and Other Tick-Borne Disorder. April 21-23, 2001

Tick-Borne Diseases and Dementia

This list is organized by date.

Tick-Borne Disease and Autism Spectrum Disorders


Compiled by Robert Bransfield, MD, DLFAPA, Rutgers-RWJ Medical School, July 2015

Congenital Transmission of Lyme/TBD
