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Lifespan Lyme Disease Center

Links to Approved Sources Regarding Lyme Disease

The Lifespan Lyme Disease Center encourages patients to be proactive about their health and wellbeing. This includes being well informed about their illness. To supplement the information you can find on our website, this page can direct you to other reliable sources regarding Lyme disease. We hope you find this helpful!

****Good research tips:** For even more information about a topic, check out the citations listed in the bibliography of each source. Usually a quick copy and paste into Google will find the desired article. To speed up your research: the abstract and discussion sections of study papers will provide you with the best synopsis of the source without all the technical information if you don't need it.

General Lyme and Tick Information

1. **Description of source:** CDC detailed information about tick prevention, removal, prevalence by area, and tick-borne illnesses.

Link: www.cdc.gov/ticks/index.html

Citation: "Ticks." *CDC.gov*. Centers for Disease Control, 14 June 2016. Web. 28 June 2016.

2. **Description of source:** This website is written by specialists at the University of Rhode Island for local tick information. This includes prevalence, tick prevention, and tick removal. Includes interesting links for creative solutions to avoid Lyme disease including a DIY tick repellent for your clothing.

Link: <http://www.tickencounter.org/prevention>

Citation: "Prevention." *Tickencounter.org*. University of Rhode Island, 2016. Web. 28 June 2016.

3. **Description of source:** This study analyzed 361 journal articles in depth to formulate a comprehensive review about tickborne illnesses.

Link: <https://jamanetwork.com/journals/jama/fullarticle/2516719>

Citation: Sanchez E, Vannier E, Wormser GP, Hu LT. Diagnosis, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: A Review. (2016) *JAMA*. 315(16):1767-77. doi:10.1001/jama.2016.2884.

Testing for Lyme Disease

4. **Description of source:** CDC explaining Lyme testing procedures (mainly two-tiered testing) and result analysis. Also lists tests NOT recommended by the CDC.

Link: <http://www.cdc.gov/lyme/diagnostesting/index.html>

Citation: "Diagnosis and Testing." *CDC.gov*. Center for Disease Control, n.d. Web. 8 July 2016.

5. **Description of source:** A study describing findings that explain why Lyme testing after antibiotic treatment is not accurate.

Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3592055/>

Citation: Iyer R, Mukherjee P, Wang K, Simons J, Wormser GP, Schwartz I. "Detection of *Borrelia burgdorferi* Nucleic Acids after Antibiotic Treatment does not confirm viability." *J Clin Microbiol*. (2013) Mar; 51(3): 857-62. doi: 10.1128/JCM.02785-12.

6. **Description of source:** A study concludes that using metabolic biosignatures to detect early Lyme disease may be more sensitive and specific than two-tier testing.

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4810808/>

Citation: Molins CR, Ashton LV, Wormser GP, Hess AM, Delorey MJ, Mahapatra S, Schriefer ME, Belisle JT. "Development of a Metabolic Biosignature for Detection of Early Lyme Disease". *Clin Infect Dis*. (2015) Jun 15;60(12): 1767-75. doi: 10.1093/cid/civ185.

7. **Description of source:** Study condemning the use of CD57 counts as an indicator of Lyme disease.

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2725528/pdf/0167-09.pdf>

Citation: Marques A, Brown MR, Fleisher TA. Natural killer cell counts are not different between patients with post-Lyme disease syndrome and controls. *Clin Vaccine Immunol*. (2009) Aug; 16(8): 1249-50. doi: 10.1128/CDI.00167-09.

8. **Description of source:** Study supporting the use of CD57 counts as an indicator of Lyme disease.

Links: <https://www.sciencedirect.com/science/article/abs/pii/S0165247800003163>

Citation: Stricker RB, Winger EE. Decreased CD57 lymphocyte subset in patients with chronic Lyme disease. (Abstract only) *Immunol Lett*. (2001) Feb 1; 76(1): 43-8.

9. **Description of source:** The official notice sent out by the CDC after its 1994 conference that decided on officially recognizing two-tiered testing as the preferred method for Lyme testing. They explain the reason for their decision and specifics about serological diagnostic criteria.

Link: www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm

Citation: “Notice to Readers: Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease”. *CDC.gov*. Centers for Disease Control. 19 Sep 1998. Web. 18 July 2016.

10. **Description of source:** Study comparing Lyme testing using the two-tiered method versus a C6 peptide ELISA. Study found results were very similar between the two tests.

Link: <https://academic.oup.com/cid/article/47/2/188/357251>

Citation: Steere AC, McHugh G, Damle N, Sikand VK. Prospective study of serologic tests for Lyme disease. *Clin Infect Dis*. (2008) Jul 15;47(2): 188-95. doi: 10.1086/589242.

11. **Description of source:** Detailed Mayo Clinic analysis of Lyme testing using the two-tiered method. Includes specific procedural details from the lab and how to interpret results of testing.

Link: <https://www.mayomedicallaboratories.com/test-catalog/Clinical+and+Interpretive/9129>

Citation: “Test ID: LYME: Lyme Disease Serology, Serum.” *Mayomedicallaboratories.com*. Mayo Clinic, n.d. Web. 18 July 2016.

Taking Doxycycline

12. **Description of source:** Taking antibiotics such as Doxycycline can leave patients susceptible to an infection called C. difficile. The Mayo clinic describes the illness and how to prevent and treat it.

Link: <https://www.mayoclinic.org/diseases-conditions/c-difficile/symptoms-causes/syc-20351691>

Citation: “C. Difficile Infection.” *MayoClinic.org*. Mayo Clinic, n.d. Web. 11 July 2016.

13. **Description of source:** Detailed information listing what you need to know about taking Doxycycline.

Link: <https://medlineplus.gov/druginfo/meds/a682063.html>

Citation: “Doxycycline: MedlinePlus Drug Information.” *Medlineplus.gov*. NIH, 1 Sept 2010. Web. 06 Aug. 2016.

14. **Description of source:** Study demonstrates how taking antibiotics for longer than a few weeks does not prove more effective than a placebo control group. In fact, patients taking long term antibiotics were sicker because of antibiotic side effects.

Link: <https://www.healio.com/infectious-disease/emerging-diseases/news/in-the-journals/%7ba31ca3f8-07c3-4684-a57f-85a3daad76e9%7d/longer-therapy-shows-no-added-benefit-for-persistent-lyme-disease-symptoms>

Citation: Berende A, Ter Hofstede HJM, van Middendorp H. “Longer Therapy shows no added benefit for persistent Lyme disease symptoms.” *Healio.com*. Healio, 16 Mar. 2016. Web. 27 July 2016.

15. **Description of source:** Study demonstrating that taking a small course of Doxycycline after finding an attached tick can reduce transmission of Lyme by 80%.

Link: https://www.nejm.org/doi/10.1056/NEJM200107123450201?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dwww.ncbi.nlm.nih.gov

Citation: Nadelman RB, Nowakowski J, Fish D, Falco RC, Freeman K, McKenna D, Welch P, Marcus R, Aguero-Rosenfeld ME, Dennis DT, Wormser GP: Tick Bite Study Group. “Prophylaxis with single-dose Doxycycline for the prevention of Lyme disease after an *Ixodes scapularis* tick bite”. *N Engl J Med*. (2001) Jul 12;345(2):79-84.

Misconceptions about Lyme Explained

16. **Description of source:** Describes the controversy surrounding long term Lyme symptoms. Explains how long term non-specific symptoms can be used as evidence for misguided perceptions about Lyme.

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4440423/pdf/IDR-8-119.pdf>

Citation: Halperin JJ. “Chronic Lyme disease: Misconceptions and challenges for patient management”. *Infect Drug Resist*. (2015) May 15; 8: 119-28. Doi: 10.2147/IDR.S66739.

17. **Description of source:** Editorial commentary about how non-pharmaceutical methods can help alleviate post Lyme symptoms. Discusses drawbacks of treating with long-term antibiotics.

Link: <http://cid.oxfordjournals.org/content/early/2015/04/06/cid.civ187.full>

Citation: Steere AC, Arvikar SL. “Editorial commentary: What constitutes appropriate treatment of post-Lyme disease symptoms and other pain and fatigue syndromes?” *Clin Infect Dis*. (2015) Jun 15; 60(12): 1783-5. doi: 10.1093/cid/civ187.

18. **Description of source:** This study analyzed the websites of facilities that advocate for alternative treatment of Lyme disease. Describes the most common alternative therapies and why they may not be scientifically validated. Discusses the reasons for so many alternative options available on the internet.

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4490322/pdf/civ186.pdf>

Citation: Lantos PM, Shapiro ED, Auwaerter PG, Baker PJ, Halperin JJ, McSweegan E, Wormser GP. "Unorthodox alternative therapies marketed to treat Lyme disease". *Clin Infect Dis*. (2015) Jun 15; 60(12): 1776-82. Doi: 10.1093/cid/civ186.

19. **Description of source:** Lyme disease as part of the anti-science movement and the damaging effect this movement has on medicine.

Link: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4489928/>

Citation: Auwaerter PG, Bakken JS, Dattwyler RJ, Dumler JS, Halperin JJ, McSweegan E, Nadelman RB, O'Connell S, Shapiro ED, Sood SK, Steere AC, Weinstein A, Wormser GP. "Antiscience and ethical concerns associated with advocacy of Lyme Disease. *Lancet Infect Dis*. (2011) Sep; 11(9): 713-9. doi: 10.1016/S1473/3099(11)70034-2.

20. **Description of source:** Defines chronic Lyme and explains its prevalence throughout the population while maintaining the notion that the symptoms often have other causes than persistent Lyme infection.

Link: https://www.nejm.org/doi/10.1056/NEJMra072023?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dwww.ncbi.nlm.nih.gov

Citation: Feder HM, Johnson BJ, O'Connell S, Shapiro ED, Steere AC, Wormser GP and the Ad Hoc International Lyme Disease Group. Current Concepts: A Critical Appraisal of "Chronic Lyme Disease". *N Engl J Med* (2007) Oct 4; 357(14): 1422-30.

21. **Description of source:** Analysis of two studies that concluded with no evidence for persistent infection with *B. Burgdorferi* but confirmed a re-infection with Lyme (two separate incidences, not one persistent infection).

Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311275/>

Citation: Shapiro ED. "Repeat or persistent Lyme disease: persistence, recrudescence or reinfection with *Borrelia Burgdorferi*?" *F1000Prime Rep*. (2015) Jan 5; 7:11.

General Wellness Sources

22. **Description of source:** Study shows that Lyme patients actually live healthier lives in the long run, than people who have never had Lyme. Also describes the increased incidences of Lyme disease within the last few years.

Link: <http://www.healio.com/rheumatology/infection/news/online/%7Bc7e19499-c8cb-4ec2-b1f7-e4e45a4772f6%7D/lyme-patients-report-higher-qol-over-time-than-general-population>

Citation: Wills AB, Eisen RJ. "Lyme Patients Report Higher QOL (Quality of Life) over Time than General Population." *Healio.com*. Healio, 6 Apr. 2016. Web 27 July 2016.

23. **Description of source:** Information about the Newport Hospital Sleep Clinic and their contact information, if you feel your sleeping troubles warrant medical investigation.

Link: <https://www.lifespan.org/centers-services/sleep-disorders-center>

Citation: "Sleep Disorders Center". *Http://www.newporthospital.org/*. Lifespan, n.d. Web. 27 July 2016.

24. **Description of source:** CDC guidelines and information about sleep disorders. Explore options to help you sleep better and general information about the importance of sleep.

Link: <http://www.cdc.gov/sleep/index.htm>

Citation: "Sleep and Sleep Disorders". *CDC.gov*. Centers for Disease Control and Prevention. Web. 27 July 2016.

25. **Description of source:** Comprehensive information about the dangers of smoking and the global effort to curb the use of cigarettes. Includes state and community resources for tobacco control.

Link: https://www.cdc.gov/tobacco/data_statistics/index.htm?s_cid=osh-stu-home-nav-005

Citation: "Smoking & Tobacco Use." *CDC.gov*. Centers for Disease Control, 17 Feb. 2016. Web. 18 July 2016.

26. **Description of source:** About the mental benefits of exercise.

Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC474733/pdf/i1523-5998-6-3-104.pdf>

Citation: Craft LL, Pema FM. "The Benefits of Exercise for the Clinically Depressed." *Prim Care Companion J Clin Psychiatry*. (2004) Feb 5; 6(3): 104-11.

27. **Description of source:** About how exercise promotes a healthy body.

Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2540212/pdf/bmj00440-0047.pdf>

Citation: Fentem PH. "ABC of sports medicine. Benefits of exercise in health and disease". *BMJ. British Medical Journal*. (1994) May 14; 308(6939): 1291-5.

28. **Description of source:** All about the CDC's recommendations for general physical activity (remember, you may need to follow modified exercise recommendations outside of the CDC guidelines). Discuss this with your doctor.

Link: <https://www.cdc.gov/physicalactivity/>

Citation: "Physical Activity." *CDC.gov*. Centers for Disease Control, n.d. Web. 8 July 2016.

29. **Description of source:** Harvard discusses the science behind antioxidants and why they are good for you.

Link: www.hsph.harvard.edu/nutritionsource/antioxidants

Citation: “Antioxidants: Beyond the Hype.” *www.hsph.harvard.edu*. Harvard, n.d. Web. 21 June 2016.

30. **Description of source:** The Mayo Clinic gives examples of how to add antioxidants to your diet.

Link: www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/multimedia/antioxidants/sls-20076428?s=7

Citation: “Nutrition and Healthy Eating: Adding Antioxidants to Your Diet”. *MayoClinic.org*. Mayo Clinic, n.d. Web. 21 June 2016

31. **Description of source:** Describes the role of gut microbiota in human health and disease.

Link: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4566439/>

Citation: Bull MJ, Plummer NT. “Part 1: The Human Gut Microbiome in Health and Disease.” *Ingr Med (Encinitas)*. (2014) Dec; 13(6): 17-22

32. **Description of source:** The USDA revised the Food Pyramid we all grew up with. Now, instead of a pyramid, it is a plate showing portion sizes of the food groups you should have at every meal.

Link: www.choosemyplate.gov/MyPlate

Citation: “My Plate.” *Http://www.choosemyplate.gov/MyPlate*. USDA, n.d. Web. 21 June 2016.

33. **Description of source:** They Mayo Clinic discusses how to curb your salt intake. They give examples of high sodium foods that you may not know have a lot of salt.

Link: <https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/sodium/art-20045479>

Citation: “Sodium: How to Tame Your Salt Habit.” *MayoClinic.org*. Mayo Clinic, n.d. Web. 21 June 2016.

34. **Description of source:** The CDC describes the opioid addition epidemic and what can be done to stop it. This includes regulations or prescribing opioids for chronic pain which may be of interest to Lyme patients.

Links: www.cdc.gov/drugoverdose/epidemic/index.html

Citation: “Injury Prevention & Control: Opioid Overdose.” *CDC.gov*. Centers for Disease Control, n.d. Web. 11 July 2016.

35. **Description of source:** Learn to recognize the symptoms of opioid withdrawal. People taking prescription medications should beware of these signs even when taking them under strict guidelines. Call your doctor if you have any of these symptoms.

Link: <https://americanaddictioncenters.org/withdrawal-timelines-treatments/opiate/>

Citation: “Opiate Withdrawal Timelines, Symptoms and Treatment.” *Http://americanaddictioncenters.org/*. American Addiction Centers, n.d. Web. 11 July 2016.

36. **Description of source:** Sports Illustrated addresses the problem of opioid addiction in young athletes who have been given the medication for sports injuries. This article has suggested that there must be much stricter guidelines for prescribing such strong medications.

Link: www.si.com/more-sports/2015/06/18/special-report-painkillers-young-athletes-heroin-addicts

Citation: Rodriguez K, Werthiem J. “Special Report: How Painkillers are turning young athletes into Heroin addicts.” *How Painkillers are turning young athletes into heroin addicts*. Sports Illustrated, 22 June 2015. Web. 11 July 2016.

37. **Description of source:** SAMHSA is a government organization dedicated to helping addicts. Their website directs you to the help centers nearest to you.

Link: <https://findtreatment.samhsa.gov>

Citation: SAMHSA.gov. *Substance Abuse and Mental Health Service Administration*, n.d. Web. 11 July 2016.

38. **Description of source:** This review of scientific literature explains a clear link between opioid use and immunosuppression. Lyme patients should consider the impact of these medications on their Lyme recovery.

Links:

https://journals.lww.com/americantherapeutics/Fulltext/2004/09000/Opioid_Therapy_and_Immunosuppression__A_Review.5.aspx

Citation: Vallejo R, deLeon-Casasola O, Benyamin R. “Opioid Therapy and Immunosuppression: A review”. *AM J Ther*. (2004) Sep-oct; 11(5): 354-65.
