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Lyme Persists

BACTERIAL PERSISTENCE IN LYME DISEASE: A GUIDE FOR MORE COMPLETE PATIENT CARE

PROJECT lyme

#LYMEPERSISTS

Approximately 10-20% of patients treated with a short course of antibiotics will experience long-term symptoms.[6]

In Lyme disease treatment, there are two phases of interest regarding bacterial growth:

- The logarithmic (log) phase: a period of exponential (rapid) growth, such as an acute infection.
- The stationary phase: a period when bacterial population growth has stabilized. In this phase, *Borrelia burgdorferi* is more resistant to antibiotics.

All forms of a Lyme infection must be addressed for a patient to regain health.

SOURCES

Visit projectlyme.org/lyme-persists for direct links and in-depth breakdowns of studies from research institutions including **Johns Hopkins University, Columbia University, Tulane University, and more.**

In this guide:

(1) Middelveen MJ, Sapi E, Burke J, et al. Persistent Borrelia Infection in Patients with Ongoing Symptoms of Lyme Disease. Healthcare (Basel). 2018;6(2):33. Published 2018 Apr 14. doi:10.3390/healthcare6020033

(2) Feng J, Wang T, Shi W, et al. Identification of novel activity against Borrelia burgdorferi persisters using an FDA approved drug library. Emerg Microbes Infect. 2014;3(7):e49. doi:10.1038/emi.2014.53

(3) Sapi E, Kasliwala RS, Ismail H, et al. The Long-Term Persistence of Borrelia burgdorferi Antigens and DNA in the Tissues of a Patient with Lyme Disease. Antibiotics (Basel). 2019;8(4):183. Published 2019 Oct 11. doi:10.3390/antibiotics8040183

(4) Sapi E, Bastian SL, Mpoy CM, et al. Characterization of biofilm formation by Borrelia burgdorferi in vitro. PLoS One. 2012;7(10):e48277. doi:10.1371/journal.pone.0048277

Melia, M. T., & Auwaerter, P. G. Time for a Different Approach to Lyme Disease and Long-Term Symptoms. New England Journal of Medicine 2016 374(13):1277

(5) Feng J, Shi W, Zhang S, Sullivan D, Auwaerter PG, Zhang Y. A Drug Combination Screen Identifies Drugs Active against Amoxicillin-Induced Round Bodies of In Vitro Borrelia burgdorferi Persisters from an FDA Drug Library. Front Microbiol. 2016;7:743. Published 2016 May 23. doi:10.3389/fmicb.2016.00743

(6) Maloney EL. Controversies in Persistent (Chronic) Lyme Disease. J Infus Nurs. 2016;39(6):369-375. doi:10.1097/NAN.0000000000000195

Sapi E, Kasliwala RS, Ismail H, et al. The Long-Term Persistence of Borrelia burgdorferi

DESPITE CDC-RECOMMENDED ANTIBIOTIC TREATMENT, SYMPTOMS CAN LINGER.[1]

OVER 700 PEER-REVIEWED STUDIES SUGGEST THE ABILITY OF LYME AND OTHER TICK-BORNE INFECTIONS TO PERSIST AGAINST ANTIBIOTICS.

THE SCIENCE

CDC-recommended antibiotic treatment is not supported by scientific research.[2]

While the optimal treatment has yet to be determined, research shows that the most successful Lyme disease treatment involves a combined approach that addresses all forms of the infection.[3]

Spirochetes

The corkscrew-shaped cells for which *Borrelia burgdorferi*, the causative agent of Lyme disease, is known.

Round Body Forms

Spirochetes have been shown to turn into round-shaped forms in response to unfavorable environmental conditions, including antibiotic exposure. In vitro studies have found round bodies to be more resistant to antibiotics, with the ability to revert to spirochetes when conditions are suitable.[4]

Biofilms

Biofilms are microcolonies of spirochetes and round bodies shielded from hostile environments by a protective layer, shown in vitro to be the most antibiotic-resistant form of *B. burgdorferi*.[5]