

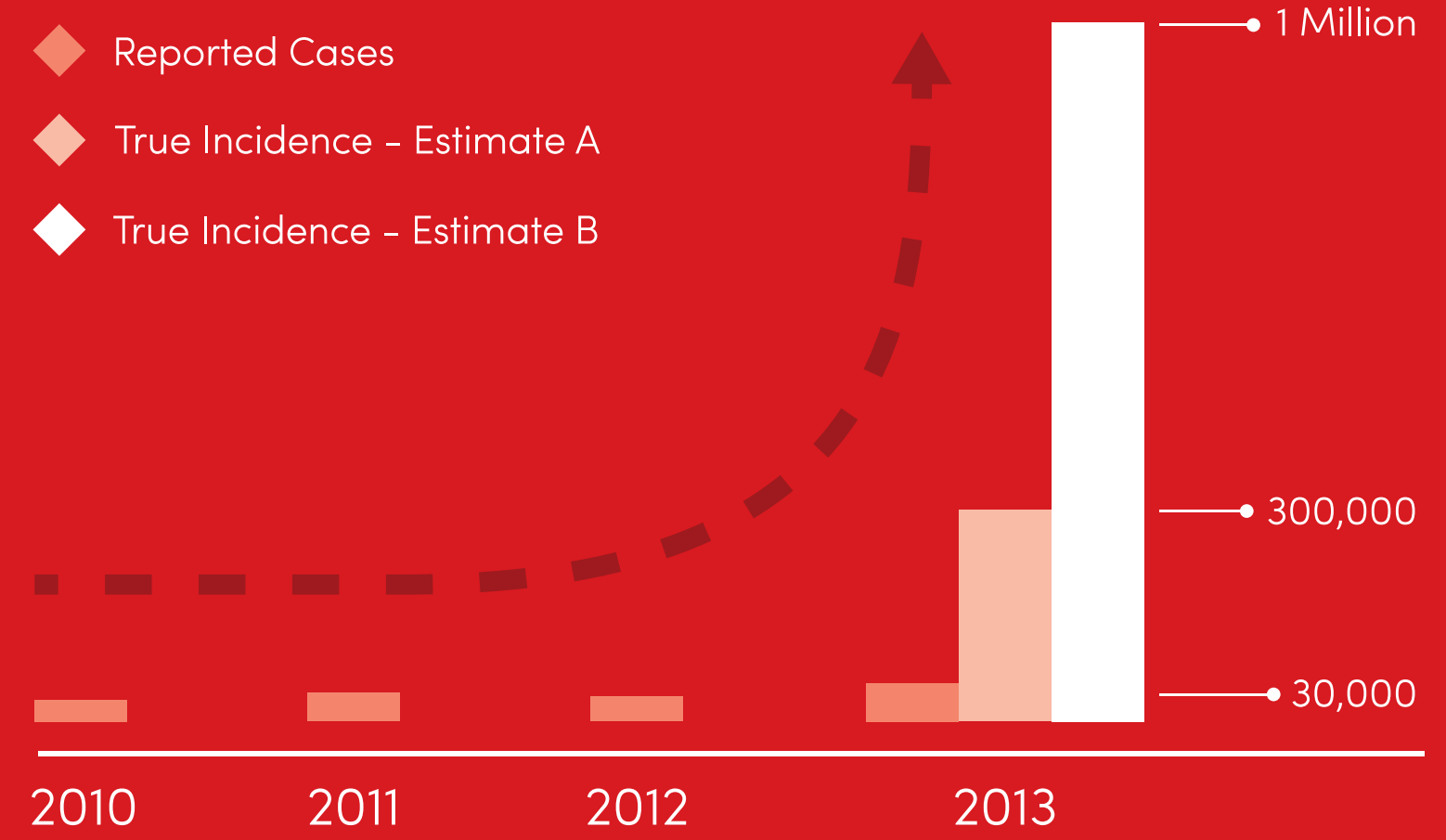
Chelicerae

When a tick bites, it uses telescopic long rods that end in hooked teeth called chelicerae to scrape and puncture skin with little effort. The chelicerae perform a breaststroke maneuver to help drive the main feeding tube (hypostome) deeper into the skin while its hooked teeth keep the tick latched onto the host.

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Source: National Geographic

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Fastest Growing

Lyme disease is the fastest growing vector-borne, infectious disease in the United States.

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Source: CDC, NIH

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Biofilms

Biofilms are polysaccharide-based matrices that protect bacteria from antibiotics and the body's natural fighting mechanisms. Lyme biofilms facilitate persistent infection, making treatment even more difficult.

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Source: NIH

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Not Just Ticks

Mosquitoes can carry Lyme disease and many other serious infections, as can flies, spiders, fleas and mites.

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Source: lymedisease.org.au

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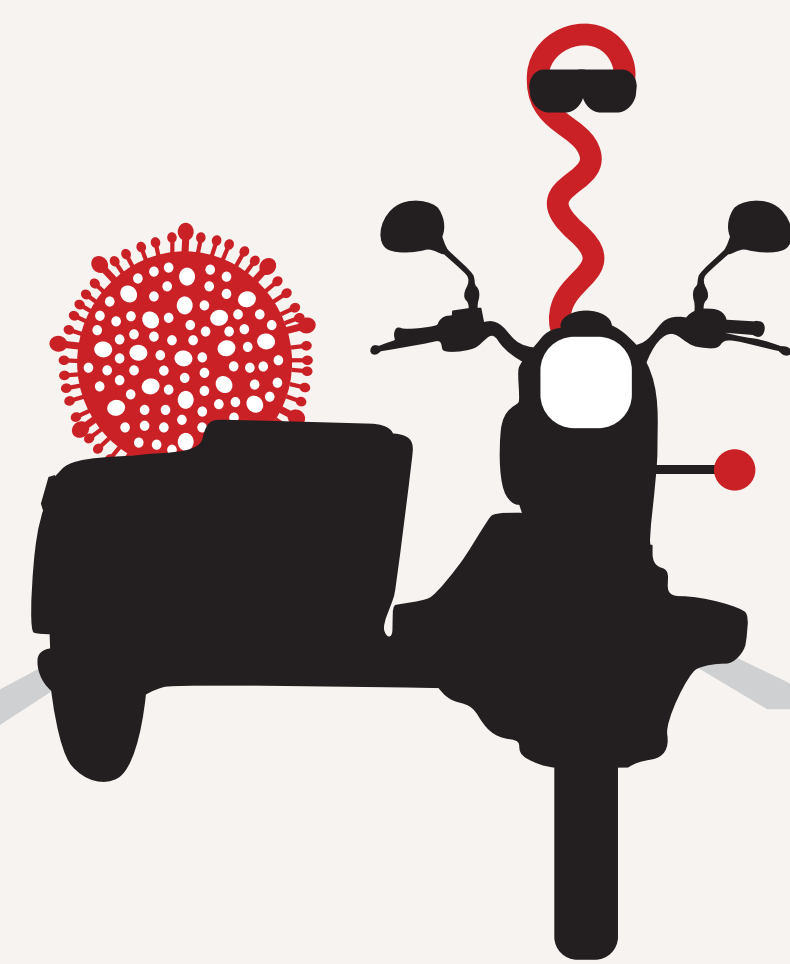
Time Limit

Minimum tick attachment time for transmission of Lyme borreliosis (LB) in humans has never been established. Claims that removal of ticks within 24 or 48 hours of attachment will effectively prevent LB are not supported by the published data. LB infection can never be excluded after a tick bite irrespective of the estimated duration of attachment time.

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Source: PMC

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Co-infections

Co-infections may increase the severity of chronic Lyme symptoms by suppressing the immune system and creating inflammation, thus creating free radicals and oxidative stress.

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Source: Dr. Richard Horowitz, ILADS

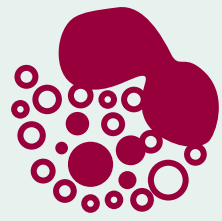
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Borrelia



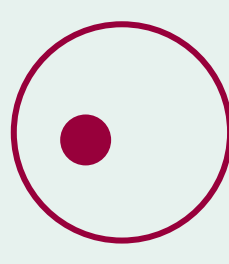
Babesia



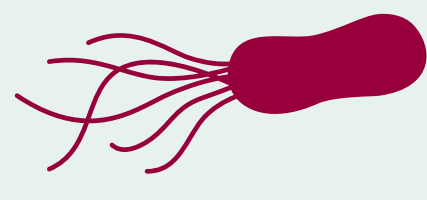
Ehrlichia



Mycoplasma



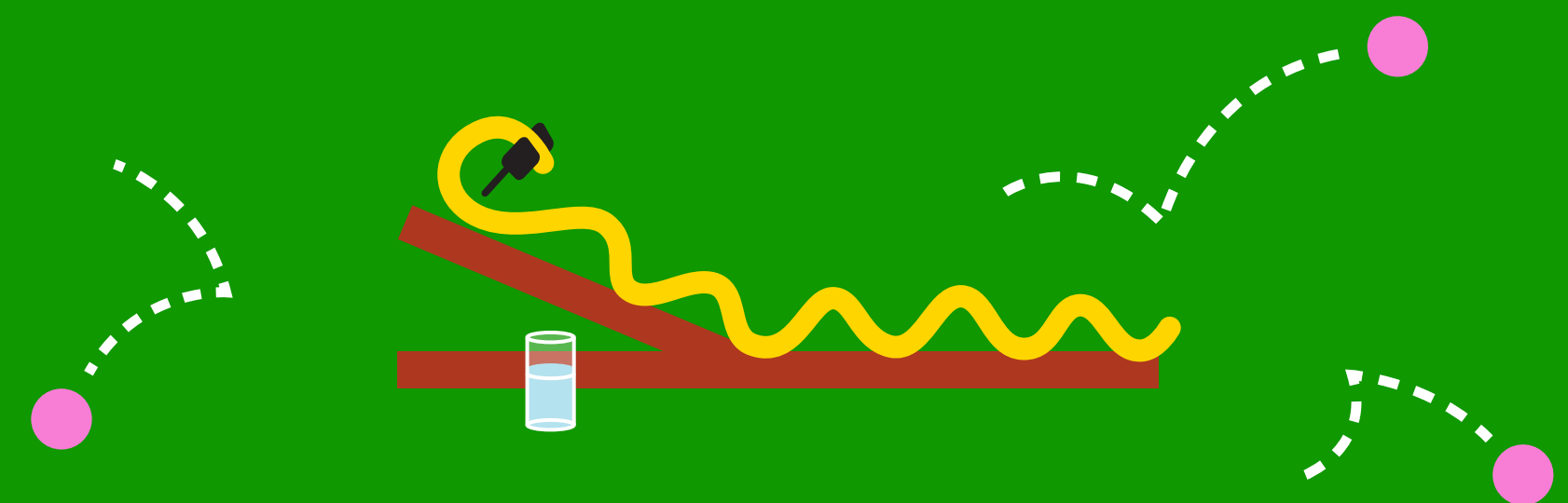
Anaplasma



Bartonella

What is Lyme?

Lyme disease is caused by a cousin of syphilis, the spiral-shaped bacteria, *Borrelia burgdorferi* (Bb). Bb are typically transmitted along with co-infectious parasites, viruses, and other pathogens.



Persisters

A 2015 study examined reasons for the recalcitrance of late stage disease to antibiotics. Antibiotics were used on cultures of *Borrelia burgdorferi*. A small subpopulation of cells survived. Upon regrowth, these cells formed a new subpopulation of antibiotic-tolerant cells, indicating that these are persisters rather than resistant mutants.

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Source: Antimicrobial Agents and Chemotherapy

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1 in 5

Lyme disease may become chronic for 1 in every 5 cases due to persister forms of *Borrelia*.

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Source: Scientific American

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Birds = *Borrelia*

In a 2015 study of birds in Northern California, 57 of the 100 birds that carried ticks had Lyme disease. *Borrelia bissettii*, of European origin, was the most common of the *Borrelia* species found in birds.

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Source: UC Berkeley, PLOS ONE

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Japanese Barberry

University of Connecticut researchers studying an invasive species, Japanese Barberry, have found that the plant creates the perfect, humid environment for ticks. Lyme infected tick populations flourish in the company of this plant and are greatly reduced when it is eliminated.

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Source: University of Connecticut

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Water On The Knee

Spontaneous knee effusion, aka 'water on the knee,' can be a primary symptom of Lyme disease, even when patients do not exhibit a 'bull's eye' rash.

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Source: The Journal of the American Academy of Orthopaedic Surgeons

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