



# Lyme Disease: A Zoonosis Tick-Borne *Borrelia* Bacterium [1/4]

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### Editorial

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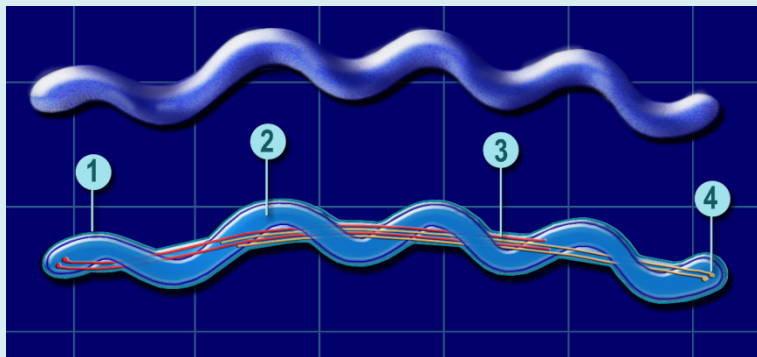
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## Editorial

Lyme disease, also called Lyme borreliosis, is a polymorphic disease associating cutaneous, neurological, cardiac, and articular symptoms. Lyme disease syndrome is erythema migrans, fever, headaches, tiredness, musculoskeletal pain, and cognitive complaints [1]. Lyme disease was first discovered in 1975 by Allen Caruthers Steere in Lyme City, Connecticut, in the United States. The bacterium Spirochete, carried by Ixodes ticks causing Lyme disease, was first discovered in 1982 by Willy Burgdorfer [2-5]. The French physician and microbiologist Amédée Borrel is the first who characterizes the *Borrelia* Spirochete [6].

Lyme disease is a zoonotic disease caused by the *Borrelia* bacteria. This bacterium uses ticks and lice as vectors [7]. It is transmitted to vertebrate hosts by the bites of tick-borne of the genus Ixodes [8]. It is a bacterium from the phylum Spirochaetota, a genus of the Borreliaceae family that belongs to the Spirochaetales order, which is Spirochaetia class. Taxonomy is based on structural features and genomic criteria by molecular phylogenetic analysis of sequence data, like phylogenetic analysis based on 16S rRNA. *Borrelia* is a spiral bacterium with helical morphologies and a gram-negative bacterium. Their outer membrane contains Ops proteins responsible for their virulence. The inner membrane and periplasmic peptidoglycan possessed flagellates for moving. The *Borrelia* genome is composed of linear chromosomes, linear plasmids, and circular plasmids (Figure 1).



**Figure 1:** *Borrelia burgdorferi* (domain Bacteria, phylum Spirochaetota, class Spirochaetia, order Spirochaetales, family Borreliaceae, genus *Borrelia*). 1) envelope of the bacterium, 2) cytoplasm 3) flagellum 4) point of attachment of a flagellum. This image is licensed under creative commons attribution.

Lyme disease is a zoonosis tick-borne disease of the genus *Ixodes*. During attachment, Ticks bite a host patient and ingest *Borrelia* species. By blood-feeding of ticks, *Borrelia* species penetrate the midgut and migrates to the

salivary glands enhancing infection. Tick saliva increases the virulence of tick-borne infection agents. Many interesting tick saliva molecules like OspA, which binds to the tick receptors, are vaccine candidates for Lyme disease (Figure 2).



**Figure 2:** Ticks (kingdom Animalia, phylum Arthropoda, subphylum Chelicerata, class Arachnida, superorder Parasitiformes, order Ixodida, superfamily Ixodoidea, family Ixodidae, genus *Ixodes*). This image is licensed under creative commons attribution 2.0.

These editorials highlight the clinical, epidemiology, and diagnosis of tick-borne pathogenic *Borrelia*. Ticks' role in transmitting Lyme disease is significant, so highlighting the infectious agents tick-borne to humans and animals is primordial [9]. There are two barriers to tick-borne Lyme disease, the host's immunity to tick bites and the tick's immunity to pathogens [10]. In Lyme disease, exposure of the host's immune system to the bacterium *Borrelia* induces chronic immune disease. Many targeting molecules have a role in modulating the immunity system against Lyme disease [11-26].

Accurate and rapid diagnosis with high sensitivities is one of the challenges in the medical field of infectious diseases for quick treatment in infected patients. The detection of the humoral immune response against *Borrelia burgdorferi* infection is based on the detection of antibody response to diagnose Lyme disease. The early diagnosis of Lyme disease remains a significant concern.

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