



Review Article

Borrelia miyamotoi: A human tick-borne relapsing fever spirochete in Europe and its potential impact on public health

Edward Siński^a, Renata Welc-Fałęciak^{a,*}, Joanna Zajkowska^b^a Department of Parasitology, University of Warsaw, Warsaw, Poland^b Department of Infectious Diseases and Neuroinfections, Medical University of Białystok, Białystok, Poland

ARTICLE INFO

Article history:

Received 4 September 2015

Accepted 4 March 2016

Available online 21 March 2016

Keywords:

Borrelia miyamotoi

Relapsing fever in humans

Tick vectors

Reservoir

Public health

ABSTRACT

Borrelia miyamotoi is a tick-borne bacterium which has only recently been identified in Europe as a human pathogen causing relapsing fever and little is known about its local impact on human health. There are three types of *B. miyamotoi*: Asian (Siberian), European, and American. *B. miyamotoi* is transmitted by the same *Ixodes ricinus-persulcatus* species complex, which also transmits *B. burgdorferi* s.l., the Lyme borreliosis group. Both *Borrelia* groups are mostly maintained in natural rodent populations. The aim of this review is to summarize the available literature on *B. miyamotoi*, with the focus of attention falling on Europe, as well as to describe its presence in ticks, reservoir hosts, and humans and discuss its potential impact on public health.

© 2016 Medical University of Białystok. Published by Elsevier Sp. z o.o. All rights reserved.

Contents

1. Introduction	255
2. Review	257
2.1. <i>B. miyamotoi</i> infection in vectors	257
2.2. Transmission and zoonotic reservoir of <i>B. miyamotoi</i>	257
2.3. Human infections with the spirochete <i>B. miyamotoi</i>	257
2.4. Diagnostics in humans, rodents and ticks	258
2.5. Treatment of patients infected with <i>B. miyamotoi</i>	259
3. Conclusions	259
References	259

1. Introduction

The spirochetes of *Borrelia* genus are helical-shaped, motile host-associated bacteria which are transmitted to humans and animals by hematophagous arthropod vectors. This group of bacteria are presently classified within the phylum spirochetes and contains 37 species which comprise two major groups [1,2] (Fig. 1A). The first group species are transmitted by hard ticks (Ixodidae) and include Lyme borreliosis (LB) *Borrelia* group (*Borrelia burgdorferi* sensu lato). LB *Borrelia* group is a heterogeneous bacterial complex, which currently comprises more than

20 species – five of which are established to be pathogenic in humans (*B. burgdorferi* s.s., *Borrelia afzelii*, *Borrelia garinii*, *Borrelia bavariensis* and *Borrelia spielmanii*) [3] (Fig. 1A).

The second group includes several *Borrelia* relapsing fever (RF) species, such as *B. hermsii*, *B. turicatae*, *B. parkeri* of the New World (Nearctic), as well as *B. duttonii* and *B. crocidurae* of the Old World (Palearctic and Afrotropic ecozone) [2]. These species, with the exception of *B. recurrentis* (louse-borne RF spirochetes), are transmitted between vertebrates mostly by soft ticks (Argasidae) (Fig. 1A).

Borrelia miyamotoi was isolated for the first time in Japan in 1995 from *Ixodes persulcatus* ticks [4]. *Ixodes* species and rodents as well as birds serve as its natural reservoir hosts [5]. There is some discussion on the exact phylogeny within the relapsing fever complex and *B. miyamotoi* phylogenetic position. The results of

* Corresponding author at: Department of Parasitology, Faculty of Biology, University of Warsaw, Miecznikowa 1, 02-096 Warsaw, Poland.

Tel.: +48 22 554 11 13; fax: +48 22 554 12 03.

E-mail address: rwelc@biol.uw.edu.pl (R. Welc-Fałęciak).

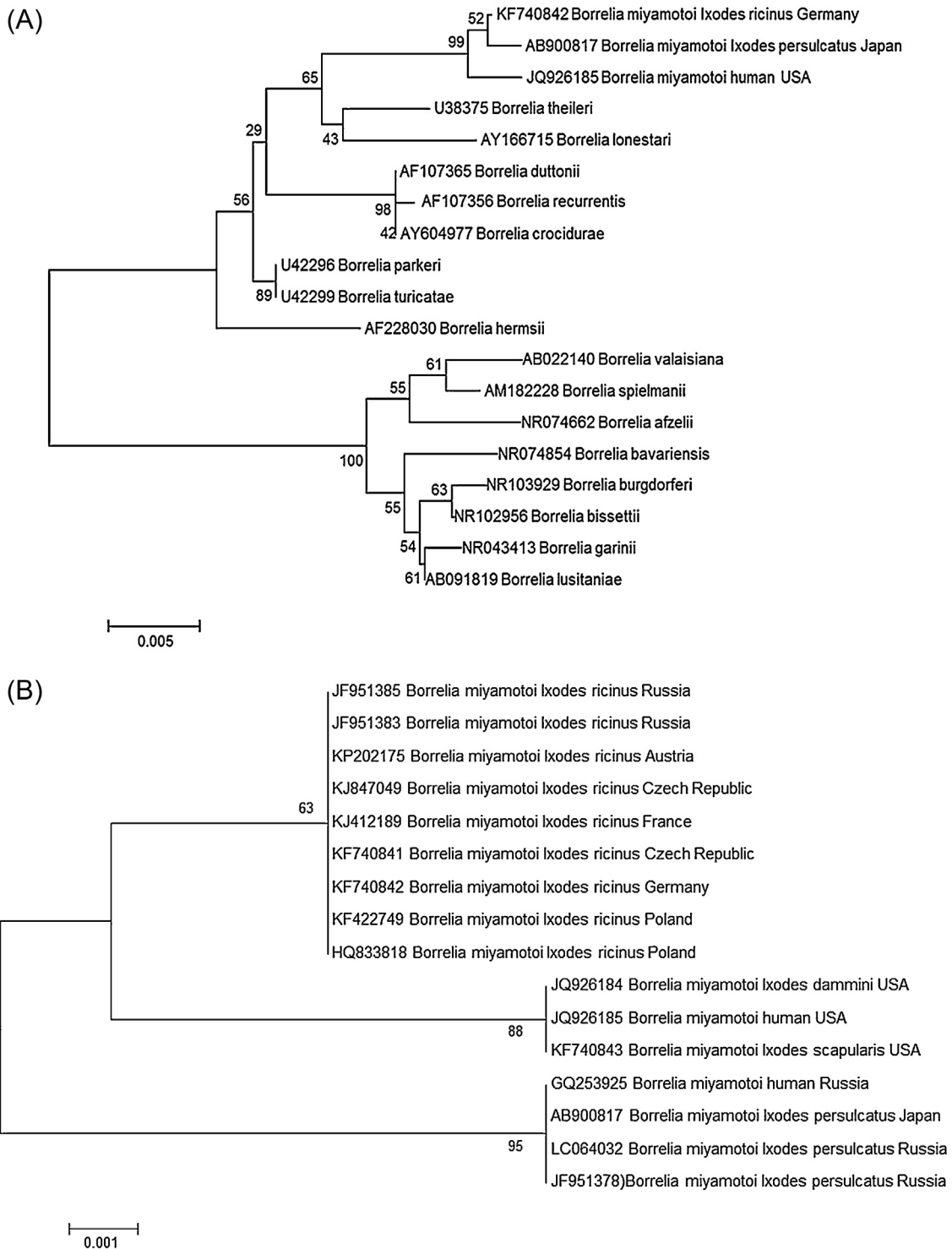


Fig. 1. Phylogenetic tree (Neighbor-Joining as the tree construction method and the Kimura 2-parameter algorithm as a distance method) of the *Borrelia* species (A) or *Borrelia miyamotoi* isolates (B) selected from GenBank, based on the 16S rRNA gene. Numbers at the nodes of the tree indicate bootstrap values (1000 replicates).

recent studies have suggested that RF spirochetes found in hard ticks (including *B. miyamotoi*, *B. theileri* and *B. lonestari*) cluster together phylogenetically and create a separate group within the RF complex [6–9] (Fig. 1A).

Apart from their genetic distance, there is also significant difference in principal biological features between *B. miyamotoi* and *Borrelia* species that cause LB. *B. miyamotoi* spirochetes achieved higher burdens in blood than in skin of their hosts. They also manifest

vertical transmission from adult female ticks to their offspring. In early studies, infections with *B. burgdorferi* were already detected in larvae [10,11], and, one may assume that those *Borrelia* spirochetes detected in larvae of *I. ricinus* were presumably *B. miyamotoi*. In support of this suggestion, there is a report by Krampitz from 1986 [12] of a “European hard tick spirochete,” which, in retrospect, was probably *B. miyamotoi* [8]. Furthermore, *in vitro* cultivation of *B. miyamotoi* isolates appear to be easier than *B. burgdorferi* [9].

Download English Version:

<https://daneshyari.com/en/article/2031825>

Download Persian Version:

<https://daneshyari.com/article/2031825>

[Daneshyari.com](https://daneshyari.com)