

LYME BORRELIOSIS in EUROPE

This information leaflet contains five sections and is intended for a generic and public health audience:

1. LB is found in certain areas of Europe.

What are the risks in European countries?

2. Ticks can be the carriers of disease.

How is the disease transmitted? What are the risk factors?

3. Disease characteristics of LB.

What are the symptoms and how can it be treated?

4. Tick-borne diseases are preventable.

What measures can be taken to protect yourself?

5. More information is available.

Where can you find more information and guidance on effective prevention and control activities?



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Key messages

- Lyme disease, or Lyme borreliosis (LB), is a bacterial disease transmitted to humans through the bite of infected ticks. It is a common disease in Europe.
- The number of cases in Europe has increased steadily, more than 360 000 cases having been reported over the last two decades.
- Central Europe is the region with the highest incidence of LB, as reported by the Czech Republic, Estonia, Lithuania and Slovenia.
- The risk of LB is reduced by avoiding tick bites.
- The most effective ways of avoiding tick bites include wearing long trousers and long-sleeved shirts, and using repellents on the skin and clothing. The skin should be checked periodically for attached ticks, which should be removed as soon as possible.
- Typical symptoms include a characteristic skin rash, called erythema migrans, often accompanied by fever, headache and fatigue. Without antibiotic treatment, the infection can spread to the joints, the heart and the nervous system.
- Most cases can be treated successfully with antibiotics taken over several weeks.



1. LB is found in certain areas of Europe

Box 1. What is a vector-borne disease?

- Vector-borne diseases are illnesses caused by pathogens in human populations.
- These diseases are spread by vectors: living organisms that can transmit pathogens between humans or from animals to humans.
- Many vectors are bloodsucking insects, which ingest pathogens during a blood meal from infected hosts (humans or animals) and transfer them to new hosts during subsequent blood meals.
- Mosquitoes are the best known disease vectors. Others include certain species of ticks, flies, sandflies, and fleas.



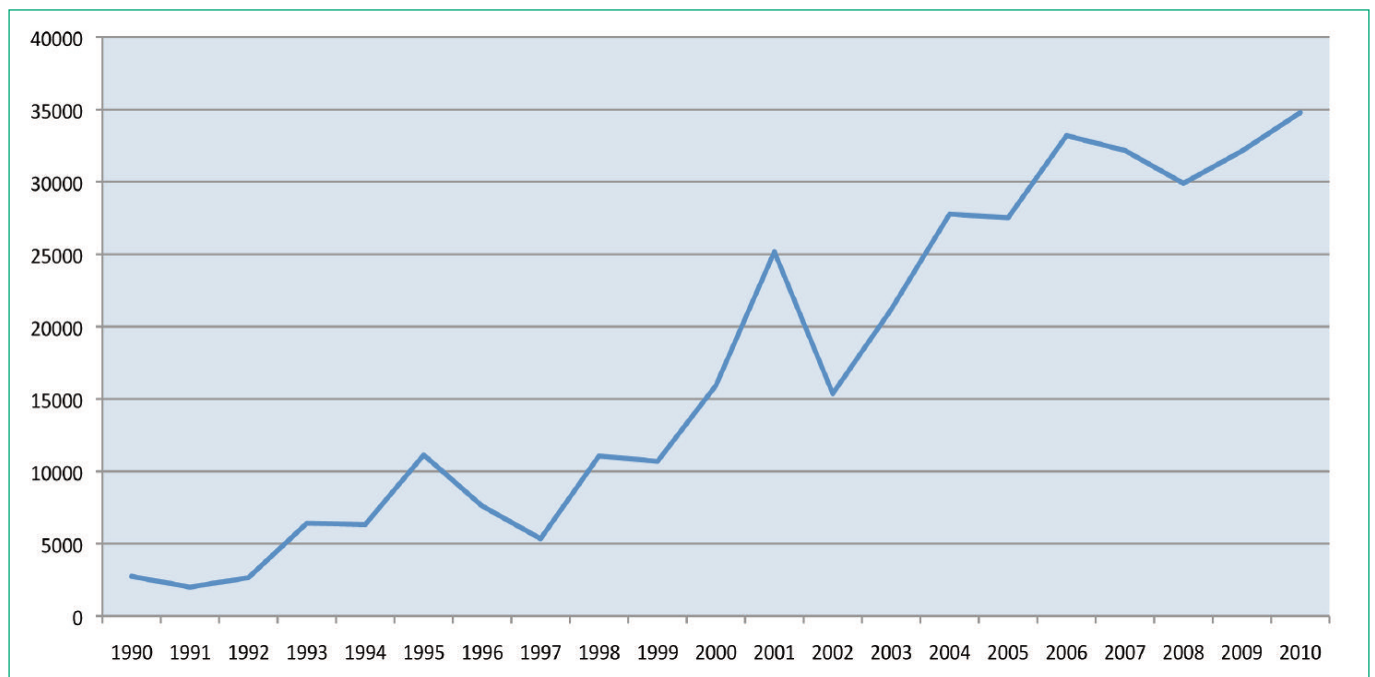
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LB is the most common tick-borne disease in Europe (Fig. 1). Between 1990 and 2010, the highest average incidence rates among the reporting countries were found in Belarus, Belgium, Croatia, Norway, the Russian Federation and Serbia (< 5/100 000), Bulgaria, Finland, Hungary, Poland and

Slovakia (< 16/100 000), the Czech Republic, Estonia, and Lithuania (< 36/100 000) and Slovenia (< 130/100 000).

It is important to be aware of LB risk areas and, if exposure is likely, to take precautions to reduce the risk of infection.

Fig. 1. Number of Lyme disease cases in Europe as reported to WHO Centralized Information System for Infectious Diseases (CISID).



2. Ticks can be the carriers of disease

LB is caused by the bacterium, *Borrelia burgdorferi*, and is transmitted to humans by the bite of infected ticks, mainly *Ixodes ricinus*. Ticks become infected when they feed on small mammals (such as rodents) and certain birds that carry the bacterium in their blood. In risk areas, as much as 5-40% of ticks may be infected.

The risk of contracting a tick-borne infection is determined by the overall number of ticks in the area, the proportion of those carrying disease, and human behaviour. In risk areas, people involved in outdoor recreational or occupational activities (e.g. hunting, fishing, camping, collecting mushrooms

and berries, forestry, farming, military training) are at an increased risk of being bitten by ticks.

Changes in the geographic and temporal distribution of the ticks and the disease have been observed in recent decades. Ticks are spreading to higher altitudes and more northern latitudes and disease incidence is shifting towards spring and autumn.

Many factors are involved, including climate change, changes in land cover and land use, changes in the distribution of tick hosts, and human-induced changes in the environment.

3. Disease characteristics of LB

LB is a multisystem disorder, which can affect several tissues. The symptoms can be divided according to the two stages of the disease (early and late) but progress from the early to the late stage does not always occur. When a person is bitten by an infected tick, the only symptom in the first stage consists of a red skin rash or lesion (called erythema migrans) that spreads in ring form from the site of the bite. This occurs in about 60–90% of cases within 2–30 days of the tick bite. If left untreated, a disseminated infection affecting the nervous system (10% of cases), the joints, the skin and/or the heart (rare) may follow within days or weeks.

All LB patients should be treated for several weeks with appropriate antibiotics (amoxicillin, cephalosporin, and macrolides for disseminated infections). Early treatment can prevent the risk of developing late-stage complications. Patients with late-stage LB can also benefit from antibiotics but if severe tissue damage occurs prior to treatment, complete recovery may not be possible.

No laboratory tests are required to diagnose erythema migrans (the rash characteristic of LB); a clinical evaluation and an assessment of the risk of tick exposure suffice. Laboratory tests are necessary to confirm a diagnosis of late-stage infection. *B. burgdorferi* antibodies are usually detectable within 4–8 weeks of infection: patients with late-stage infection usually test very strongly positive for these antibodies. However, the occurrence of false-positive tests in patients with other infections or conditions, such as autoimmune diseases, can lead to misdiagnosis and inappropriate treatment.

Fig. 2. An example of erythema migrans caused by LB infection.



4. Tick-borne diseases are preventable

No licensed vaccine is currently available for LB.

LB infection is best prevented by avoiding tick bites and promptly removing ticks attached to the skin. An integrated approach to voiding tick bites and preventing infection is necessary. This includes wearing protective clothing, using tick repellents, checking the entire body daily for ticks, and removing attached ticks before transmission of infection can occur.

Ixodes ticks live on the ground and climb 20-70 cm onto grasses and bushes where they wait for hosts. The tick bite is painless and it is often impossible to sense a tick moving on the skin. An attached tick should be removed using tweezers or fine-pointed forceps, grasping it as closely as possible to where it is attached to the skin and pulling it gently upwards, trying not to break off the mouth parts. The risk of LB infection is not increased if the mouth parts are left behind. A skin disinfectant should be applied after removal of the tick to prevent infection.

When checking the skin for ticks, particular attention should be paid to skin folds as ticks seek the more humid parts of the body, such as the groins, the armpits, the waistband area, under the breasts and behind the knees. In young children, the head (including the scalp) and the neck area should also be checked carefully as tick bites are relatively more common at these sites in this age group. Before entering homes, clothing, bags and other belongings should be examined thoroughly for ticks.

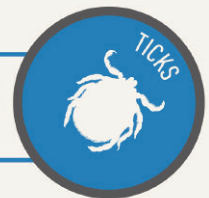
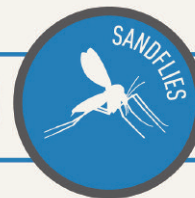
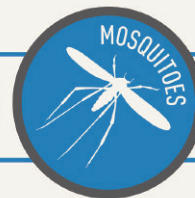
The best ways to avoid tick bites are to:

- avoid tick risk areas;
- be informed about how to remove ticks and recognize early symptoms;
- use insect repellent on skin and clothing when in risk areas;
- wear protective clothing with long sleeves, and long trousers tucked into socks or boots.

VECTORS MAY BE A THREAT TO YOU, AT HOME AND WHEN TRAVELLING

VECTORS ARE SMALL ORGANISMS THAT CARRY SERIOUS DISEASES

COMMON VECTORS



5. More information is available

WHO documents

Lindgren E, Jaenson TGT. Lyme borreliosis in Europe: influences of climate and climate change, epidemiology, ecology and adaptation measures. Copenhagen: World Health Organization; 2006
(http://www.euro.who.int/__data/assets/pdf_file/0006/96819/E89522.pdf).

Lyme Borreliosis (Lyme disease). In: International travel and health [website]. Geneva: World Health Organization; 2014
(<http://www.who.int/ith/diseases/lyme/en/>).

ECDC resources

ECDC communication toolkit on tick-borne diseases. Stockholm: European Centre for Disease Prevention and Control; (http://www.ecdc.europa.eu/en/healthtopics/emerging_and_vector-borne_diseases/tick_borne_diseases/public_health_measures/pages/communication_toolkit.aspx).

Factsheet for health professionals – Lyme borreliosis [website]. Stockholm: European Centre for Disease Prevention and Control; 2010

(http://www.ecdc.europa.eu/en/healthtopics/emerging_and_vector-borne_diseases/tick_borne_diseases/lyme_disease/factsheet-health-professionals/Pages/factsheet_health_professionals.aspx).

Ixodes ricinus [website]. Stockholm: European Centre for Disease Prevention and Control; 2014

(<http://www.ecdc.europa.eu/en/healthtopics/vectors/ticks/Pages/ixodes-ricinus.aspx>).

Tick species – distribution maps. In: Tick maps [website]. Stockholm: European Centre for Disease Prevention and Control; 2010

(<http://www.ecdc.europa.eu/en/healthtopics/vectors/vector-maps/Pages/VBORNET-maps-tick-species.aspx>).

Other resources

Medlock JM et al. Driving forces for changes in geographical distribution of *Ixodes ricinus* ticks in Europe. *Parasites & Vectors*. 2013;6:1

(<http://www.parasitesandvectors.com/content/6/1/1>).

Randolph SE. Tick ecology: processes and patterns behind the epidemiological risk posed by ixodid ticks as vectors. *Parasitology*. 2004;129(S):37-65.

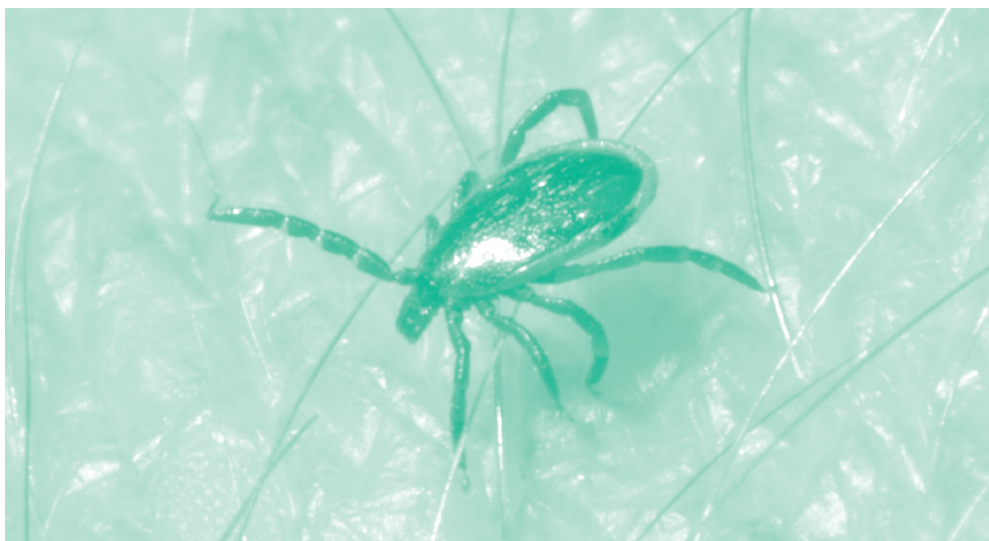
Rizzoli A et al. Lyme borreliosis in Europe. *Eurosurveillance*. 2011;16(27)

(<http://www.eurosurveillance.org/images/dynamic/EE/V16N27/art19906.pdf>).

Study Group for Lyme Borreliosis – ESGBOR [website]. Basel: European Society of Clinical Microbiology and Infectious Diseases; 2013

(https://www.escmid.org/research_projects/study_groups/esgbor/ or <http://www.eucalb.com/>).

Vázquez M et al. Effectiveness of personal protective measures to prevent Lyme borreliosis. *Emerging Infectious Diseases*. 2008;14:210-216.



LYME BORRELIOSIS in EUROPE



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