

Tick bites and Lyme disease

Factsheet and Best Practice Guide for Forest Users

Edward R. Wilson¹

Introduction

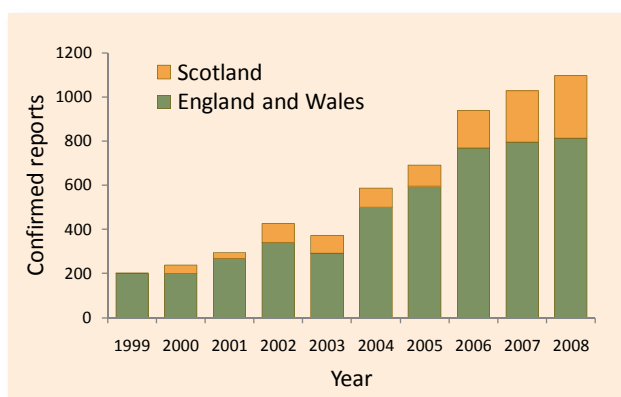
Lyme disease is the most important vector-borne health problem in Europe and North America. It is caused by bacteria of the genus *Borrelia* which are transferred from infected wildlife species to humans through the bite of a tick. Since it was first described at Old Lyme, Connecticut, in 1974, incidence has risen dramatically, with more than 100,000 cases now being reported world-wide each year. Although Lyme disease is relatively uncommon in the UK, the number of cases is increasing steadily. People working in or visiting woodland are at-risk of being infected. This factsheet aims to raise awareness and outlines best practice for minimising the risk of infection.

Transmission

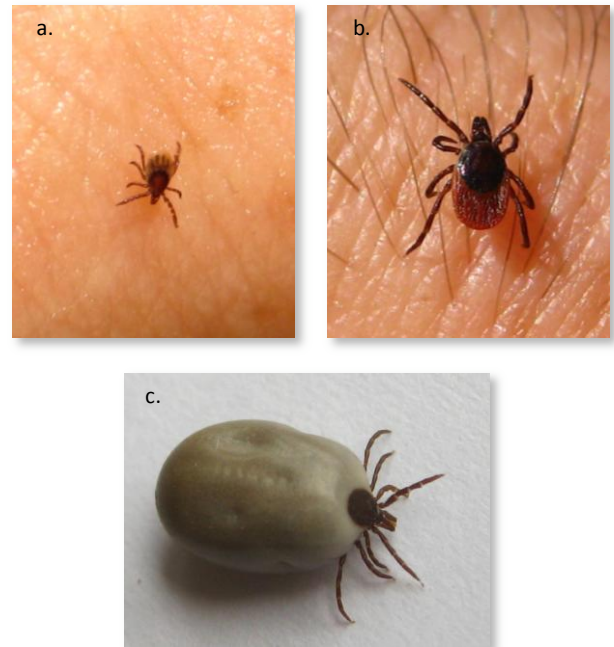
Ticks are small arthropods, related to spiders and mites. Several species of Ixodid ticks are carriers of *Borrelia* bacteria. In Europe, the vector for infection is *Ixodes ricinus*, which is commonly known as the sheep, deer, or woodland tick.

Ticks have a three-stage life cycle (larva, nymph and adult). They require a blood feed between each stage and before laying their eggs. For Lyme disease to be transferred to humans, the tick must first acquire the *Borrelia* bacteria by feeding on an infected host, such as a bird, rodent or deer. Infected ticks then transmit the bacteria to humans, but usually only after they have been attached to the skin for at least 24 hours. They are small in size, often no larger than a poppy seed, which helps them evade detection in the early stages of a blood feed.

Since 1999, nearly 6,000 confirmed cases of Lyme disease have been recorded in the UK. The actual total number is likely to be higher because cases diagnosed on the basis of clinical findings (i.e., not requiring lab tests) are not routinely recorded for England and Wales. Reasons for the upward trend include: improved levels of reporting; an increase in the population and range of ticks due to successive mild winters; and, growth in recreational travel to high-risk areas, bringing more people into contact with infected ticks.



The number of confirmed reports of Lyme disease in England, Wales and Scotland, 1999 to 2008. (Data: HPA and HPS 2009)



Stages in the life cycle of a tick: (a.) nymph (1-1.5 mm); (b.) adult female (3-3.5 mm); (c.) adult after a blood feed (8-10 mm). Ticks remain attached to their host for many hours to complete their feed. (Photos: © 2008 Edward Wilson)

Occurrence

Ticks are endemic to a wide variety of habitats. They are common in forested, heathland and moorland areas, but can also be found in city parks. They favour long grass or leafy vegetation from where they latch onto a passing host. Not all ticks carry the *Borrelia* bacteria. Complex interactions between ticks, their preferred host species and environmental conditions help explain regional differences in the risk of infection for humans.

Late spring, early summer and autumn are peak feeding times for ticks. A lower level of feeding activity takes place in other seasons. Therefore, the risk to humans is potentially year-round.

Populations of ticks carrying *Borrelia* are distributed widely throughout the UK. High risk areas include the New Forest, Exmoor, other woodland and heathland habitat in southern England, the South Downs, Thetford Forest, North York moors, the Lake District and the Scottish Highlands. Most of these are holiday and outdoor activity destinations. However, anywhere ticks are present should be regarded as a potential risk area.

People of all ages and both sexes are equally susceptible to infection. Occupational groups most at risk include forestry workers, farmers, deer handlers and gamekeepers. All cases acquired in the work-place should be reported to the Health and Safety Executive (HSE).

Up to 20% of lab-confirmed cases of Lyme disease are acquired abroad, most commonly by people undertaking activity holidays in high risk areas such as New England and mid-west regions in the United States, central and eastern Europe, and Scandinavia.

Symptoms and Treatment

Lyme disease, or Lyme borreliosis as it is also known, is a complex medical condition and the focus of considerable

research at the present time. It presents most commonly as a target-shaped rash (called *erythema migrans*) that spreads from the site of a tick bite. Other features can include vague flu-like symptoms, muscle ache and tiredness, but for a significant number of patients there is no rash or other early signs.

With time, more serious problems can occur as the bacteria disseminates from the initial site of infection. These include a viral-like meningitis, facial palsy, other nerve damage or arthritis. All stages of Lyme disease respond to antibiotics, though treatment is easiest when the rash is still present. No vaccine is currently available. Check the websites listed below for further information.



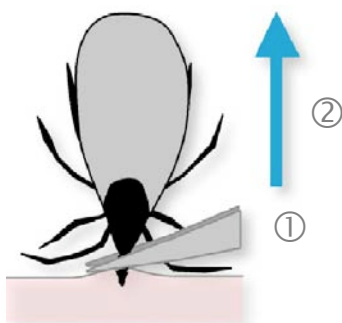
Erythema migrans rash on the upper right arm of a patient with Lyme disease. The shape of the rash varies with bite location. The patient shown here acquired Lyme disease in the US; in Europe the rash tends to be less intensely coloured but last longer. (Photo: James Gathany, US Centers for Disease Control and Prevention (CDC), reproduced by permission)

Prevention

Infection can be prevented altogether by taking measures to avoid tick bites and by removing ticks at an early stage of their blood feed. Practice heightened tick awareness, avoid tick infested areas, avoid tall grassy or leafy vegetation, and wear clothes that cover legs and arms. Repellents containing DEET may protect uncovered skin.

Checking for ticks should be a routine procedure if you have been in a tick area. Ticks can attach anywhere on the skin surface, but are especially likely in skin folds (i.e., armpits, groin, under the breasts) and around the waistband. Carefully inspect the head, neck and hair of children. Also check that unfed ticks are not brought home on clothes or the fur of pet dogs.

If you are bitten, there are several safe methods for removing a tick. Fine-pointed tweezers or a tick tool (available from pet and outdoor shops) are best, but a loop of fine thread may act as an effective alternative. The goal in each case is to grab the tick by its mouthparts (see below). Burning or using volatile oils are not advised. These increase the risk of skin damage or the tick regurgitating its stomach contents into the bite.



When removing ticks with fine-pointed tweezers, (1) be careful to grab the lower mouthparts close to the skin and then (2) firmly pull upwards. Avoid twisting as this increases the risk of detaching the head and leaving parts of the tick in the wound.

Tick Aware!

Best practice for minimising the risk of Lyme disease

Prior to your visit:

- Access appropriate public health information about ticks and Lyme disease. See websites listed below.
- Purchase and carry a tick removal tool
- Be familiar with the features of nymph and adult ticks

During your visit:

- Cover skin, especially in “brushy” areas
- Wear long trousers rather than shorts or a skirt
- Favour light coloured clothing to make ticks easier to spot
- Button up collars and cuffs, wear a hat and tuck socks into trousers
- Wear boots, not sandals
- Apply an acaricide (e.g., permethrin) or insect repellent to clothes and exposed skin
- Be especially vigilant during peak feeding times, May-July and September-October

After your visit:

- Brush off clothing and check pets before getting into a car and/or returning home
- Conduct a self-inspection at the earliest opportunity; focus on armpits, the navel, groin and hairline - early detection is important for preventing Lyme disease
- Children should be checked by a responsible adult, with close attention to areas such as the hairline

Summary

Be “tick aware” for your own safety, and communicate with others to increase knowledge of this potentially serious infection. Dress appropriately and undertake checks of your skin after visiting tick areas. Early removal of an attached tick is important for avoiding infection. And don’t panic.

Finally, please remember that this factsheet is not a substitute for professional medical advice and is intended as general information only. Consult your GP as soon as possible if you suspect you may have Lyme disease.

Useful websites

- **Health Protection Agency (HPA):** www.hpa.org.uk
- **Health Protection Scotland (HPS):** www.hps.scot.nhs.uk
- **European Concerted Action on Lyme Borreliosis (EUCALB):** <http://meduni09.edis.at/eucalb>
- **US Centers for Disease Control and Prevention (CDC):** www.cdc.gov
- **Lyme Disease Action (LDA):** www.lymediseaseaction.org.uk

Further Reading

Wilson, E. R., and K. J. Smith. 2009. Lyme disease: ecology, epidemiology and prevention. *Scottish Forestry* 63(2): 3-11

¹Author Information

Medical School, University of Sheffield, Sheffield S10 2RX
Email: ted.wilson@yahoo.co.uk

This factsheet was produced for the Royal Forestry Society. Copies can be downloaded from www.rfs.org.uk