

UNDER THE RADAR: LYME BORRELIOSIS IN THE UK



Wendy Fox
Director and Chairperson,
BADA-UK Ltd

Wendy Fox has a background in zoology. She is a founding member and Chair of the charity Borrelia & Associated Diseases Awareness (BADA-UK). Wendy was left paralysed from the waist down and partially sighted by Lyme borreliosis after she suffered a brain and spinal cord swelling.

BADA-UK Ltd
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England & Wales, SC038414
Scotland
<http://www.bada-uk.org/>

INTRODUCTION

Lyme borreliosis (LB) is recognised to be an emerging disease and a significant public-health threat but, despite a year-on-year rise in case numbers, this disease remains an overlooked and under-researched condition, and a lack of awareness could significantly increase its prevalence. This was the main reason for the presentation and documentation that was on display in the House of Commons, Upper Waiting Hall, 15-19 November 2010.

BACKGROUND

LB (also known as Lyme disease or Borreliosis) is a spirochaetal infection usually transmitted via the bite of a hard-bodied tick; most commonly *Ixodes ricinus* (known as the sheep tick, wood tick, castor bean tick and deer tick). Certain soft-bodied ticks can also transmit LB to people. Transplacental transmission has been demonstrated; and potentially via infected blood products.

To date, *Borrelia burgdorferi* (B.b.), the causative agent of LB, can be divided into at least 15 genospecies. *B. afzelii*, *B. bavariensis*, *B.b. sensu stricto* (s.s.), *B. garinii* and *B. spielmanii* are all known to be capable of causing disease but there is currently a lack of consistent evidence to determine whether other genospecies such as *B. bissettii*, *B. lusitaniae* and *B. valaisiana* are also pathogenic. The group as a whole is referred to as *B. burgdorferi sensu lato* (B.b. s.l.) and the term Borreliosis is used to describe an infection of any genospecies.

Signs and symptoms may vary between genospecies. There is recent evidence, for example, that *B. afzelii* causes an annular Erythema Migrans (the rash associated with LB) and *B. garinii* a homogenous lesion which seems to develop more

rapidly. Not all patients present with Erythema Migrans. This may also suggest genospecies variation in some cases, as does the fact that Lyme arthritis is rare in Europe but much more common in North America.

Ticks acquire *Borrelia* bacteria from reservoir hosts, such as small mammals and birds, when they take a blood meal. Transmission to other hosts, including humans, occurs during the following feed.

Hard-bodied ticks are present in many forested, heathland or moorland areas but they are also present in more urban parklands and gardens. European studies found *Borrelia*-infected soft ticks in urban pigeon roosts. One study demonstrated that tick larvae and nymphs parasitise certain garden birds as frequently as white-footed mice, the principal reservoir host of B.b.s.s. in North America.

Many people assume that LB has made its way to the United Kingdom following the first documented outbreak in 1975 in Old Lyme, Connecticut. LB has actually been known in Europe under different names since Anid Afzelius associated *Ixodes ricinus* with Erythema Migrans in 1909.

OCCURRENCE

Certain areas in the UK are considered high risk for LB, such

as the New Forest, Exmoor, other woodland or heathland areas of southern England, the Lake District, the Scottish Highlands and Islands, the North Yorkshire moors, Thetford Forest, and the South Downs. However, as stated by the Health Protection Agency (HPA), "any area where *Ixodid* ticks are present should be regarded as a potential risk area". Considering that ticks have been highlighted as a significant threat in the World Health Organisation's 'Public Health Significance of Urban Pests', most areas that support varied wildlife, whether rural or urban, are likely to support a tick population to some degree, and a proportion will carry infective agents.

There has been a marked rise in the incidence of LB since 2001, when there were just 268 laboratory-confirmed cases in England and Wales. In 2009 (the latest available data) there were 973. The HPA acknowledges that this data is incomplete and doesn't account for cases diagnosed and treated on the basis of clinical features such as Erythema Migrans, without laboratory tests. They estimate that between 1,000 and 2,000 additional cases occur each year in England and Wales.

An equal increase has occurred in Scotland with just

28 cases in 2001, rising to 605 in 2009. Dr Darrel Ho-Yen, head of Scotland's Lyme disease testing service, has stated that he believes the actual number of cases could be ten times the recorded data if taking into account "wrong diagnoses, tests giving false results, sufferers who weren't tested, people who are infected but asymptomatic, failures to notify and infected individuals who don't consult a doctor".

Improved awareness may account for some of the increase but other factors such as an increase in the tick population and its distribution, plus an increase in outdoor pursuits have also played their part.

DEFICIENCY IN MEDICAL AWARENESS

A casual survey, conducted by the charity Borreliosis & Associated Diseases Awareness UK (BADA-UK), revealed that a number of General Practitioners believe that there is no Lyme disease in the UK. In one instance, a doctor stated that there are no ticks present in the UK. Of the 489 respondents to the survey, 72% had used incorrect methods of tick removal which may increase the chance of disease transmission, often having been advised by a vet, GP, practice nurse or NHS Direct.

Although rural physicians in highly endemic areas tend to be better informed, there are exceptions. Some doctors dismiss the possibility of LB in diagnosis on the basis that the patient did not present with a rash.

Another difficulty in LB diagnosis is the limitations with blood-testing techniques. Patients may be tested before they have an immune response and therefore a false-negative result can be returned. Seroconversion may occur with a second test. Health Protection

Scotland highlights the fact that some patients may be seronegative, "often because of early antibiotic treatment". They go on to state that, "The serodiagnosis of late Lyme disease requires good, specific clinical histories, and with some patients there may need to be a trial of treatment".

Conversely, patients may have antibodies without having a current infection (this can occur through regular occupational or recreational exposure to tick bites). Other conditions (eg Glandular Fever, Syphilis and certain autoimmune diseases) can result in false-positive reactions to LB. It is due to these limitations that the HPA states, "The significance of any result, negative or positive, should be interpreted carefully by clinicians in the overall context of the patient's clinical findings and tick exposure risk history".

In an analysis of laboratory-confirmed cases in 2008, the HPA recorded that just 32% of the 813 cases reported Erythema Migrans and just 40% a tick bite. As ticks may be the size of a poppy seed, feeding in inaccessible places and often under body hair, the latter is unsurprising.

Common advice, often perpetuated from out-dated papers, is that a tick must be attached for some considerable time for transmission to occur (ranging between 24, 36 and 48 hours). Yet, an extensive literature review to determine the sources for these claims revealed that although longer tick-attachment times do increase the risk of infection, a minimum attachment time for transmission to occur has never been established. Claims that the risk of infection is non-existent if the tick is removed within 48 hours are not supported by the published data. Other frequently published

statements that the risk is minimal if the tick is removed within 24 hours are misleading, and data indicate there is significant risk within 24 hours of attachment. European experimental data indicate significant risk within 16.5 hours and demonstrate that partially-attached ticks would efficiently re-attach to a new host, having already gone through the physiological mechanisms allowing spirochaetes to have migrated to the salivary glands prior to re-attachment.

Crucial facts about where ticks may be present, their inconspicuous nature, disease transmission, symptom variation, and testing limitations are not filtering through to most General Practitioners; the first port of call for patients.

PROPHYLAXIS – NOT SO PROLIFIC

A secret survey of UK county and district councils was conducted by BADA-UK to determine the availability of information about ticks and LB. 124 councils were telephoned to obtain information for public and staff visiting areas of potential tick exposure. Each council web site was also examined. Only 7.26% (9/124) of authorities surveyed provided information to staff; of this subset, 22.22% provided leaflets or electronic documentation. 55.56% mentioned LB within standard health and safety guides and 22.22% claimed to have information on their web site. 7.26% (9/124) of councils claimed to have information for public use. Of this subset, 55.55% provided web-based material. Arun and the New Forest District Councils stood apart by providing comprehensive information. Many environmental health departments were unaware that LB is reportable under the 'Reporting of Injuries, Diseases

and Dangerous Occurrences Regulations 1995' (RIDDOR).

Health and safety in the workplace documents, and for visiting public, from sources such as the Health and Safety Executive, were also reviewed by BADA-UK. It revealed a significant lack of information regarding hazards and risk avoidance, and out-dated and conflicting data. In one document, 'Baseline incidence of ill health in agriculture in Great Britain', it was stated that LB is acquired from straw.

SLIPPING UNDER THE RADAR

Many documents advise on zoonoses of low prevalence, particularly Leptospirosis (of which in 2009 there were just 52 cases). Such concentrated focus on less-prevalent zoonoses is almost certainly deflecting attention from an equally serious and escalating disease.

With no vaccine available against LB, and five other tick-borne diseases endemic to the UK, awareness is vital. One controlled trial of a primary prevention program for Lyme disease and other tick-borne illnesses (TBI), conducted by Daltroy et al in southeastern Massachusetts, demonstrated lower rates of TBI amongst those receiving TBI education, and a significant increase in the likelihood of precautionary behaviour.

To date, BADA-UK (a volunteer-run charity) has the only proactive public-education strategy in place. The environment is there to be enjoyed by everyone and it is vital for people to be better informed, rather than unknowingly exposed. Consistent and effective communication is key to preventing more people from becoming infected.