LYME DISEASE

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WHAT IS LYME DISEASE?

The name originates from the description of a number of patients from Lyme, Connecticut, United States of America. Although features of the condition have been recognised since the turn of the century, the full description was only given in 1977. Technically, Lyme disease is classified as a zoonosis, being a condition transmitted to man by animals.

WHAT CAUSES LYME DISEASE?

The causative agent is a small spirochaete organism called Borrelia burgdorferi. This organism causes the disease but is transmitted to man by ticks. It is predominantly the tick species Ixodes ricinus (in Europe and the UK) and dammini (in the USA) that transmit the organism. During the tick’s life cycle, small mammals are often hosts but larger animals, particularly deer, are also important. The former may be more relevant in heavily wooded areas in America but deer have been increasingly relevant in both America and Europe. In less wooded areas, such as hill and fell ground, sheep may replace deer as hosts for ticks and I ricinus (sheep tick) is the main vector for Borrelia burgdorferi. During the life cycle, ticks feed and may choose man or domestic animals in tick-infested areas. It is during this attachment to the skin during feeding that Borrelia organisms may be transmitted into a host animal and cause Lyme disease.

WHAT ARE THE FEATURES OF LYME DISEASE?

There are three stages in the condition. The first stage is a rash that spreads around the tick bite. This may develop a few days or a few weeks after the bite, and generally settles spontaneously. Sometimes a slight fever may be noticed at the same time as the rash. The rash is termed erythema chronicum migrans. The second stage develops a few weeks or months after the tick bite and there are various manifestations including neurological, musculoskeletal, cardiovascular, and eye problems, together with other system involvement. The third, late stage, develops months after the initial infection and is predominantly associated with joint problems although neurological sequelae may develop.

HOW COMMON IS LYME DISEASE?

It is rare in man in Britain in contrast to America where Lyme disease is the most common vector-borne infection. A recent survey of 41 rural general practitioners in the North Lancashire, South Cumbria and East Cumbria areas undertaken by the authors shows that 33 (80%) had never seen a case of Lyme disease in the last 10 years. Eight general practitioners in rural areas (20%) had seen a case of Lyme disease within the last 10 years, but only one case per practice. One person had contracted Lyme disease from a tick bite in Denmark and presented with a rash and paraesthesia. Another three people had a rash, another person a rash and paraesthesia, another joint pains, another joint pains and headache. Finally two people had a rash and headaches. To these cases of Lyme disease in the area should be added two mild hospital cases. Thus, significant Lyme disease has not been a problem in the area.

A survey of 30 veterinary practitioners in the area revealed that 9 (32%) had seen little evidence of ticks, 5 (18%) had seen little evidence of ticks but had seen evidence of ticks in domestic animals including dogs, cats and cattle. A further 15 veterinary practitioners (50%) had seen ticks as a problem and also ticks prevalent in sheep, cattle, horses, dogs and cats. It appeared that the fringes of fell areas, particularly when wooded, appeared to have more of a tick problem than fell areas or lowland areas. In heavily wooded areas, such as the New Forest, ticks are more prevalent, but in the northwest, Pennine upland seems to have less of a problem than more western upland areas, particularly the Lake District.

Ticks are common in this area on different animals and Borrelia organisms have been found to be present in local ticks. However, British I ricinus organisms appear to carry fewer borrelia organisms than European or American ticks. This may be one reason why Lyme disease is less common in Britain. However, in areas where ticks are particularly prevalent, evidence of borrelia infection in animals (by seropositivity on blood testing) has been found in some studies to be as much as 40% in dogs, 60% in horses and similar incidences in cattle and other animals. The animal situation is different to man’s, in whom both clinical infection and seropositivity are low. Lyme disease may be less common in Britain and Europe than America because of a difference in virulence in borrelia organisms or possibly because of genetic differences in host susceptibility.

The risk of infection with Lyme disease after tick bite is less than 1% in Europe and less than this in Britain, and from our evidence, it is certainly a low risk problem in the northwest of England.

WHAT IS THE TREATMENT OF LYME DISEASE?

Antibiotic therapy is active against borrelia organisms. Antibiotics include tetracyclines, penicillin (particularly ampicillin), cephalosporins and erythromycin. The treatment
depends upon the severity of Lyme disease but most mild cases will respond to a one- to three-week course of the appropriate antibiotic.

**HOW CAN LYME DISEASE BE CONFIRMED?**

Blood tests may be used to confirm infection but these may only give an indication of past exposure to Borrelia infection and may not necessarily give an indication about recent infection. Although seropositivity can indicate Borrelia infection, the tests can be difficult to interpret and it is often the history of a tick bite and development of a rash, together with other clinical features, which lead to the diagnosis.

**WHEN IS LYME DISEASE A PROBLEM?**

The life cycle of ticks involves eggs, larvae, nymphs and adults. The major peak of activity for all feeding stages is in spring and early summer, although reported cases of Lyme disease are generally between June and October. In woodland, larvae and, to a lesser extent, nymphs feed on small mammals such as voles and mice. Nymphs feed on a wide range of birds and wild mammals and adult ticks feed on large mammals, especially deer. Ticks are frequently found on open fell areas in Cumbria where sheep have replaced wild species as hosts, for all three feeding stages of the tick. In woodland, in both Europe and the USA, ticks acquire infection during feeding on voles, mice and possibly some birds and squirrels. This results in highest infection rates in nymphs. Most infection of humans occurs following a nymph bite which may not be as easily recognised as an adult tick bite. There is some evidence that where sheep are the main hosts for all feeding stages, adult ticks have the highest infection prevalence.

**HOW CAN LYME DISEASE BE AVOIDED?**

Tick control measures, particularly applied to sheep, will reduce infestation problems in some areas, but these are not so practical with wild animals. When walking through areas where ticks might be found, such as upland sheep grazing areas, trousers to cover bare skin may be practical. However, often the simplest thing to do is to examine legs or other body areas after a walk since the tick bite is usually painless and therefore may be unrecognised initially. It is known that it will take at least 24 hours for borrelia organisms to be inoculated into a person or animal whilst a tick is attached to the skin during feeding. Therefore, early removal will prevent infection and this can be simply done with a pair of tweezers. People working in areas where tick exposure may be high, for example forestry workers, can apply insect repellent and wear protective clothing. Some people, however, may develop relative immunity, possibly because of subclinical infection. There is some variation in infectivity of Borrelia organisms in Europe, indicating a low infection rate compared with that of America. As already mentioned, this may reflect different pathogenicity of organisms, or possibly there are local host factors or even genetic factors explaining the current low susceptibility of European and particularly British people to Lyme disease. There appears to be little role for prophylactic antibiotics in view of the low risk of infection after tick bites in Britain. Precautions may be necessary in America, however, in certain areas where Lyme disease is a problem. In America, public education programmes are active to inform travellers about Lyme disease.

**IS LYME DISEASE A PROBLEM IN OTHER ANIMALS?**

Animals other than man appear to have a low disease incidence with high seropositivity. Borrelia infection can give rise to a similar disease in domestic animals. Dogs, cats and horses should be examined at regular intervals and ticks removed: for humans a visit to the doctor is important if Lyme disease is suspected. Domestic animals should be seen by a veterinary practitioner. As mentioned earlier, local veterinary practitioners are much more aware of the problem than are general practitioners, reflecting the low incidence in man and the higher incidence in domestic animals. In the same way that one should examine one’s own skin after walking, dogs should be examined at regular intervals and ticks removed with tweezers. Alternatively, a visit to the local veterinary practitioner may be appropriate for examination of the animal.

**IS THERE ANY PARTICULAR AGE GROUP AT RISK?**

No is the simplest answer. Lyme disease may affect any age group but may be expected to be seen in a younger more active population. It does not seem to have a sex preference although it seems in our experience that it may be more common in females (but on so few cases it would be difficult to say). Lyme disease has rarely been described as causing problems in pregnancy but the condition is rare and certainly in this area there have been no significant sequelae from the disease.

**WHAT ABOUT THE FUTURE?**

Will possible future climate or environmental changes alter the incidence of Lyme disease? Warmer and wetter conditions would lengthen the seasons when ticks are active and in the warmest parts of Cumbria, the Grange area, ticks are seen on deer all year round. Therefore, predicted possible global warming may increase the habitats of ticks by increasing its geographical range. Whether this will have implications for man in the future is difficult to say.