Comment

The significance of European Bat Lyssavirus infection in Great Britain

A bat conservationist in Scotland died recently from a form of rabies after being bitten by an infected animal. This caused much media attention, but how much of a risk does bat lyssavirus pose to human health in the UK?

Bat rabies is enzootic in the UK. The first bat found to have European Bat Lyssavirus (EBL) infection, in Newhaven in 1996, was assumed to have been imported, but a further bat isolation from Lancashire in 2002 and the human death in Scotland, have confirmed that the virus is indigenous. This discovery reveals unexpected dangers and creates opportunities for misunderstanding and inappropriate responses.

Bat rabies has occurred in continental Europe for at least 50 years, but only four human deaths from infection have been reported. On the continent, where there has been a greater danger of fox rabies, EBL infection is regarded as an insoluble problem which causes little concern, and the only costs are increased need for post-exposure treatment and the prolonged anxiety of recipient patients. Since the UK has been free of rabies for a century, should we be more concerned?

The distribution of the four EBLs seem well defined, so far as is known. Lyssavirus genotype 5 is EBL type 1, and genotype 6 is EBL type 2, both have subtypes a and b. EBL type 1a, the most common, occurs across Northern and Central Europe to Russia. EBL type 1b is in some Western coastal countries down to Spain. EBL type 2 has very rarely been identified: 2a in the Netherlands and the three UK isolates, and 2b in Switzerland. Both infected English bats were Daubentons' (*Myotis daubentonii*), whereas the few Dutch EBL 2a isolates came from *Myotis dasycneme*. Both genotypes of EBLs cause similar rabies-like encephalitis in man, but differences in their glycoproteins may influence pathogenesis. There is very little known about natural infection with EBL 2.

European insectivorous bats are protected species and population control would be inappropriate and impossible. Although oral vaccination has dramatically controlled the fox rabies epizootic, bats are inaccessible to vaccine treatment.

What are the risks of EBL infection in the UK? Human disease has always been associated with known contact with a bat (unlike the majority of human infections from bats in the USA, where the virus is rabies genotype 1). Bats which appear sick or behave abnormally are more likely to be rabid. However, apparently healthy bats may be infectious before symptoms of their illness show. European bats can recover from infection, become seropositive, and survive for years. Virus RNA has been detected by PCR in the brain or saliva of healthy looking Spanish bats, without evidence of active viral replication. Re-emergence of infectious virus may be possible.

The chance of EBL infecting other animals is small but finite. It is striking that four of the five EBLs identified in terrestrial animals to date have been isolated from Danish sheep. The fifth was from a stone marten in Germany recently. Detailed typing of rabies isolates has not been routine in Europe, but is increasingly performed. Although there has been no known transmission of EBL from a terrestrial mammal to man, the possibility exists. Should domestic animals dying from undiagnosed acute neurological diseases in the UK now be tested for rabies?

The slightest physical contact with a bat now requires immediate post-exposure treatment. The first-aid procedure of scrubbing the wound with soap or detergent and water, should be widely disseminated. Anyone who plans to handle bats should have pre-exposure prophylaxis, but who pays for the expensive vaccine?

Current rabies vaccines, all containing genotype 1 antigens, have had variable effects against EBLs in different experiments. Protection may be less efficient against some EBLs than against most terrestrial virus strains. As there is no alternative treatment, the urgency of post-exposure treatment is paramount. Furthermore, the enhanced secondary immune response provided by pre-exposure vaccination is even more important here.

The UK now joins France, Denmark, Belgium, The Netherlands and Spain in being enzootic for EBL in the absence of rabies genotype 1 virus. Australia harbours its own rabies-related virus, genotype 7, Australian Bat Lyssavirus, in colonies of flying foxes (*Pteropus* sp., fruit bats). According to the WHO definition, in the absence of terrestrial rabies, all these countries remain officially rabies-free!

EBL has probably existed in the UK for many years, and it cannot be compared to some other potential virus infections, for example West Nile virus, which has spread uncontrollably across the USA in three years. Although mosquito-transmitted, the virus survives winter temperatures and avian vectors cover great distances. There is no treatment and no vaccine or other specific prevention against West Nile virus infection. The whole population is at risk and other animals can be infected. Transfer of the virus to the UK is not inconceivable and perhaps the discovery of EBL here will alert people to the importance of keeping foreign animals out of Britain. The 'pet-passport' scheme, allowing pets to travel abroad, has already introduced parasitic infections not previously seen here.

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Further reading

Amengual, B., Whitby, J.E., King, A., Cobo, J.S. & Bourhy, H. (1997). Evolution of European bat lyssaviruses. *J Gen Virol* **78**, 2319–2328.

Serra-Cobo, J., Amengual, B., Abellán, C. & Bourhy, H. (2002). European Bat Lyssavirus infection in Spanish bat populations. *Emerg Infect Dis* **8**, 413–420.

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