Tick-borne encephalitis

Epidemiology, diagnosis and prevention
About Public Health England

Public Health England exists to protect and improve the nation’s health and wellbeing, and reduce health inequalities. We do this through world-leading science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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Introduction

Tick borne encephalitis (TBE) is a viral infectious disease of humans and animals, caused by TBE virus (TBEV). The virus is a member of the genus Flavivirus.

Epidemiology

The virus has 3 subtypes, which are closely related:

- European: transmitted by *Ixodes ricinus* ticks, and endemic in rural and forested areas of central, eastern and northern Europe. The European subtype is associated with milder disease than the other subtypes
- Far-Eastern: transmitted mainly by *Ixodes persulcatus*, and endemic in far-eastern Russia and in forested regions of China and Japan
- Siberian: transmitted by *I. persulcatus*, and endemic in Urals region, Siberia and far-eastern Russia, and some areas in north-eastern Europe

*Ixodes ricinus* is the most abundant and widely distributed tick species in the UK (see map), and is also the vector for Lyme disease.

See *Ixodes ricinus* distribution in Europe map.

Competent reservoir hosts of TBEV are mainly small rodents (voles, mice) and insectivores (shrews). Other animals support virus circulation indirectly by enabling tick multiplication. These include wild and domestic mammals (especially hares, deer, wild boar, sheep, cattle and goats).

Transmission

TBEV is normally transmitted by the bite of an infected tick.

In humans, disease is also, but more rarely, associated with consumption of unpasteurised milk or milk products from infected animals. About 1% of human TBEV infections are transmitted via unpasteurised milk.

TBEV is not directly transmitted from person to person, but is rarely transmitted through transplants, blood transfusion and breastfeeding. Infection has also followed laboratory incidents.
Symptoms

The incubation period of TBE is 7 days on average, but periods of up to 28 days have been described. The incubation period after foodborne infection is usually shorter, around 4 days.

Approximately two-thirds of human TBEV infections are asymptomatic. In clinical cases, TBE often has a biphasic course. The first viraemic phase lasts approximately 5 (range 2–10) days, and is associated with non-specific symptoms (fever, fatigue, headache, myalgia, nausea).

This phase is followed by an asymptomatic interval lasting 7 (range 1–33) days that precedes the second phase, when the central nervous system is involved. Typically, individuals in this phase present with meningitis, meningoencephalitis, myelitis, paralysis, or radiculitis.

The European virus subtype is associated with milder disease than that caused by other subtypes, and 20–30% of those with early flu-like symptoms going on to the second phase. Up to 10% of patients who experience the second phase may develop severe neurological sequelae. The European subtype is rarely fatal, with a mortality rate of 0.5–2%.

In children, the second phase of illness is usually limited to meningitis, whereas adults older than 40 years are at increased risk of developing encephalitis. There is a higher mortality and longer-lasting sequelae in those over the age of 60 years.

Acute encephalitis of any cause is a notifiable disease and should be notified to Public Health England if suspected.

Laboratory diagnosis

Testing can be arranged with the Rare and Imported Pathogens Laboratory (RIPL).

If TBE is suspected, the referring clinician should contact a clinician at RIPL to discuss the case.

TBEV is a notifiable organism, and should be notified to Public Health England if detected.
Risk for UK travellers

If you are travelling outside the UK, check whether you are visiting a place where TBE is present. TBEV-Eur (European subtype) is endemic in rural and forested areas of central, eastern and northern Europe where the incidence varies considerably, with highest rates reported from Lithuania, Latvia and Estonia. Ticks carrying the virus are also found in France, Germany, Italy, Scandinavia, Greece and Switzerland.

Check whether you are visiting a place where TBE is present. You can look up the country you’re visiting on the TravelHealthPro country information pages, or speak to a GP or travel clinic for more information.

Consider having a course of vaccine before you travel if you are travelling to a country where TBEV is endemic, and always practise tick avoidance.

Risk in the UK

In 2019, TBEV (European subtype) was detected in a small number of ticks collected from deer in Norfolk (East of England).

These are very early research findings, but suggest that TBEV may occur in ticks in the UK. There is currently no evidence of transmission of TBEV to humans in the UK and the risk to the public is very low.

All cases of TBEV infection reported in the UK to date have been acquired through travel to high risk areas abroad.

Rare and imported pathogens laboratory (RIPL)

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Manor Farm Road
Porton Down
Wiltshire
SP4 0JG
DX address: DX 6930400, Salisbury 92 SP

Telephone: 01980 612348 (available 9am to 5pm, Monday to Friday)
Email: ripl@phe.gov.uk

Website: www.gov.uk/government/collections/rare-and-imported-pathogens-laboratory-ripl
Tick resources and surveillance

See tick toolkits and tick awareness materials.

See information on how to take part in the tick surveillance scheme.

For further information, see NaTHNaC factsheet.