Tick Borne Encephalitis

Introduction

Tick borne encephalitis (TBE) viruses are a closely related group of flaviviruses; other flaviviruses include yellow fever, dengue and Japanese encephalitis.

There are two subtypes of TBE:

- Eastern subtype, (or Russian Spring/Summer encephalitis) transmitted by *Ixodes persulcatus* ticks. This subtype occurs in the former USSR, east of the Ural Mountains, and also in areas of China, Japan and Korea.

- Western subtype, (or Central European Encephalitis) transmitted by *Ixodes ricinus* ticks. This subtype occurs in the forested areas of Central, Eastern and Northern Europe.

Epidemiology

(Data from the Travel Health Surveillance Section of the Health Protection Agency
Communicable Disease Surveillance Centre)

Global Epidemiology

Tick-borne encephalitis (TBE) is caused by 3 different subtypes of tick borne encephalitis virus: Western European TBE virus, Far Eastern TBE virus and Siberian TBE virus. Although the viruses are virtually identical, they occur in different areas of the world, are transmitted by different species of *Ixodes* tick, and have different rodent reservoirs.

**Western European TBE** (also known as Central European encephalitis) is endemic in western and central European countries, and is particularly common in forest and mountainous regions of Austria, Estonia, Latvia, the Czech Republic, Slovakia, Germany, Hungary, Poland, Switzerland, western Russia, Ukraine, Belarus, and northern Yugoslavia. It occurs at a lower frequency in Bulgaria, Romania, Denmark, France, the Aland archipelago and neighbouring Finnish coastline, and along the coastline of southern Sweden, from Uppsala to Karlshamn. Thousands of cases occur each year from late spring to early autumn; the total number of annual cases in Western European countries has averaged 3000 over the last five years’. This type of TBE is transmitted by the tick *I. ricinus* and outbreaks often follow periods when voles (the principle reservoir) and ticks are numerous (between May and June and between September and October).
Far Eastern TBE (also known as Russian Spring/Summer encephalitis) is transmitted by the tick *I. persulcatus*, and occurs in the spring and summer months in eastern Russia, Bulgaria, Iran and some countries in East Asia, particularly in forested regions of China, Japan and Korea.

Siberian TBE (also known as west-Siberian encephalitis) is, as its names suggests endemic in Siberia and is also transmitted by the tick *I. persulcatus*.

**TBE in UK travellers**

Tick borne encephalitis is not a notifiable disease in England, Wales and Northern Ireland. As of late 2003, no cases of TBE have ever been reported to CDSC (although it is possible that there may have been cases imported into England, Wales or Northern Ireland which have not been diagnosed or reported to CDSC).

**Risk for travellers**

Travellers to endemic areas may be at risk when walking, camping or working in woodland terrain. Infection may also be acquired by consuming un-pasteurised dairy products from infected animals.

The risk is highest during the spring and summer months, with Eastern subtype occurring mainly in spring and Western mainly in early autumn. These peaks are dependent on vector distribution and a number of climatic factors such as temperature, soil moisture and relative humidity – wet summers and mild winters tend to increase tick population density. The virus is rarely found at altitudes more than 1000 metres.

**Transmission**

Infected ticks are found on forest fringes with adjacent grassland, forest glades, riverside meadows and marshland, forest plantations with brushwood, and shrubbery. They reside most commonly on ground level vegetation, on the underside of foliage, from where they can be brushed onto clothing or drop onto passing humans; ticks do not jump.

The disease can also affect animals including cows and goats. Transmission, although less common, can occur through ingesting un-pasteurised dairy products from these infected animals.
Signs and symptoms

The incubation period of TBE is usually 7-14 days. Approximately two-thirds of infected persons experience a self-limited, mild flu-like illness that lasts for a week.

Following an afebrile period lasting from one to 20 days, a third of those with clinical illness will proceed into a second stage of disease with symptoms of a high temperature and neurological involvement in the form of meningitis. Approximately a third of these patients will suffer more serious symptoms including paralysis. The case fatality rate in those developing symptomatic disease is 0.5%-2% for the Western subtype, and 5%-20% for the Eastern subtype.

Treatment

There is no specific anti viral treatment for TBE, but rather supportive intervention.

Prevention

The risk of acquiring TBE can be reduced by insect bite avoidance methods. In particular, clothing should be treated with insecticide sprays, and trousers tucked into socks.

In addition:

- Check body for ticks regularly. The larvae of *Ixodes* ticks are tiny and difficult to see. Adult ticks, once they have fed and become engorged, may be the size of a coffee bean. The groin and armpit are common areas for ticks to bite.
- Ticks should be removed as soon as possible by using a pair of tweezers or tick remover. The tweezers should be placed as close as possible to the skin and then the tick pulled slowly, ensuring the mouth parts are removed completely. Care needs to be taken not to squeeze the stomach contents into the site of the bite.
- Avoid consumption of un-pasteurised dairy products in areas of risk.
- TBE vaccination is available for those travellers intending to visit rural endemic areas, or whose occupation may put them at higher risk.
- TBE immunoglobulin is available in some European countries.
Tick Borne Encephalitis Vaccine

Indications for use of TBE vaccine

Tick borne encephalitis vaccine should be considered for:

- All persons living in endemic areas where TBE virus is transmitted by ticks
- Those at occupational risk in endemic areas, e.g. farmers, forestry workers, soldiers
- Rural travellers to endemic areas during late spring and summer e.g. campers, hikers, Scout groups

Availability

There are two inactivated vaccines available, one is licensed in the UK, and the other is used on an unlicensed basis. Both of these vaccines are licensed in several European countries where TBE is endemic, and may be included in the routine vaccination schedule of many.

Details of vaccines available in the UK, together with their manufacturers, can be found in the summary table below.
### Vaccine Schedules

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Manufacturer</th>
<th>Schedule</th>
<th>Rapid Schedule</th>
<th>Length of protection</th>
<th>Age range</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSME-Immun</td>
<td>Baxter</td>
<td>3 doses. Day 0, day 21-3 months, then 9-12 months</td>
<td>2nd dose can be given at 2 weeks after 1st</td>
<td>Booster every 3 years if at continued risk</td>
<td>From 3 years * Note different dosage for children below</td>
</tr>
<tr>
<td>(licensed)</td>
<td>Currently distributed by MASTA</td>
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<td></td>
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<tr>
<td>* For children aged 3-15 years, 1st dose 0.25ml, 2nd and 3rd doses 0.5ml</td>
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<tr>
<td>Encepur</td>
<td>Chiron Vaccines</td>
<td>Not currently available</td>
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<tr>
<td>Distributed by MASTA</td>
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<tr>
<td>Encepur Children</td>
<td>Chiron Vaccines</td>
<td>Not currently available</td>
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<tr>
<td>Distributed by MASTA</td>
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We strongly advise that the SPC is consulted prior to the administration of any vaccine.

The recommended primary course is 3 doses of vaccine; however, the first 2 doses only are required to achieve a protective antibody titre. Immunisation usually persists for about 1 year after the second dose.

**Interrupted courses**

If a course of TBE has been interrupted immunity can be attained with a single dose of vaccine, provided the interval:

- Between the first and second doses does not exceed 1 year
- Between the second and third doses or between the third and booster doses does not exceed 8 years

This information specifically applies to FSME Immun vaccine. No specific data is available for Encepur vaccine.
Contraindications

- Current febrile illness
- Allergies to constituents of the vaccine, including egg white
- The vaccine should be used with caution in those with autoimmune disease

Adverse Events

Adverse reactions following TBE vaccine are most commonly mild and transient. They include swelling, redness and pain at the injection site. Generalised flu-like symptoms such as mild fever, with headache, dizziness and itching/numbness can occur. In rare cases there are more serious reactions, for example fatigue, nausea, vomiting, muscle or joint pain. These usually subside within 24 hours.

Reading List

Department of Health. Immunisation Against Infectious Disease. 1996; HMSO London

References


Reading list


Plotkin S, Orenstein W. Vaccines. 3rd Edition. 1999; WB Saunders USA