

Tickborne encephalitis

The Disease

Most European countries have *Tick-Borne Encephalitis (TBE)*. However, it is most common in Scandinavia, Austria, the Czech Republic, Slovakia, Germany, Hungary, Poland, Switzerland, Russia, Ukraine and Belarus. A closely-related disease, *Russian spring-summer encephalitis*, occurs in China, Korea, Japan and areas of eastern Russia.

These viruses are mainly transmitted to humans by the bite of an infected tick. Ticks are usually found at the edge of forests and in clearings, long grass and hedges and are more common in the summer months. Often, the bite goes unnoticed. Infection can also be acquired by consuming unpasteurized dairy products from infected cows, goats or sheep.

About 14 days after the tick bite, the patient suffers fever, headache, muscle aches, nausea and fatigue. The symptoms usually resolve in a week or so, but up to one third of patients develop a second, more severe illness. Symptoms may include severe headaches, decreased mental state, convulsions, weakness and/or coma. These symptoms indicate that the virus is affecting the brain. About one percent of cases are fatal. The Far Eastern virus is more severe than the European variety. About 20 percent of those hospitalized die.

Fortunately, only one out of 250 people who get infected with the virus actually becomes ill.

Risk to Travelers

Those who visit or work in forests, fields or pastures or drink unpasteurized milk are at risk. The risk is particularly high from April through August.

Vaccine

A safe, effective vaccine is available in Canada, Europe and the UK. It is not available in the U.S. The vaccine is given routinely to populations living in infected areas of Europe and Russia. However, the CDC does not recommend its use for travelers.

Primary vaccination

A series of three injections.

Booster

A single injection is probably required every two to three years (if still exposed).

Prevention

It is important to prevent tick bites, especially as most travelers have not been vaccinated.

- Wear long pants with tight cuffs, and tuck pant legs into socks.
- Use insect repellent containing DEET.

- Consider soaking or spraying your clothes with the insecticide permethrin. (Do not apply permethrin directly to the skin.)
- After visiting a forest or pasture, search for ticks on your body and clothing. If a tick is found, remove it gently using tweezers.

Synonyms

Central European encephalitis, Far Eastern encephalitis, Russian spring-summer encephalitis

[CDC Tick-borne encephalitis informatio](#)

Encephalitis, Tickborne

Description

Tickborne encephalitis (TBE), also known as spring-summer encephalitis, is a flavivirus infection of the central nervous system. The two main serotypes, European and Far Eastern, are transmitted by the hard ticks *Ixodes ricinus* and *I. persulcatus*, respectively. Humans acquire disease by the bite of an infected tick or rarely, by ingesting unpasteurized dairy products primarily from infected goats, but also sheep or cows.

Occurrence

TBE disease occurs in endemic foci correlated with the distribution of the tick vectors in the temperate regions of Europe and Asia between latitudes 39-65 degrees, extending from western France to Hokkaido in Japan. The countries most heavily impacted are Austria, Belarus, Czech Republic, Estonia, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Switzerland, and the Ukraine. There are also foci in the southern portions of Finland, Norway, Sweden, and the island of Bornholm in Denmark, as well as the northern portions of Albania, Bosnia, Croatia, Italy, Greece, and Slovenia. Sporadic cases have also been reported in Turkey. In China the known endemic areas are Hunchun in Jilin province and western Yunan near the Burmese border.

The tick vectors are most active in warm, moist conditions; thus, there are two peaks of disease in Central Europe: April/May and September/October. In cooler climates there is a single peak in summer. Infected ticks are generally localized in transition zones between different types of vegetation (e.g., forest fringes with adjacent grassland and the transition zones between deciduous and coniferous forests). Individual ticks are suspended on the edges of leaves adjacent to trails and attach to passing mammals.

Risk for Travelers

The risk for travelers to urban or nonforested areas who do not consume unpasteurized dairy products is thought to be negligible. Travelers who sustain unprotected exposure via bicycling, camping, hiking, or fishing; collecting flowers, berries, or mushrooms; or certain occupational activities, such as forestry in endemic areas, might be at high risk, even if the visit is brief.

The number of cases reported from individual countries (see www.tbe-info.com) is not always a reliable predictor of risk to the traveler, as it is dependent not only on the ecology within that geographic area, but also on the level of surveillance and the percentage of the population that have been vaccinated. For example, the number of cases in Austria declined from >600 per year to 60 in 2000, when 84% of the population had been vaccinated. Vaccination prevents disease in humans but does not eradicate the virus in the tick population. An unvaccinated tourist staying four months in a highly endemic province in Austria is estimated to have a risk of acquiring TBE of about 1 per 10,000 person-months of exposure. Based on the number of tourist overnight stays in Austria, this would equate to 60 travel-associated clinical TBE cases per summer. Members of a US military unit that trained in a highly endemic area in Bosnia had an infection rate of 0.9/1,000 person-months of exposure.

Clinical Presentation

TBE usually has a biphasic course. The median incubation period is a week. The first phase consists of a few days of fever, fatigue, headache, and muscle pain. This may be followed by a week-long asymptomatic interval before signs of CNS involvement develop, including meningitis, encephalitis, and myelitis, which can result in severe neurologic sequelae. The European form seems to be milder with only 20%-30% experiencing the second phase and a mortality rate less than 1%. Case-fatality rates of 20%-40% have been reported during outbreaks of the Far Eastern subtype, which tends to be monophasic. A slow progressive form in 2%-5% of cases of the Far Eastern subtype is characterized by a long incubation period of years.

TBE should be suspected in travelers who return from an endemic area and present with uncharacteristic influenza-like illness that progresses to aseptic meningitis or encephalitis within 1-4 weeks of return. More than 50% of infected persons will not remember a tick bite. Diagnosis is made by demonstration of specific IgM, which is usually detectable by ELISA during the second (neurologic) phase of the illness. As TBE virus antibodies cross-react with other flaviviruses the laboratory that performs the test will want to know whether there is a prior history of dengue infection or flavivirus vaccination.

Prevention

Travelers may reduce their risk by avoiding exposure to tick-infested areas of forest and woodland during the spring and summer, when ticks are active. They may also protect

themselves from tick bites by barrier methods, such as wearing clothing with long sleeves and taping trouser legs or tucking them into socks or shoes. Light-colored clothing makes it easier to detect ticks, and smoothly woven clothing makes it more difficult for ticks to attach. Clothing and camping gear can be impregnated with compounds containing permethrin, which have an acaricidal and repellent effect. These compounds can be used with repellents containing N,N-diethylmetatoluamide (DEET), which can be directly applied to exposed skin (see Protection against Mosquitoes and Other Arthropods). Travelers should also inspect their bodies and clothing for ticks daily during exposure and should avoid unpasteurized dairy products.

Two effective vaccines are available in Europe from Baxter (Vienna, Austria) and Chiron (Marburg, Germany). However, since protection lasting 3 years requires 3 doses (the first 2 separated by 4-12 weeks, and the last at least 9 months after the second), it will be the rare traveler who will be in the position to benefit by immunization. An accelerated schedule is used by some clinicians. Travelers anticipating high-risk exposures, such as working or camping in forested areas or farmland, adventure travelers, expatriates or those planning to live in disease-endemic countries for an extended period of time may need special consideration.

Treatment

The only treatment currently available is supportive. Post-exposure prophylaxis with specific immune globulin is no longer recommended.

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