EcoSurv

Tick-Borne Encephalitis (TBE)

Category: OTHER SPECIES

What it is:

Tick-Borne Encephalitis (TBE) is an acute viral disease of the central nervous system, caused by the TBE Virus (TBEV), an arbovirus belonging to the genus *Flavivirus*.
TBEV **can cause meningitis, encephalitis, and meningoencephalomyelitis** in humans and, more rarely, in domestic animals, with potentially severe outcomes and permanent neurological complications.

Categories

MICE

VOLES

DEER

BIRDS

TBE virus **circulates primarily in nature through a cycle involving ticks and small wild mammals. Ticks may become infected during blood meals on infected hosts. Rodents**, such as mice and voles, **are the main reservoirs of the virus**, maintaining the infection in natural environments.
Other wild animals, such as **deer and birds**, can also contribute to the geographical spread of ticks, although they do not act as reservoirs.
Rarely, livestock such as cattle, goats, and sheep can become infected and transmit the virus to humans through the consumption of raw milk. In addition, **both humans and other domestic animals such as dogs and horses may develop clinical disease.**

Origin and Transmission

The primary transmission of the virus occurs through the bite of infected ticks, particularly *Ixodes ricinus* in Europe and *Ixodes persulcatus* in Asia. **Ticks can transmit the infection during all stages of their life cycle**: larva, nymph, and adult.
In rare cases, **transmission can also occur through the ingestion of raw milk or unpasteurised dairy products** (such as fresh cheeses) **from infected ruminants**, including goats, sheep, and cattle.
The incubation period ranges from 4 to 28 days, with an average of 7–8 days.
The life cycle of ticks, whose activity in temperate countries is highest from spring through autumn, drives the **seasonal pattern** of the disease.

Symptoms and Impacts

ANIMALS	HUMANS
In general, **infected domestic animals do not show obvious clinical signs**. In rare cases, **dogs or horses may develop encephalitis,** presenting with fever, disorientation, or neurological symptoms, although the frequency is low.	The groups **at highest risk** are those with greater exposure, such as **agricultural and forestry workers, hunters, hikers, and travelers to endemic areas**. In humans, TBE infection generally follows a **biphasic course.** The first phase is characterised by non-specific, **flu-like symptoms** such as fever, fatigue, headache, muscle pain, and sometimes digestive disturbances. After a few days, these symptoms may resolve; however, **in a proportion of cases (10–30%), a more severe second phase follows, during which the virus affects the central nervous system**. In this phase, meningitis, encephalitis, or meningoencephalomyelitis may develop, with symptoms including high fever, severe headache, neck stiffness, balance disorders, paralysis, cognitive impairment, and, in the most severe cases, loss of consciousness and coma. **Neurological complications may persist long term**, and in severe cases, the disease can be fatal, particularly in elderly, debilitated, or immunocompromised patients. In Europe, **mortality** associated with infection is **estimated at 0.5–2%**.

Geographical Distribution

TBE is found **mainly in Central, Eastern, and Northern Europe, as well as in parts of Asia** (Russia, China, Mongolia). The highest incidence rates are reported in **Austria, Slovenia, the Czech Republic, and the Baltic States. In Italy, the disease is endemic in some Alpine and pre-Alpine areas**, particularly in Trentino-Alto Adige, Friuli Venezia Giulia, and Veneto. It has also been sporadically detected in Emilia-Romagna, Tuscany, and Lazio.

Preventive Measures

Prevention of tick-borne encephalitis **primarily relies on vaccination**, which is both effective and recommended for individuals living in or traveling to endemic areas. In addition to vaccination, **personal protective measures** should be used during outdoor activities in at-risk areas, including **wearing clothing that covers the skin, using tick repellents, and thoroughly checking clothing and the body** after being in wooded or grassy environments. No specific therapy is available for the disease; therefore, **treatment is based on symptomatic and supportive care, as well as the management of complications** in severe cases. For this reason, **prevention remains the most effective strategy** to reduce the risk of infection.

IZS TERAMO Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale"
IZSVe Istituto Zooprofilattico Sperimentale delle Venezie
Istituto Superiore di Sanità

Project coordinated by: Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale"
Project Partners: Ministero della Salute, Istituto Zooprofilattico Sperimentale delle Venezie, Istituto Superiore di Sanità

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) onlyand do not necessarily reflect those of the European Union, the European Commission or European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

References:

- *Centers for Disease Control and prevention (2024). About Tick-borne Encephalitis Virus https://www.cdc.gov/tick-borne-encephalitis/about/index.html*
- *Centers for Disease Control and prevention (2025). Tick-Borne Encephalitis https://www.cdc.gov/yellow-book/hcp/travel-associated-infections-diseases/tick-borne-encephalitis.html*
- *European Centre for Disease Control (2024). Factsheet about tick-borne encephalitis (TBE) https://www.ecdc.europa.eu/en/tick-borne-encephalitis/facts/factsheet*
- *Istituto Superiore di Sanità, Sorveglianze e registri, Archivio per anni https://www.epicentro.iss.it/archivio/2024/11-1-2024*
- *Istituto Superiore di Sanità (2024) Meningoencefalite da zecche https://www.epicentro.iss.it/zecche/meningoencefalite*
- *Istituto Superiore di Sanità, Zanzara tigre, Archivio 2017-2023 https://www.epicentro.iss.it/zanzara/2017-2023*
- *Morso di zecca. TBE: qual è la situazione in Italia? https://morsodizecca.it/tbe-qual-e-la-situazione-in-italia/*
- *World health Organization (2025). Tick-borne encephalitis https://www.who.int/health-topics/tick-borne-encephalitis/#tab=tab_1*