

Powassan encephalitis

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Background

Powassan encephalitis is a condition caused by the Powassan virus, also known as deer tick virus. It is a flavivirus, a group of viruses often transmitted by ticks or mosquitoes. The virus spreads through tick bites, making it a type of arbovirus infection (a virus spread by arthropods such as ticks). The virus is closely related to [tick-borne encephalitis virus \(TBEV\)](#).

Infections happen most often in parts of Russia, the northeastern United States and the Great Lakes region of the United States and Canada, from late spring through to mid-autumn when ticks are most active.

The condition was first identified in 1958 in Powassan, Ontario, following the death of a boy from encephalitis. Since then, around 270 cases have been reported in the United States and Canada. However, because it is difficult to diagnose, its true prevalence - the actual level of how common it is - may be higher than reported.

What are the symptoms?

Symptoms first appear within one week to one month from the initial tick bite and include fever, headache, partial paralysis, confusion, nausea, difficulty speaking, seizures, and even coma.

How is it diagnosed?

It is diagnosed by first reviewing the medical and travel histories. This is followed by a blood test for antibodies, specifically immunoglobulin M, which the body has produced to defend against the infection. A lumbar puncture (spinal tap) may also be conducted to test the cerebrospinal fluid for immunoglobulin M. The immunoglobulin M antibodies can become detectable within a few days to about 1 week after infection and are useful for early detection.

The PRNT (plaque reduction neutralization test), performed on both blood and cerebrospinal fluid samples, is more specific than immunoglobulin M for confirmation. The test can distinguish the Powassan virus from other similar viruses. However, a positive result may take time to develop. The plaque reduction neutralization test typically becomes positive 1-3 weeks after infection and is used for confirmation rather than early diagnosis.

If neurological symptoms are present, brain imaging may be performed, typically using CT (computed tomography) or MRI (magnetic resonance imaging).

How is it treated?

There are currently no specific antivirals, so treatment is largely supportive. Supportive treatment focuses on relieving symptoms and supporting the body while it recovers. There is little data to support or refute the use of steroids. [Intravenous immunoglobulin \(IVIG\)](#) has been used in some cases, but its effectiveness is unclear.

What are the outcomes?

Many patients have substantial long-term morbidity, including persistent neurological symptoms in approximately a third of patients who survive. Unfortunately, between 10-15% of cases result in death.

Can it be prevented?

There are currently no vaccines, but research is ongoing. Unfortunately, tick-borne encephalitis virus vaccines do not provide cross-protection against Powassan encephalitis as they do for other tick-borne flaviviruses.

Precautions should be taken to avoid tick bites by wearing long trousers and sleeves and using an insect repellent that is effective against ticks. If a tick bites and attaches, this should be removed as soon as possible, using tweezers. Pinch as close to the skin attachment as possible and pull steadily and straight back.

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