

Encephalitis

Encephalitis is inflammation of the brain. It is usually caused by a viral infection. In the UK, the most common virus to cause encephalitis is herpes simplex virus. Symptoms usually start with the common symptoms of a viral infection such as high temperature (fever), headache, muscle aches, feeling tired and feeling sick (nausea).

Confusion, drowsiness and eventually coma can develop. Encephalitis can be difficult to diagnose. Treatment includes antiviral medication such as aciclovir. However, this is not effective against all viruses that can cause encephalitis.

Some people can recover from encephalitis and have few, or no, long-term problems. In other people, encephalitis can be life-threatening. Also, after encephalitis, some people are left with permanent brain damage.

What causes encephalitis?

The usual cause of brain inflammation (encephalitis) is a viral infection.

Examples of viral infections that can cause encephalitis include:

- The virus that causes [cold sores](#) and [genital herpes](#) (herpes simplex virus).
- The [chickenpox](#) virus (varicella-zoster virus).
- The [mumps](#) virus.
- The [measles](#) virus.
- [Flu](#) viruses.

In the UK, the most common virus to cause encephalitis is herpes simplex virus.

Most people who catch these viruses only have a mild illness (depending on the virus, these could include a skin rash, a cold sore, etc). However, rarely, in some people, the virus can travel in the bloodstream to attack the brain and cause encephalitis.

Elsewhere in the world, other viruses can cause encephalitis after bites by insects such as mosquitoes (Japanese B encephalitis virus, West Nile virus) or ticks (Central European tick-borne virus). Sometimes encephalitis can develop with rabies virus infection after an animal bite.

Most cases of encephalitis are caused by the virus directly infecting the brain. However, sometimes encephalitis can develop if your immune system tries to fight off a virus and, at the same time, attacks the nerves in your brain in error. This is known as post-infectious or autoimmune encephalitis. Rarely, this type of encephalitis can develop after an immunisation.

Very rarely, infection with germs (bacteria, fungi and parasites) can cause encephalitis.

Encephalitis symptoms

The symptoms usually start with the common symptoms of a viral infection:

- High temperature (fever).
- Headache.
- Muscle aches.
- Feeling tired.
- Feeling and being sick (nausea and vomiting).

As the infection starts to attack the brain, these symptoms can occur:

- Behavioural changes (odd behaviour, confusion, drowsiness).
- Severe headache.
- Stiff neck and back.
- Intolerance of light (photophobia).

- Muscle weakness or paralysis.
- Unconsciousness.
- Seizures (fits).

Symptoms can develop quite quickly over a few hours or sometimes they can develop over a few days.

Babies with encephalitis can be off their feeds and appear irritable and/or drowsy. They may also develop seizures.

Other symptoms

These will depend on the underlying virus that is causing the encephalitis infection. For example, if you have herpes simplex virus infection you may have a typical herpes simplex rash affecting your skin, eyes or mouth. (This is the blistery-looking rash that causes cold sores.)

Someone with encephalitis may have recently been bitten by an insect such as a mosquito or a tick. The rabies virus is transmitted through animal bites such as from an infected dog.

What is the difference between encephalitis and meningitis?

Encephalitis and meningitis are not the same. [Meningitis is an inflammation of the lining that covers the brain and spinal cord \(the meninges\)](#). It is usually caused by a bacterial or viral infection. Sometimes you can have both encephalitis and meningitis at the same time. This is called meningoencephalitis.

Who gets encephalitis?

Encephalitis is not very common. About 2,500 people per year develop encephalitis in the UK and the Republic of Ireland. Anyone can develop encephalitis.

Risk factors

However, the very young and the very old are most at risk. You are also more likely to develop encephalitis if your immune system is compromised in some way. For example, if you are [HIV-positive](#), if you are undergoing treatment for cancer, if you are taking long-term steroid treatment, etc.

How is encephalitis diagnosed?

Encephalitis can be difficult to diagnose. This is because other things such as meningitis, stroke and sometimes brain tumours can cause similar symptoms. Therefore, you may have various tests before encephalitis can be diagnosed.

CT or MRI scan

You will often need to have a [CT](#) or [MRI](#) scan of your brain to:

- Rule out other causes for your symptoms.
- Make sure that there are no signs of raised pressure in your skull (raised intracranial pressure).

A CT or MRI scan will be done before a lumbar puncture, as performing a lumbar puncture if you have raised intracranial pressure can be dangerous, so a CT or MRI scan of your brain may also show signs of brain inflammation.

Lumbar puncture

A lumbar puncture (sometimes called a spinal tap) is a procedure where a sample of cerebrospinal fluid (CSF) is taken for testing. A lumbar puncture is normally carried out if you are suspected of having encephalitis.

CSF is the fluid that surrounds the brain (cerebrum) and spinal cord. To obtain some CSF, a doctor pushes a needle through the skin and tissues between two vertebrae into the space around the spinal cord, which is filled with CSF.

A lumbar puncture can look for signs of the virus and can also help to exclude meningitis. [See the separate leaflet called Lumbar Puncture \(Spinal Tap\) for more detail.](#)

Electroencephalograph (EEG)

The EEG test looks at your brainwaves and can show abnormal brainwaves that occur if you have encephalitis. Several small patches (electrodes) are attached to your scalp. Wires from the electrodes are connected to the EEG machine. [See the separate leaflet called Electroencephalograph \(EEG\) for more detail.](#)

Other tests

These can include [blood tests](#), urine tests and swab tests (for example, if you have a blistering skin rash). They can help to look for signs and causes of infection.

Note: the exact virus that is the cause of encephalitis is not always found. In some people, encephalitis is diagnosed when other causes for their symptoms have been excluded after tests.

Encephalitis treatment

Someone with suspected encephalitis needs to be admitted to hospital urgently. Antiviral medication is usually prescribed if encephalitis is suspected. The most common medicine that is used is aciclovir. This is particularly effective in treating encephalitis caused by herpes simplex virus.

However, it may not be as effective against some of the other viruses. If you are suspected as having viral encephalitis, you will usually be started on aciclovir treatment straightaway without waiting for confirmation from test results.

This is because the medicine needs to be started quickly to be most effective and also because herpes simplex virus is the most common virus that causes encephalitis in the UK.

[Antibiotics may also be given initially](#). This is because, without test results, it may be difficult to tell the difference between encephalitis and meningitis caused by germs (bacteria).

Other treatments

Supportive treatments to help your body to rest and try to fight the infection can include:

- Fluids given via a vein (intravenous fluids).
- Medicines to control any fits (seizures) that you may have.
- Medicines to help with high temperature (fever) and pain.
- Oxygen given via a face mask.

If you have encephalitis you need close monitoring and nursing. If the infection is severe, you may be admitted to an intensive care unit.

What is the outlook for encephalitis?

Encephalitis can affect different people in different ways. Some people recover from encephalitis and have few, or no, long-term problems. However, in many people, encephalitis is a serious condition and can be life-threatening.

Also, after encephalitis, it is common for people to be left with some permanent brain damage. The extent and severity of brain damage can vary greatly.

This brain damage can lead to various problems including:

- Problems with balance, co-ordination and dexterity.
- Speech problems.
- Weakness and problems with movement.
- [Swallowing problems](#).
- Fits (seizures).
- Chronic headache.
- Personality changes.
- Memory problems.
- Behavioural problems.
- Mood problems, [anxiety](#) and [depression](#).
- Difficulty concentrating.

Support and rehabilitation are needed to help you adjust to, and cope with, any problems that you may have. Therapies such as speech therapy and physiotherapy may help to improve symptoms in some people.

Some people who are severely affected with encephalitis need continuous nursing care, as they are no longer able to look after themselves.

Can encephalitis be prevented?

[Immunisation programmes in the UK against common childhood illnesses](#) such as measles, mumps and rubella have helped dramatically to reduce the numbers of people who develop encephalitis.

Immunisation is also available against viruses that can cause encephalitis in other countries, such as [Japanese B encephalitis](#) and [tick-borne encephalitis](#) caused by insect bites. Insect repellent sprays and wearing protective clothing, such as long sleeves, can also be helpful in preventing infection. [A vaccine is also available against rabies](#).

Herpes simplex infection in newborn babies is an uncommon complication of active genital herpes in the mother around the time of delivery. It can also (very rarely) occur after direct contact with a herpes blister (such as a cold sore) in someone who is looking after the baby.

[See the separate leaflet called Genital Herpes for more detail](#). It also gives details about how to reduce the chance of passing on genital herpes to your baby if you develop genital herpes whilst you are pregnant or have recurrent genital herpes during pregnancy.

Further reading

- [Management of suspected viral encephalitis in adults](#); Association of British Neurologists and British Infection Association National Guidelines (April 2012)
- [Management of suspected viral encephalitis in children](#); Association of British Neurologists and British Infection Association National Guidelines (May 2012)
- [Stahl JP, Mailles A, Dacheux L, et al](#); Epidemiology of viral encephalitis in 2011. *Med Mal Infect.* 2011 Sep;41(9):453–64. Epub 2011 Jul 29.
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- [Dorsett M, Liang SY](#); Diagnosis and Treatment of Central Nervous System Infections in the Emergency Department. *Emerg Med Clin North Am.* 2016 Nov;34(4):917–942. doi: 10.1016/j.emc.2016.06.013.
- [Ellul M, Solomon T](#); Acute encephalitis – diagnosis and management. *Clin Med (Lond).* 2018 Mar;18(2):155–159. doi: 10.7861/clinmedicine.18–2–155.

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