

Viral encephalitis

Viral encephalitis is an inflammation of the brain caused by a virus. Some viral diseases, such as measles and rubella, can also progress to involve inflammation of the brain. Other micro-organisms, such as bacteria, fungi and parasites, are capable of triggering encephalitis, but viruses – particularly the group known as enteroviruses – are the leading cause. Once inside the blood, the viruses migrate to the brain where they start to multiply.

The body notices the invasion and mounts an immune system response. This causes the brain to swell. The combination of infection and immune response creates the typical symptoms of viral encephalitis. The major risk from viral encephalitis is permanent brain damage. Children aged one year or less and adults aged 55 years and over are more vulnerable to life threatening complications.

Symptoms

The symptoms of viral encephalitis include:

- High temperature
- Headache
- Sensitivity to light (photophobia)
- General malaise
- Stiff neck
- Stiff back
- Vomiting
- Changes to personality
- Confusion
- Memory loss (amnesia)
- Seizures
- Paralysis
- Coma.

Viruses that can cause encephalitis

Some of the viruses that are capable of causing encephalitis include:

- Enteroviruses – such as coxsackievirus, poliovirus and echovirus
- Herpes simplex virus
- Varicella zoster virus
- Epstein-Barr virus
- Cytomegalovirus
- Adenovirus
- Rubella
- Measles
- Murray Valley encephalitis (MVE) virus and Kunjin virus
- Japanese encephalitis virus.

Modes of transmission

Viruses are highly infectious. Some of the modes of viral transmission include:

- Coughs or sneezes from an infected person that release airborne viruses, which are then inhaled by others.

- Infected insects (such as mosquitoes or ticks) and animals, which can transfer some viruses directly into the bloodstream via their bite.
- Eating contaminated food or drink.
- The transfer of some viruses can occur through touching an infected person.
- There is evidence to suggest that some cases of viral encephalitis are caused by a dormant herpes simplex virus infection becoming active again.

Infection and the immune system response

Once the viruses have gained access to the bloodstream, they multiply and head to the spinal cord and brain (central nervous system). Access to the brain is by blood or nerves. After breaching the blood-brain barrier, the viruses slip inside brain cells. This disrupts, damages and ultimately ruptures the infected brain cells.

Certain viruses have a preference for different areas of the brain. For example, the herpes simplex virus likes to target the temporal lobes located over each ear. The cells of the immune system rush to the brain and start attacking the viruses. This causes the characteristic brain swelling (cerebral oedema). Both the infection and the attempts of the body to fight the infection are responsible for the symptoms of viral encephalitis.

Complications

Babies, older people and people with reduced immunity are at increased risk of developing complications of viral encephalitis. Some of these complications include:

- Low blood pressure (hypotension)
- Low oxygen levels in the blood (hypoxaemia)
- Bleeding inside the brain (intracerebral haemorrhage)
- Brain damage
- Death.

Diagnosis methods

Viral encephalitis is diagnosed using a number of tests including:

- Physical examination.
- Blood tests.
- Computed tomography (CT) scan.
- Electroencephalography (EEG) to measure brain waves.
- Laboratory examination of cerebrospinal fluid (clear liquid that bathes the brain and spinal cord) removed via lumbar puncture.
- Magnetic resonance imaging (MRI).

Treatment options

Unlike bacteria, viruses are difficult to treat. Antiviral medications only work on a limited number of viruses. Treatment aims to reduce the severity of the symptoms and can include:

- Hospitalisation
- Antiviral medication, given intravenously, if the virus is known to be drug-sensitive (such as the herpes simplex virus)
- Intravenous administration of carbohydrate solutions to help reduce brain swelling
- Drugs, including corticosteroids to reduce brain swelling
- Pain-killing drugs
- Drugs to prevent vomiting
- Anticonvulsive drugs
- Drugs to reduce fever, such as paracetamol
- Fluids to prevent dehydration, but not too much as this can worsen cerebral oedema (swelling of the brain).

Long-term outlook

The severity of viral encephalitis depends on the particular virus and how quickly treatment was given. Generally, the acute phase of the illness lasts around one or two weeks, and the symptoms either disappear quickly or subside slowly over a period of time. In many cases, the person makes a full recovery. In other cases, the person can be left with varying degrees of brain damage, which may require long-term supportive care and therapy.

Where to get help

- Your doctor
- Emergency department of your nearest hospital
- Always call an ambulance in an emergency (triple zero) Tel. 000

Things to remember

- Viral encephalitis is an inflammation of the brain caused by a virus.
- The major risk is permanent brain damage.
- Children aged one year or less and adults aged 55 years and over are at increased risk of life threatening complications.
- Treatment options include drugs to relieve the symptoms and antiviral medications if appropriate.

This page has been produced in consultation with, and approved by:

Department of Health - Communicable Disease Prevention and Control Unit

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