Zika virus infection and encephalitis

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Background

Zika virus (ZIKV) was first discovered in 1947, when a mysterious fever developed in a rhesus monkey in the Zika Forest of Uganda. Since then, it has only caused small outbreaks in Yap Island, Micronesia, and in French Polynesia. However, in 2015 it has spread rapidly through South and Central America and has reached epidemic proportions. An up-to-date list of the countries where ZIKV has been reported is available from Public Health England:

www.gov.uk/guidance/zika-virus-country-specific-risk

The World Health Organization (WHO) declared Zika a public health emergency of international concern in 2016, since an association between ZIKV and severe births defects as well as other neurological disorders had been proved.

ZIKV is transmitted primarily through the bite of infected Aedes species mosquitoes which tend to bite mainly during the day. There is also evidence of transmission from mother to child (transplacental infection), blood transfusion and sexual contact.

Complications of ZIKV infection

Regarding neurological manifestations, ZIKV has been particularly associated to Guillain-Barre syndrome. This normally causes a weakness of the arms and legs and changes in sensation but can also lead to paralysis and difficulty breathing. Myelitis (inflammation of the spinal cord), encephalitis (inflammation of the brain), meningoencephalitis (inflammation of the brain and the meninges – the protective layers that cover the brain) and acute disseminated encephalomyelitis (post-infectious inflammation of the brain and spine) have all been reported in relation to ZIKV infection.

It is not possible to predict whether an individual will develop problems in the nervous system when they are infected with ZIKV**.**

If infection occurs during pregnancy, this can result in births defects such as microcephaly (abnormally small head with underdeveloped brain), ventriculomegaly (an increase in volume of the fluid pockets in the brain), malformation of cortical development (problems with the grey matter that lines the surface of the brain), and brain calcifications (builds up of calcium in the brain).

It is recommended that pregnant women:

- Postpone non-essential travel to areas at high risk of Zika virus transmission.
- Consider postponing non-essential travel to areas at moderate risk of ZIKV transmission until after pregnancy.

Further advice about the risk of ZIKV in pregnancy, or in women trying to get pregnant, is available on the NHS website: www.nhs.uk/conditions/zika?#advice-for-pregnant-women

Symptoms and diagnosis

In most people, ZIKV infection causes a mild illness or may not cause any symptoms at all. The most common signs and symptoms of **ZIKV infection** are skin rash (mostly maculopapular- red bumps on a flat and red skin patch), fever, arthralgia (joints pain), myalgia (muscle pain), headache and conjunctivitis. Other symptoms such as articular oedema (joint swelling), sore throat, cough, and vomiting are also reported.

ZIKV encephalitis symptoms range from disturbed level of consciousness, irritability, personality change and seizures to deep coma and death.

The diagnosis can be made by clinical history, symptoms and laboratory tests looking for the virus or the antibody response to the virus in the blood and spinal fluid (which is collected from the lower back using a fine needle via a lumbar puncture). The virus can sometimes be detected in urine and saliva.

Often countries with a risk of ZIKV infection will also have other diseases such as dengue, chikungunya, yellow fever, or malaria; it is very important to rule these out too.

Treatment, outcomes and prevention

At the moment there is no specific treatment for ZIKV infection. Treatment is symptomatic, including antipyretic (to reduce fever), analgesic (to reduce pain), anti-inflammatory drugs (to reduce joint and muscle pain), lubricating eye drops if required, anti-allergy drugs (for itching), among others.

There is no specific treatment for ZIKV encephalitis. Usually, it consists of treating the complications of encephalitis such as aches, seizures or raised pressure within the skull.

The outcome is extremely variable: people can recover completely or remain with deficits. The outcome of ZIKV encephalitis is difficult to assess as only a few cases have been reported. In children who had been infected during pregnancy, the prognosis is usually poor, with cognitive deficits and a psychomotor development delay.

There is currently no vaccine against ZIKV. Although several vaccine candidates have been studied, there is concern that immunization of individuals against ZIKV may exacerbate subsequent Dengue Virus (DENV) infection symptoms. In ZIKV endemic regions this question should be observed since there are multiple flaviviruses coexisting. Preventive measures include simple measures involving mosquito bite prevention (wearing trousers and long sleeves along with repellents use, bed nets).

For more information about mosquito bite prevention methods, please see Encephalitis International's factsheet: **Infectious encephalitis: Guidelines for travellers** (www.encephalitis.info/factsheets).

Future research

At the moment, scientists are carefully studying the patterns of spread of ZIKV and trying to work out if certain people are more likely to develop complications of infection such as encephalitis. They are working on more effective new methods for controlling mosquitoes and preventing the spread of disease. Several studies involving ZIKV vaccines are in development, and it is hoped that a safe and effective one may be available in a near future.

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Page created: August 2018. Page updated: September 2022. Review date: September 2025.

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