

Arbovirus

Arboviruses is a term used to describe a group of RNA viruses transmitted to humans by **blood-sucking arthropods** from one vertebrate host to another. There are many strains of arbovirus.

The viruses range in severity from no symptoms to mild flu-like symptoms to very severe symptoms. Avoiding insect bites is key to preventing these nasty viral infections.

Insects that can infect humans with arboviruses include **fleas, ticks, gnats, and mosquitoes**. There are over 130 different arboviruses that affect humans.

General properties-the arboviruses share some common biological

- 1-They can multiply in the tissues of the arthropod without evidence of disease or damage
- 2-The vector acquires a lifelong infection through the ingestion of blood from a viremic vertebrate.
- 3-all arboviruses have an RNA genome and most have a lipid-containing envelope.
- 4-All members produce fatal encephalitis in suckling mice after intracerebral inoculation
- 5-They possess haemagglutinin and agglutinate erythrocytes of goose or day-old chicks
- 6-They can be grown in tissue cultures of primary cells like chick embryo fibroblasts or continuous cell lines like vero, and in cultures of appropriate insect tissues
- 7-They may also be isolated in the yolk sac or CAM of chick embryo
- 8-in general arboviruses are readily inactivated at room temperature and by bile salts either or sodium deoxycholate and other lipid solvent.**

Common types of arbovirus

There are many types of arboviruses. The different types of arbovirus are broken down into specific genera.

The three main genera for arboviruses that cause infections in humans are as follows:

- 1- flavivirus**
- 2- togavirus**
- 3- bunyavirus**

Types of flavivirus include the following: Yellow fever, West Nile virus, Zika virus, dengue fever, Japanese encephali

Types of togavirus include the following: Ross River virus, Eastern equine virus, Western equine virus

Types of bunyavirus include the following: California encephalitis, La Crosse virus, Jamestown Canyon virus

Transmission

The arboviruses spread mainly through **insect bites**. The most common insect that spreads arboviruses is the **mosquito**. However, other arthropods such as ticks, fleas, and gnats can also spread these diseases if they bite a human. While insect bites are the most common way arboviruses are transmitted, the viruses can also spread through blood transfusion, organ transplant, sexual contact, pregnancy and childbirth from mother to child.

Pathogenesis

→ When an infected vector bites a suitable host, the virus is injected into the capillary circulation.

→ Virus comes in contact with susceptible target cells such as endothelial cells of capillaries, monocytes, macrophages and cells of RES.

→ After replication in endothelial cells and RE cells, a secondary viraemia usually results leading to infection of target organs such as brain, skin, musculature and liver, depending on the tissue tropism.

→ The virus reaches the **brain by infecting small blood vessels of the brain or choroid plexus**.

Clinical feature

Most infections caused by arboviruses asymptomatic however, symptom when present can range from a mild flu-like illness to encephalitis, a potentially life-threatening inflammation and swelling in the brain.

The clinical characteristics and symptoms are divided into two subgroups:

1- Neuroinvasive diseases indicating that the disease can infect the nervous system, often cause meningitis or encephalitis. Symptoms of neuroinvasive arboviruses include the sudden onset of fever, headache, stiff neck, muscle pain, confusion or disorientation, weakness in the arms and legs, seizures.

2- Non-neuroinvasive diseases in this disease arboviruses differ slightly in their symptoms. The nervous system is not affected, so they do not typically cause altered mental state, such as confusion or seizures.

non-neuroinvasive arboviruses can cause a fever in addition to headache, muscle aches, upset stomach, joint pain, nausea, vomiting or diarrhea, rash.

Laboratory Diagnosis of Arbovirus

Specimen: Blood, CSF (Cerebrospinal fluid) and Brain may be used for isolation of virus. All Arboviruses are viremia – blood is collected during the acute phase of the disease. CSF is useful in encephalitis cases but the best specimen is the brain.

Diagnosis may be established by virus isolation or serology.

Isolation of the virus:

a) **Suckling mice** – specimens are inoculated intracerebrally into suckling mice. The animal may develop fatal encephalitis.

b) **Tissue culture** – Arboviruses may also be isolated in tissue cultures – Vero, BHK-21 and mosquito cell lines are inoculated with specimens. The growth of virus in cell cultures is identified by immunofluorescence, haemagglutination inhibition, complement fixation, ELISA or neutralization tests.

Serology: Using ELISA, serotype-specific IgM antibody may be detected in patient serum within 1-3 days after the onset of illness.

Prevention

While effective vaccines are available for some arboviruses, including Japanese encephalitis and yellow fever, there is not a vaccine for all arboviruses. Many other vaccines for arboviruses are currently being developed, however. The best way to prevent arboviral infections is by preventing insect bites particularly in areas that have high incidences of arboviruses.