



La Crosse Encephalitis¹

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Introduction

La Crosse encephalitis is a relatively rare viral disease that is spread by infected mosquitoes. The disease affects the central nervous system and can be serious and even lethal in rare instances. It is named for the city of La Crosse, Wisconsin, where it was first identified in 1963. Since then, La Crosse encephalitis has been identified in several Midwestern and Mid-Atlantic states (Figure 1).

**Reported La Crosse Encephalitis
Cases: 1964-1977**



Average = 73 cases/yr

Figure 1. Reported La Crosse encephalitis cases in the US (data from the Centers for Disease Control). Credits:

An average of 73 cases per year are reported to the Centers for Disease Control (CDC), with the majority being from children under 16 years of age. It is suspected that La Crosse encephalitis has a higher

incidence and wider distribution in the eastern United States, but is not reported because the virus is often not identified, and because symptoms are often mild and medical attention is not sought.

Disease Cycle

The La Crosse encephalitis organism is an arbovirus (a virus carried by arthropods such as mosquitoes, flies, and ticks). It is normally cycled between the treehole mosquito *Ochlerotatus triseriatus* (Figure 2) and vertebrate hosts (chipmunks and squirrels) in forest habitats throughout the range of the disease.



Figure 2. The treehole mosquito, *Ochlerotatus triseriatus*. Credits: Jim Newman

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A. triseriatus is a daytime biting mosquito that normally inhabits tree holes, but can also breed in other water holding containers such as discarded tires, cans, etc. Recently, eggs of the Asian Tiger Mosquito, *Aedes albopictus*, infected with the La Crosse encephalitis virus have been collected in North Carolina and Tennessee. The virus can be maintained during the winter by transmission in mosquito eggs (an infected female lays eggs that carry the virus and eventually develop into infected adults).

In a normal cycle (Figure 3), the virus is transmitted to the vertebrate host through the bite of an infected mosquito. In the host, the virus replicates and increases in abundance rapidly (a process known as amplification). When sufficiently abundant, the virus can then be passed on to other mosquitoes that may bite the infected vertebrate host. Infected chipmunks and squirrels do not show signs or symptoms of disease. Although not part of the normal cycle of the disease, humans can also contract the disease by the bite of an infected mosquito. However, humans are “dead end hosts”, meaning that an infected human can't transmit the disease because sufficient amplification of the virus does not occur in humans.

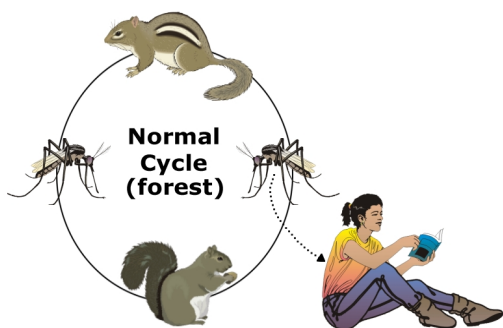


Figure 3. La Crosse encephalitis cycle.

Symptoms

As the name implies, the disease can cause inflammation of the brain which interfere with brain and spinal cord functions. Initial symptoms of La Crosse encephalitis infection include fever, headache, nausea, vomiting and lethargy. More severe symptoms usually occur in children under 16 and include seizures, coma, paralysis and neurological

aftereffects. The death rate for clinical cases of La Crosse encephalitis is about 1%. Many pediatric cases that present La Crosse encephalitis symptoms are screened for herpes or other viral diseases, but are not specifically tested for presence of the La Crosse encephalitis virus. Many of these cases are reported as "aseptic meningitis" or "unknown viral encephalitis".

Treatment

There is no specific treatment for La Crosse encephalitis. No anti-viral drugs are available at this time, and antibiotics are not effective against viruses. Patients with the disease are given supportive treatment for the symptoms, particularly headaches, fever and seizures.

Risk and Prevention

Risk of contracting La Crosse encephalitis is highest in children younger than 16 years, in people residing in or near woodlands that harbor the treehole mosquito, in people that maintain water holding containers in their residences, and in those involved in outdoor activities where *O. triseriatus* is present. Prevention of the disease involves mostly protection against the bite of infected mosquitoes. Personal measures include the use of repellents containing DEET, and the use of protective clothing (long sleeved shirts and long pants) when exposed to mosquitoes. Effective local mosquito control measures can also decrease disease risk by lowering mosquito populations and thus decreasing the probability of mosquito-human encounters, and possibly, the transmission of the disease among wild populations of mosquitoes and vertebrate hosts. Mosquito control includes the use of appropriate pesticides, and also the cleanup of water holding containers that may offer breeding sites for *O. triseriatus*.

Further Reading

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