St. Louis Encephalitis

St. Louis encephalitis is a viral disease that is spread to humans through the bite if infected mosquitoes. St. Louis encephalitis if found throughout much of the United States, as well as parts of Canada, the Caribbean, and South America. St. Louis encephalitis virus is a member of the genus Flavivirus, family Flaviviridae. Other similar diseases are West Nile virus, eastern equine encephalitis, western equine encephalitis, and La Crosse encephalitis.

How do humans become infected with St. Louis encephalitis virus?

St. Louis encephalitis virus is transmitted to humans through the bite of an infected mosquito. All residents of and visitors to areas where virus activity has been identified are at risk of getting St. Louis encephalitis, particularly persons living in crowded, low-income areas, and those who engage in outdoor work and recreational activities. St. Louis encephalitis virus infection is thought to confer life-long immunity against re-infection with St. Louis encephalitis virus.

What can people do to prevent becoming infected with St. Louis encephalitis virus?

The best way to avoid St. Louis encephalitis virus infection is to prevent mosquito bites. There is no vaccine or preventive drug. Prevention tips are similar to those of West Nile virus:

- Use insect repellent containing **DEET** or another **EPA-registered active ingredient** on exposed skin. Always follow the directions on the package.
- Wear long sleeves and pants.
- Avoid outdoor activity when mosquitoes are active (*Culex* species mosquitoes are most active between dusk and dawn).
- Have secure screens on windows and doors to keep mosquitoes out.

Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep wading pools empty and on their sides when not being used.

Geographic Distribution and Distribution History

1. First recognized in Paris, Illinois in 1932
2. Since its discovery, SLE has caused more than 1000 deaths, 10,000 severe illnesses, and more than 1 million mild infections
3. Widely distributed in the Americas
4. Isolated from southern Canada to Argentina
5. Most human illness seen in central and eastern parts of U.S.

Host Range

1. Natural Vertebrate Hosts
    a. Humans
        i. Develop infection
        ii. Dead-end host only

b. Domestic Animals
    i. Horses, cattle, dogs, cats, goats, sheep, pigs, and domestic birds can be infected
        1. clinical disease does not occur in domestic animals
        2. domestic birds may serve as maintenance or amplifying hosts
c. Wildlife
    i. Disease has not been associated with wild mammals
    ii. Wild birds and waterfowl serve as the primary amplifying hosts
    iii. Bats may serve as a maintenance host with long-lasting viremia

2. Disease Manifestation
    a. Humans
        i. Onset is sudden, with headache, fever, dizziness, nausea, malaise, and sore throat or cough
        ii. Clinical syndromes are described as encephalitis, aseptic, meningitis, and febrile headache
        iii. Seriousness of illness increases with age
        iv. Case fatality rate: increases with age from 2% in young adults to 22% in elderly adults
        v. Convalescence is protracted and usually lasts no longer than 3 years
        vi. Elderly patients and severe acute illness appear to predispose long lasting neurologic and physical sequelae
        vii. Incubation period of 4 to 21 days
    b. Domestic Animals
        i. Domestic animals rarely show manifestation of disease
    c. Wildlife
        i. Birds, bats, mammals
            1. wild birds serve as amplifying hosts but do not show disease manifestation
            2. bats may produce long lasting viremia but are not adversely affected by infection

3. Ecology
    a. Natural Vectors
        i. The primary vectors are *Cx. Pipiens* and *Cx. Quinquefasciatus*
        ii. In the western U.S., *Cx. Tarsalis* is an important vector
        iii. In Florida, *Cx. Nigripalpus* is an important vector
    b. Reservoir Hosts
        i. Wild birds and waterfowl are the reservoir hosts
        ii. Bats may play an important role in maintaining virus in an area during adverse conditions such as winter in temperate areas
    c. Basic Transmission Cycle
        i. SLE is amplified in the blood systems of wild birds
        ii. Ornithophagic mosquitoes feed on infected birds and transmit the virus to more birds
        iii. Zoophilic mosquitoes may feed on infected birds and then bridge the virus to humans and other dead-end hosts
        iv. In temperate climates, virus may overwinter with infected, hibernating *Culex* mosquitoes or may be maintained by infected bats
        v. Vertical transmission has been shown for SLE and may initiate outbreaks early in breeding seasons in temperate climates

4. Problems
    a. Maintenance/overwintering mechanisms need to be fully characterized
    b. No vaccine available
    c. Unpredicatable and intermittent outbreaks difficult to prepare for

Literature Cited

Calisher, C.H. 1994. Medically Important Arboviruses of the United States and Canada. Clin. Microviol. Rev. 7(1):89-116

[CDC] Centers for Diseases Control and Prevention. Factsheet: St. Louis Encephalitis. 2004 Dec. 2. CDC homepage. http://www.cdc.gov/ncidod/dvbid/arbor/slefact.htm.

Griffin, D.E. 2001. *Alphaviruses*. Fields Virology. 4th ed. pp. 935-937

Monath, T.P. ed. The Arboviruses: Epidemiology and Ecology, vol. III. Florida: CRC Press. 1988