March 21, 2011

Lymphocytic Choriomeningitis Virus Fact Sheet

1. **What is Lymphocytic Choriomeningitis (LCM)? –** LCM is a rodent-borne viral disease that presents as aseptic meningitis (inflammation of the membrane, or meninges, that surrounds the brain and spinal cord), encephalitis (inflammation of the brain), or meningoencephalitis (inflammation of both the brain and meninges). Its causative agent is the lymphocytic choriomeningitis virus (LCMV), a member of the family Arenaviridae that was initially isolated in 1933. Although LCMV is recognized as causing neurological disease,infection without symptoms is common. Infection during pregnancy has been associated with fetal congenital hydrocephalus, chorioretinitis and mental retardation.

2. **Where does the virus come from**? **-** The primary host is the common house mouse, *Mus musculus*. Infection in house mouse populations may vary by geographic location but, about 5% of mice throughout the United States carry LCMV. The virus is found in the saliva, urine, and feces of infected mice. Infected mice carry LCMV and shed it for the duration of their lives without showing any sign of illness. Other types of rodents, such as hamsters, are not the natural host but can become infected with LCMV from wild mice at the breeder, in the pet store or home environment. Humans are more likely to contract LCMV from house mice, but infections from pet rodents and from rodents in research laboratories have also been reported.

3. **How do humans become infected? -** Individuals become infected with LCMV after exposure to fresh urine, droppings, saliva, or nesting materials. Transmission can also occur when these materials are directly introduced into broken skin, the nose, the eyes, or the mouth, or presumably, via the bite of an infected rodent. Person-to-person transmission has not been reported, with the exception of transmission from infected mother to fetus. Recent investigations indicate that organ transplantation can also be a means of transmission.

4. **Where does LCM occur? -** LCM infections have been reported in Europe, the Americas, Australia, and Japan, and may occur wherever infected rodent hosts of the virus are found. However, the disease has historically been underreported, often making it difficult to determine incidence rates or estimates of prevalence by geographic region. Surveys have shown that the prevalence of LCMV infection among humans ranges from 2% to 5% in urban areas.

5. **What are the symptoms of LCM? -** Some people infected with LCMV do not become ill. For those who do become ill, onset of symptoms usually occurs 8-13 days after being exposed to the virus. A characteristic two-phased febrile illness then follows.

    a. The initial phase, which may last as long as a week, typically begins with any or all of the following symptoms: fever, fatigue, lack of appetite, muscle aches, headache, nausea, and vomiting. Other symptoms that appear less frequently include sore throat, cough, joint pain, chest pain, testicular pain, and parotid (salivary gland) pain.

b. Following a few days of recovery, the second phase of the disease occurs, consisting of symptoms of meningitis (for example, fever, headache, and a stiff neck) or characteristics of encephalitis (for example, drowsiness, confusion, sensory disturbances, and/or motor abnormalities, such as paralysis). LCMV has also been known to cause acute hydrocephalus (increased fluid on the brain), which often requires surgical shunting to relieve increased pressure. In rare instances, infection results in myelitis (inflammation of the spinal cord) and presents with symptoms such as muscle weakness, paralysis, or changes in body sensation. An association between LCMV infection and myocarditis (inflammation of the heart muscles) has been suggested.

6. **Are there complications after recovery? -** Previous observations have shown that most patients who develop aseptic meningitis or encephalitis due to LCMV recover completely. No chronic infection has been described in humans, and after the acute phase of illness, the virus is cleared. However, as in all infections of the central nervous system, particularly encephalitis, temporary or permanent neurological damage is possible. Nerve deafness and arthritis have been reported. Infection of the human fetus during the early stages of pregnancy may lead to developmental deficits that are permanent.

7. **Is the disease fatal? -** LCM is usually not fatal. In general, mortality is less than 1%.

8. **How is LCM treated? -** Aseptic meningitis, encephalitis, or meningoencephalitis requires hospitalization and supportive treatment based on severity. Anti-inflammatory drugs, such as corticosteroids, may be considered under specific circumstances. Although studies have shown that ribavirin, a drug used to treat several other viral diseases, is effective against LCMV in the laboratory, there is no established evidence to support its routine use for treatment of LCM in humans.

9. **Who is at risk for LCMV infection? -** Individuals of all ages who come into contact with urine, feces, saliva, or blood of the house mouse are potentially at risk for infection. Laboratory workers who work with the virus or handle infected animals are also at risk. However, this risk can be minimized by using animals from sources that regularly test for the virus, wearing proper protective laboratory gear, and following appropriate safety precautions. Owners of pet mice or hamsters may be at risk for infection if these animals originate from breeding colonies that have become contaminated with LCMV, or if the animals become infected from other wild mice. Human fetuses are at risk of acquiring infection from an infected mother.

10. **What can be done to prevent getting LCMV? –** There is no vaccine for LCMV. LCMV infection can be prevented by avoiding contact with house mice and taking precautions when handling pet rodents (i.e. mice, hamsters, or guinea pigs). Although rare, pet rodents may become infected with LCMV from wild rodents. Breeders, pet stores, and pet owners should take measures to prevent infestations of wild rodents. Pet rodents should not come into contact with wild rodents. If you have a rodent infestation in and around your home, take the following precautions to reduce the risk of LCMV infection:

    a. Seal up rodent entry holes or gaps with steel wool, lath metal, or caulk.

b. Trap rats and mice by using an appropriate snap trap.

c. Clean up rodent food sources and nesting sites and take precautions when cleaning rodent-infected areas. See recommendations for cleaning rodent-infested areas.

d. If you have a pet rodent, wash your hands with soap and water (or waterless alcohol-based hand rubs) after handling rodents or their cages and bedding.

11. **What are the recommendations for cleaning rodent-infected areas?**

a. Use cross-ventilation when entering a previously unventilated enclosed room or dwelling prior to cleanup.

b. Put on rubber, latex, vinyl or nitrile gloves.

c. Do not stir up dust by vacuuming, sweeping, or any other means.

d. Thoroughly wet contaminated areas with a bleach solution or household disinfectant.

e. Hypochlorite (bleach) solution: Mix 1½ cups of household bleach in 1 gallon of water.

f. Once everything is wet, take up contaminated materials with damp towel and then mop or sponge the area with bleach solution or household disinfectant.

g. Spray dead rodents with disinfectant and then double-bag along with all cleaning materials and throw bag out in an appropriate waste disposal system.

h. Remove the gloves and thoroughly wash your hands with soap and water (or waterless alcohol-based hand rubs when soap is not available and hands are not visibly soiled).

12. **For more information about Lymphocytic Choriomeningitis (LCM)**:
http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm

This fact sheet provides general information. Please contact your physician and/or veterinarian for specific clinical information related to you or your animal.