

## Occupational Health - Zoonotic Disease Fact Sheet

### LYMPHOCYTTIC CHORIOMENINGITIS

#### **KEY FACTS:**

- Lymphocytic choriomeningitis, or LCM, is a rodent-borne viral infectious disease caused by lymphocytic choriomeningitis virus.
- Originally initially isolated in 1933 by Armstrong and Lillie during an investigation of a St. Louis Encephalitis outbreak, LCM is an arenavirus found worldwide in mice.

**SPECIES:** Mice are the primary host of LCM. Other types of rodents, such as hamsters, are not the natural reservoirs but can become infected with LCM from wild mice. In addition to mice, infection has been reported in guinea pigs, chinchillas, rats, rabbits, dogs, pigs, and primates.

**CAUSATIVE AGENT:** Arenavirus. Of many latent viruses present in mice, only LCM naturally infects humans. LCM can easily be transmitted from animals to humans.

**TRANSMISSION:** Infection in mice is maintained by congenital infection followed by lifelong carriage and excretion of virus in saliva, urine, and feces. LCM virus is present in experimental mouse tumors which is a second source of infection for humans. This was first recognized in a transplantable leukemia of C58 mice. The disease can also be transmitted to laboratory animals via inoculation of infected tissue culture cells. Human infections have been linked to exposure to urine, droppings, saliva, and contaminated food and dust, the handling of dead mice, and mouse bites. Bloodsucking arthropod vectors such as ticks, lice, and mosquitos may transmit the disease. Person to person transmission has not been reported, with the exception of transmission from infected mother to fetus.

**DISEASE IN ANIMALS:** The clinical signs of LCM depend on the host's resistance and age when infected, although the various categories of the disease are not always clearly delineated. Animals infected in utero or during the first 48 hours postpartum may develop a transient viremia but recover completely within a few weeks. Other animals similarly infected may develop a persistent tolerant infection (PTI) that continues asymptotically for 6 or more months. Animals infected after the first few days, when the virus will be recognized as foreign, often overcome the infection completely, but an acute, usually fatal syndrome can develop. Signs of acute infection in mice continue for 1-2 weeks and include decreased growth, rough hair coat, hunched posture, blepharitis, weakness, photophobia, tremors, and convulsions. The terminal stage of the PTI, which occurs over several weeks to 5 to 12 month old mice, is characterized by weight loss, blepharitis, and impaired reproductive performance and runt litter. The important necropsy signs are microscopic. Visceral organs, including the liver, kidneys, lungs, pancreas, blood vessels, and meninges, are infiltrated by lymphocytes. A glomerulonephritis of probable immune complex origin is a characteristic feature of terminal PTI.

**DISEASE IN HUMANS:** For infected persons who become ill, onset of symptoms usually occurs 8-13 days after exposure to the virus as part of a biphasic febrile illness. The course of

disease can be broken down into two phases. The first phase features many influenza-like symptoms, including fever, lethargy, lack of appetite, muscle aches, headache, nausea, and vomiting. Other symptoms appearing less frequently include sore throat, cough, joint pain, chest pain, testicular pain, and parotid (salivary gland) pain. Following a few days of recovery, a second phase of illness may occur. Symptoms may include meningitis, encephalitis, or meningoencephalitis. LCM virus has also been known to cause acute hydrocephalus (increased fluid on the brain), which often requires surgical shunting to relieve increased intracranial 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.

**DIAGNOSIS:** Laboratory diagnosis is usually made by detecting IgM and IgG antibodies in the CSF and serum. Virus can be detected by PCR or virus isolation in the CSF at during the acute stage of illness. *Please review current literature before prescribing diagnostic testing as recommendations may have changed.*

**TREATMENT:** The Centers for Disease Control states that 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 vitro, there is no established evidence to support its routine use for treatment of LCM in humans. Severe cases of illness may require hospitalization. *Please consult your physician for treatment options as recommendations may have changed.*

**PREVENTION/CONTROL:** Infection can be prevented through limiting wild mice from entering facilities, restricting the flow of traffic into and out of LCM infected colonies, wearing protective clothing, and proper care when handling infected animals or tissues, as well as basic hygienic practices. To prevent and control unintended infections, use uninfected animals for research, and isolate any animals used in clinical trials. Additionally, only conduct projects in laboratories with proper engineering controls and train staff members in the proper use of required personal protective equipment when they are in spaces containing live agent.

More information on lymphocytic choriomeningitis can be found on the Centers for Disease Control and Prevention website at: <https://www.cdc.gov/vhf/lcm/index.html>