# Lymphocytic Choriomeningitis

Lymphocytic choriomeningitis, or LCM, is a rodent-borne viral illness that causes *aseptic meningitis*. This is an inflammation of the membranes (*meninges*) that surround the brain and spinal cord. It also causes *encephalitis* (inflammation of the brain) or *meningoencephalitis* (inflammation of both the brain and meninges). It is caused by the lymphocytic choriomeningitis virus (LCMV). LCMV most commonly shows up as a neurological disease. An asymptomatic infection or mild fever is also commonly caused. Pregnancy-related infection has been known to cause miscarriage, congenital *hydrocephalus* (fluid accumulation around the brain), *chorioretinitis* (inflammation of the retina), and mental retardation. LCM is usually not fatal. Usually mortality is less than 1%. Because many of the infections with this virus do not make people very sick, it is probably much more common. The number of people that have been infected with this virus may be as high as 10 percent.

## HOST OF LYMPHOCYTIC CHORIOMENINGITIS

LCMV is naturally spread by the common house mouse. Once infected, these mice can become continually infected by maintaining virus in their blood and/or persistently shedding virus in their urine. Infected female mice usually transmit infection to their offspring.

## HOW DO HUMANS GET LYMPHOCYTIC CHORIOMENINGITIS?

- By breathing in infectious particles of rodent urine, feces, or saliva contaminating air.
- By ingesting food contaminated with virus.
- By contamination of mucus membranes with infected body fluids of mice, or by directly exposing cuts or other open wounds to virus-infected blood.
- LCMV infection has also been documented among staff handling infected hamsters.
- Person-to-person transmission has not been reported, with the exception of transmission from an infected mother to fetus.

## SYMPTOMS

The incubation period of LCMV infection is usually between 8 and 13 days. The incubation period is the time it takes you to get sick following exposure. A characteristic illness with a fever then follows. The initial phase, which may last as long as a week, begins with any or all of the following symptoms:

- Fever
- Loss of appetite
- Vomiting
- Malaise
- Muscle aches
- Headache
- Nausea

Other symptoms that appear less frequently include sore throat, cough, joint pain, chest pain, testicular pain, and salivary gland pain. Following a few days of remission, the second phase of the disease occurs. This consists of symptoms of meningitis (fever, headache, and a stiff neck) or characteristics of encephalitis (drowsiness, confusion, sensory disturbances, and/or motor abnormalities such as paralysis). LCMV has also been known to cause acute hydrocephalus. This is an accumulation of water in the brain. This often requires surgical shunting to relieve pressure. In rare instances, infection results in *myelitis.* This is an 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.

## DIAGNOSIS

During the first phase of the disease, the most common laboratory abnormalities are a low white blood cell count (leukopenia) and a low platelet count (thrombocytopenia). Liver enzymes in the serum may also be mildly elevated. After the onset of neurological disease during the second phase, an increase in protein levels, an increase in the number of white blood cells or a decrease in the glucose levels in the cerebrospinal fluid (CSF) is usually found.

## COMPLICATIONS FOLLOWING RECOVERY

- Most patients who develop aseptic meningitis or encephalitis due to LCMV recover completely. No chronic infection has been described in humans. After the first illness, the virus is cleared.
- Temporary or permanent neurological damage is possible.
- Nerve deafness and arthritis have been reported.
- Infection of the human fetus during the early states of pregnancy may lead to developmental defects that are permanent.

## TREATMENT

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

## PEOPLE AT RISK

- Anyone who handles urine, feces, saliva, or blood of the house mouse are at risk for infection.
- Laboratory workers who handle infected animals are at risk. This risk can be decreased by using safe animals that have been tested. Proper protective laboratory clothing and gloves should be worn.
- Owners of pet mice or hamsters may be at risk for infection if these animals come from colonies with circulating LCMV or if the animals become infected from other wild mice.
- Human fetuses are at risk of acquiring infection from an infected mother.

## PREVENTION

- Minimize direct contact with rodents or exposure to their droppings.
- Good ventilation should be provided to all heavily infested, previously unventilated rooms or dwellings prior to cleanup.
- A liquid disinfectant, such as a diluted household bleach solution, should be applied to rodent droppings and their surroundings.
- Gloves should be worn when disinfecting and cleaning up after rodents.
- Control rodents with traps and poisons.

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