

## LASSA FEVER

### REPORTING INFORMATION

- **Class A:** *Report immediately via telephone* the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located. Local health departments should report immediately via telephone the case or suspected case and/or a positive laboratory result to the Ohio Department of Health (ODH).
- Reporting Form(s) and/or Mechanism:
  - *Immediately via telephone.*
  - For local health departments, cases should also be entered into the Ohio Disease Reporting System (ODRS) within 24 hours of the initial telephone report to the ODH.
- Key fields for ODRS reporting include: import status (whether the infection was travel-associated or Ohio-acquired), date of illness onset, and all the fields in the Epidemiology module.

### AGENT

Lassa fever is an acute viral illness that occurs in West Africa. The illness was discovered in 1969 when two missionary nurses died in Nigeria. The cause of the illness was found to be Lassa virus, named after the town in Nigeria where the first cases originated. The virus, a member of the virus family Arenaviridae, is a single-stranded RNA virus and is zoonotic. In areas of Africa where the disease is endemic, Sierra Leone, Liberia, Guinea, and Nigeria, Lassa fever is a significant cause of morbidity and mortality. It is mild or has no observable symptoms in about 80% of people infected with the virus; the remaining 20% have a severe multi-system disease. Lassa fever is also associated with occasional epidemics, during which the case-fatality rate can reach 50%.

### CASE DEFINITION

**The case definition below is the standard CDC case definition for viral hemorrhagic fevers (VHF).**

#### Clinical Description

An illness with acute onset with ALL of the following clinical findings:

- A fever > 40°C, 104°F
- One of more of the following clinical findings:
  - Severe headache
  - Muscle pain
  - Erythematous maculopapular rash on the trunk with fine desquamation 3-4 days after rash onset
  - Vomiting
  - Diarrhea
  - Pharyngitis (arenavirus only)
  - Abdominal pain
  - Bleeding not related to injury
  - Retrosternal chest pain (arenavirus only)
  - Proteinuria (arenavirus only)
  - Thrombocytopenia

#### Laboratory Criteria for Diagnosis

One or more of the following laboratory findings:

- Detection of VHF viral antigens in blood by enzyme-linked Immunosorbent Assay (ELISA) antigen detection

- VHR viral isolation in cell culture for blood or tissues
- Detection of VHF-specific genetic sequence by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) from blood or tissues
- Detection of VHF viral antigens in tissues by immunohistochemistry

### **Criteria for Epidemiologic Linkage**

One or more of the following exposures within the 3 weeks before onset of symptoms:

- Contact with blood or other body fluids of a patient with VHF
- Residence in or travel to a VHF endemic area
- Work in a laboratory that handles VHF specimens
- Work in a laboratory that handles bats, rodents, or primates from endemic areas
- Exposure to semen from a confirmed acute or convalescent case of VHF within 10 weeks of that person's onset of symptoms

### **Case Classification**

Suspect: Case meets the clinical and epidemiologic linkage criteria.

Confirmed: Case meets the clinical and laboratory criteria.

### **SIGNS AND SYMPTOMS**

Because the symptoms of Lassa fever are so varied and nonspecific, clinical diagnosis is often difficult. Symptoms include fever, retrosternal pain, sore throat, back pain, cough, abdominal pain, vomiting, diarrhea, conjunctivitis, facial swelling, proteinuria and mucosal bleeding. Neurologic problems have also been described, including hearing loss, tremors and encephalitis. Death may occur within two weeks after symptom onset due to multi-organ failure.

The most common complication of Lassa fever is deafness. Various degrees of deafness occur in approximately one-third of infections, and in many cases hearing loss is permanent. As far as is known, severity of the disease does not affect this complication: deafness may develop in mild as well as in severe cases.

### **DIAGNOSIS**

Lassa fever is most often diagnosed by using enzyme-linked immunosorbent serologic assays (ELISA), which detect IgM and IgG antibodies as well as Lassa antigen. Reverse transcription-polymerase chain reaction (RT-PCR) can be used in the early stage of disease. The virus itself may be cultured within 7 to 10 days. Immunohistochemistry, performed on formalin-fixed tissue specimens, can be used to make a post-mortem diagnosis.

### **EPIDEMIOLOGY**

#### **Occurrence**

Lassa fever was discovered in 1969 when two missionary nurses died in Nigeria. The virus is named after the town in Nigeria where the first cases occurred. Lassa fever is endemic in parts of west Africa including Sierra Leone, Liberia, Guinea and Nigeria; however, other neighboring countries are also at risk because the animal vector for Lassa virus, the "multimammate rat," is distributed throughout the region. The number of Lassa virus infections per year in west Africa is estimated at 100,000 to 300,000, with approximately 5,000 deaths. In some areas of Sierra Leone and Liberia, it is known that 10%-16% of people admitted to hospitals every year have Lassa fever, which indicates the serious impact of the disease on the population of this region.

#### **Mode of Transmission and Source**

The reservoir, or host, of Lassa virus is a rodent known as the multimammate rat. These rodents breed very frequently, produce large numbers of offspring, and are numerous in

the savannas and forests of West, Central, and East Africa. The virus is in urine and droppings, therefore, the virus can be transmitted through direct contact with these materials, through touching objects or eating food contaminated with these materials, or through cuts or sores. Contact with the virus also may occur when a person inhales tiny particles in the air contaminated with rodent excretions (aerosol or airborne transmission). Finally, because multimammate rats are sometimes consumed as a food source, infection may occur via direct contact when they are caught and prepared for food. Lassa fever may also spread through person-to-person contact. This type of transmission occurs when a person comes into contact with virus in the blood, tissue, secretions, or excretions of an individual infected with the Lassa virus. Person-to-person transmission is common in healthcare settings where proper personal protective equipment is not available or used.

### **Incubation Period**

7-21 days

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

Obtain information about the patient's occupation, history of travel outside the United States, contact with wild animals or lab animals, contact with a suspected or confirmed case of viral hemorrhagic fever, or close contact with an ill individual who traveled to a viral hemorrhagic fever-endemic area.

#### Treatment

Ribavirin, an antiviral drug, has been used with success in Lassa fever patients. It has been shown to be most effective when given early in the course of the illness. Patients should also receive supportive care consisting of maintenance of appropriate fluid and electrolyte balance, oxygenation and blood pressure, as well as treatment of any other complicating infections.

#### Isolation

Ohio Administrative Code (OAC) 3701-3-13 (DD) states:

"Viral hemorrhagic fever (VHF): a person with confirmed or suspected viral hemorrhagic fever shall be placed in airborne isolation until no longer considered infectious."

Clinicians evaluating suspect cases should use standard (e.g. hand hygiene), airborne (e.g., N-95 respirator) and contact (e.g. gowns and gloves) precautions.

### **Contacts**

#### Investigation

Currently there is no post-exposure prophylaxis available for individuals exposed to these agents. Investigation of contacts and source of infection: Identify all close contacts in the three weeks after the onset of illness. Initiate quarantine and active surveillance of contacts by having contacts take and maintain record of body temperature twice a day for 3 weeks after last exposure. If temperature is greater than 101°F (38.3°C), hospitalize patient immediately and initiate appropriate isolation precautions.

**What is Lassa fever?**

Lassa fever is an acute viral illness that occurs in west Africa. The illness was discovered in 1969 when two missionary nurses died in Nigeria. The virus is named after the town in Nigeria where the first cases occurred. The virus, a member of the virus family *Arenaviridae*, is a single-stranded RNA virus and is zoonotic, or animal-borne.

**What are the signs and symptoms of Lassa fever?**

Signs and symptoms of Lassa fever include fever, retrosternal pain, sore throat, back pain, cough, abdominal pain, vomiting, diarrhea, conjunctivitis, facial swelling, proteinuria and mucosal bleeding. Neurologic problems have also been described, including hearing loss, tremors and encephalitis.

**How is Lassa fever spread?**

Transmission of Lassa virus to humans occurs most commonly through ingestion or inhalation. *Mastomys* rodents shed the virus in urine and droppings and direct contact with these materials, through touching soiled objects, eating contaminated food, or exposure to open cuts or sores, can lead to infection.

Person-to-person transmission may occur after exposure to virus in the blood, tissue, secretions, or excretions of a Lassa virus-infected individual. Casual contact (including skin-to-skin contact without exchange of body fluids) does not spread Lassa virus. Person-to-person transmission is common in health care settings where proper personal protective equipment (PPE) is not available or not used. Lassa virus may be spread in contaminated medical equipment, such as reused needles.

**Who is most at risk of getting Lassa fever?**

Individuals at greatest risk of Lassa virus infection are those who live in or visit endemic regions, including Sierra Leone, Liberia, Guinea, and Nigeria and have exposure to the multimammate rat. Risk of exposure may also exist in other west African countries where *Mastomys* rodents exist. Hospital staff are not at great risk for infection as long as protective measures and proper sterilization methods are used.

**How is Lassa fever treated?**

Ribavirin, an antiviral drug, has been used with success in Lassa fever patients. It has been shown to be most effective when given early in the course of the illness. The following basic interventions, when used early, can increase the chances of survival.

- Providing fluids and electrolytes
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur

### **How do I protect myself from Lassa fever?**

Avoiding close physical contact with infected people and their body fluids is the most important way of controlling the spread of disease. Barrier nursing or infection control techniques include isolating infected individuals and wearing protective clothing. Other infection control recommendations include proper use, disinfection, and disposal of instruments and equipment used in treating or caring for patients with Lassa fever, such as needles and thermometers.

Educating people in high-risk areas on ways to decrease rodent populations in their homes will aid in the control and prevention of Lassa fever.