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Lymphocytic Choriomeningitis Virus Infection in Organ Transplant Recipients — Massachusetts, Rhode Island, 2005

On May 3, 2005, CDC received a report of severe illness in four patients who had received solid organ transplants from a common donor. All four organ recipients subsequently were found to have evidence of infection with lymphocytic choriomeningitis virus (LCMV), a rodent-borne Old World arenavirus. Preliminary findings from the ensuing investigation indicate the source of infection likely was an infected hamster in the donor's home. This report summarizes the ongoing investigation and provides information on exposure risks and possible prevention measures.

In early April, in Rhode Island, a woman with a medical history remarkable only for hypertension and 1 week of headache had sudden onset of hemiplegia caused by a stroke, followed by brainstem herniation and brain death within 3 days. A thorough evaluation was not suggestive of infection.

Family members of the woman consented to donation; organs and tissues were recovered, including the liver, the lungs, both kidneys, both corneas, and skin. Within 3 weeks after transplantation, the four persons who received the liver, lungs, and two kidneys had abnormalities of liver function and blood coagulation, and dysfunction of the transplanted organ. Signs, symptoms, and clinical laboratory test results varied in these patients and included fever, localized rash, diarrhea, hyponatremia, thrombocytopenia, hypoxia, and kidney failure. Three of the four organ recipients died, 23–27 days after transplantation. The fourth patient, a kidney recipient, survived. Histopathologic findings varied in the four cases, but hepatocellular necrosis was common to all three decedents on autopsy. The two cornea recipients were asymptomatic. Skin was not transplanted.

When the cause of illness among the recipients was not identified through extensive diagnostic testing and suspicion of transplant-transmitted infection arose, tissue and blood samples from the donor and recipients were sent from the Rhode Island Department of Health and the Massachusetts Department of Public Health to CDC. LCMV was identified as the cause of illness in all four organ recipients; diagnosis was made in tissues from multiple organs through immunohistochemical staining, reverse transcriptase-polymerase chain reaction (RT-PCR), enzyme-linked immunosorbent assays (i.e., IgM capture and indirect IgG), and viral culture on Vero E6 cells. Sequencing of the virus genome confirmed its identity as LCMV. Based on the diagnosis of LCMV infection, the surviving kidney transplant recipient was treated with intravenous ribavirin and reduction in his immunosuppressive drug regimen; the patient improved clinically.

Epidemiologic Investigation

To determine the source of LCMV infection, investigations were conducted at the hospitals involved in organ recovery and transplantation and at the coordinating organ procurement organization. Interviews also were conducted at locations where the donor had spent substantial time in the month preceding her death.

Interviews with hospital and organ bank staff members revealed no likely sources of LCMV infection in the hospital or organ-recovery settings. Environmental assessment at locations the donor frequented (e.g., home and work) revealed limited opportunities for exposure to wild rodents; the sole location noted with rodent infestation was a garden shed at her home. Interviews with family members of the donor determined that a pet hamster had been acquired recently. The hamster was cared for primarily by another family member. No illnesses compatible with LCMV had been reported in the donor or family members during the month preceding the donor's death. Further investigation of the source of infection, including rodent traceback, is ongoing.

Laboratory Investigation

Family members of the donor were tested for LCMV antibodies. The family member who cared for the hamster had specific IgM and IgG antibodies to LCMV. No other family member had detectable IgG or IgM antibodies to LCMV. All available donor tissues were tested, and no evidence of LCMV was determined by serology, immunohistochemistry, RT-PCR,

or viral culture. However, the pet hamster was determined positive for LCMV by virus isolation, RT-PCR, and immunohistochemistry. Genetic sequencing to enable comparison of patient and rodent virus isolates is planned.

Reported by: *Rhode Island Hospital, Providence; Rhode Island Dept of Health. New England Organ Bank, Newton; Massachusetts General Hospital, Brigham and Women's Hospital, Boston; Massachusetts Dept of Public Health. Infectious Disease Pathology Activity, Special Pathogens Br, Div of Viral and Rickettsial Diseases, Div of Healthcare Quality Promotion, National Center for Infectious Diseases; EIS officers, CDC.*

Editorial Note: LCMV infection usually is either asymptomatic or causes mild self-limited illness in otherwise healthy persons. LCMV can cause aseptic meningitis, but the infection is rarely fatal (*1*). Infection during pregnancy can result in vertical transmission of the virus from mother to fetus; LCMV infection during the first or second trimesters can lead to severe illness in the fetus (*2*). Serologic studies conducted in urban areas of the United States have indicated that prevalence of LCMV infection among humans is approximately 5% (*3,4*). The house mouse (*Mus musculus*) is the primary reservoir for LCMV, with a prevalence of infection of 3%–40%; a high degree of focality often is noted (*3,5,6*). However, other types of rodents (e.g., hamsters or guinea pigs) can be infected after contact with infected house mice (*7*); these rodents also have been implicated in human infection. Animals can become ill or can be asymptomatic. Infection in humans occurs primarily through exposure to secretions or excretions of infected animals (*8*).

Human-to-human transmission of LCMV has not been reported, with the exception of vertical transmission from an infected mother to fetus (*2*). A large outbreak associated with pet hamsters sold by a single distributor was reported in 1975, when 181 symptomatic cases among persons with hamster contact were identified in 12 states; no deaths occurred (*9*). In 2003, a cluster of solid organ transplant-associated meningoencephalitis deaths in Wisconsin was investigated and determined to be associated with LCMV infection. In that investigation, testing of donor tissues did not reveal any evidence of infection (*10*), and no exposures to rodents were found. Acute LCMV infection in an organ donor is thought to be a rare event.

In the case described in this report, neither the donor nor the infected family member had illness characteristic of LCMV infection. In the organ recipients, transplantation of LCMV-infected organs in the setting of immunosuppression likely increased disease severity. Although most persons infected with LCMV do not exhibit symptoms and the risk for LCMV infection from pet rodents is considered low, persons (especially pregnant women) should be aware of the possible risks associated with LCMV infection. Persons can minimize risk of LCMV infection from pet rodents by being attentive to proper hand hygiene and environmental cleaning. Additional information on handling pet rodents is available at http://www.cdc.gov/healthypets/animals/pocket_pets.htm. Additional information on LCMV is available at http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm.

Health-care providers should be aware that LCMV can be transmitted through organ transplantation. Any unexpected infectious syndromes in recipients after solid organ or tissue transplantation should trigger concern about the possibility of transplant-associated transmission of an infectious agent. Although such instances are rare, providers should alert the associated organ procurement organization, tissue bank, and public health authorities when such events are suspected. The lifesaving benefits from transplanted organs outweigh the potential risk for unidentified infectious diseases; opportunities to increase donation should be encouraged.

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