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Laboratory-Acquired West Nile Virus Infections—United States, 2002

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WEST NILE VIRUS (WNV), A MOSQUITO-borne flavivirus introduced recently to North America, is a human, equine, and avian neuropathogen.[1] The majority of human infections with WNV are mosquito-borne; however, laboratory-acquired infections with WNV and other arboviruses also occur.[2-4] This report summarizes two recent cases of WNV infection in laboratory workers without other known risk factors who acquired infection through percutaneous inoculation. Laboratory workers handling fluids or tissues known or suspected to be WNV-infected should minimize their risk for exposure and should report injuries and illnesses of suspected occupational origin to their supervisor.

Case Reports

Case 1. In August 2002, a microbiologist working in a U.S. laboratory was performing a necropsy on a blue jay submitted as part of a state's WNV surveillance program. The microbiologist worked in a Class II laminar flow biosafety cabinet under biosafety level 2 (BSL-2) conditions[5] and lacerated a thumb while using a scalpel to remove the bird's brain. The wound, a superficial cut over the dorsal surface of the interphalangeal joint, was cleansed and bandaged. Four days after injury, the microbiologist had acute symptoms of headache, myalgias, and malaise followed by chills, sweats, dysesthesias, recurring hot flashes, swelling of the postauricular lymph nodes, and anorexia. Two days later, the microbiologist noted a maculopapular rash that began on the face; extended to the trunk, arms, and legs during the next 3 days; and then disappeared gradually. The microbiologist continued to work during illness and had intermittent chills, sweats, dysesthesias, and hot flashes for approximately 1 week before recovering fully. On the third day of illness (7 days postinjury), the microbiologist sought medical care from a physician and reported no history of recent mosquito bites, prolonged outdoor activities, or recent blood transfusion. On physical examination, the patient was afebrile with erythema on the cheeks, but the examination was otherwise normal. Serial serum samples taken from the patient and submitted to CDC for WNV serologic testing revealed evidence of an acute WNV infection. The initial specimen (collected 3 days after illness onset) was negative for WNV-specific IgM or neutralizing antibodies. Specimens collected 13 and 21 days after illness onset both were positive for WNV-specific IgM antibody; the latter specimen was positive for WNV-specific neutralizing antibody, with a titer of 160; the specimen collected 13 days after illness onset was not tested by neutralization. The brain of the blue jay tested positive at CDC for WNV RNA by real-time polymerase chain reaction (TaqMan®) using two primer/probe sets.

Case 2. In October 2002, a microbiologist working in a U.S. laboratory who was harvesting WNV-infected mouse brains in a Class II laminar flow biosafety cabinet under BSL-3 conditions[5] punctured a finger with a contaminated needle. The wound was cleansed and bandaged. The microbiologist's body temperature was measured several times each day, and 3 days after injury, the microbiologist had upper respiratory infection (URI) symptoms without fever or chills. The next day, URI symptoms continued with malaise, fatigue, chills, and a low-grade fever (100.9°F [38.3°C]). That evening, the patient took an over-the-counter cold medication. The next morning, the patient awoke without fever or chills but with continued URI symptoms and a dry cough and hoarseness that persisted for >1 week, although the patient missed only 1 day of work. At no time did the patient notice a skin rash, an increase in the usual degree of joint pain, or a stiff neck. The patient reported no history of recent mosquito bites, prolonged outdoor activities, or recent blood transfusion. The patient had a history of exposure to multiple flaviviruses or flavivirus antigens (i.e., had had dengue fever and had received yellow fever and Japanese encephalitis vaccines). Serial serum samples taken and submitted to CDC for WNV serologic testing revealed evidence of an acute WNV infection. WNV-specific IgM antibody was absent from both the initial specimens (1 day after injury and 3 days before fever onset) and a specimen collected 2 days after fever onset. Anti-flaviviral IgG antibody was detected in both of these specimens by enzyme-linked immunosorbent assay (ELISA), but no change in the intensity of IgG activity was observed. A serum specimen collected 10 days after illness onset was positive for WNV-specific IgM antibody and showed a sharp increase in the intensity of anti-flaviviral IgG antibody by ELISA. Neutralizing antibody test results are pending.

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CDC Editorial Note: This report documents two recent laboratory-acquired WNV infections in the United States. On the basis of the timing of the events described, WNV infection of the two microbiologists resulted from exposure through percutaneous inoculation in laboratories. Illnesses in both laboratory workers were mild and self-limited, which is typical of illnesses in WNV-infected persons.[1] These cases confirm that laboratory workers are at risk for occupationally acquired WNV

infection,[2-4] including West Nile meningoencephalitis.

In the second case, although the presence of heterologous flavivirus antibodies did not prevent WNV infection, these heterologous antibodies might have provided some degree of cross-protection that moderated the clinical severity of the infection. Laboratory workers should not assume that immunity to other flaviviruses will protect them from WNV infection or its more severe clinical consequences.[6]

During the 2002 WNV epidemic and epizootic in the United States,[7] the number of laboratories and laboratory workers involved in arboviral diagnostic and reference activities has increased substantially. Therefore, the potential for laboratory-acquired WNV infections has increased. Laboratory-acquired arboviral infections are most likely underreported, and few recent data are available.[3,4] In 2001, a suspected case of laboratory-acquired WNV infection was reported in New York.[8] Laboratory workers involved in necropsies or other procedures involving materials potentially infected with WNV should use every precaution to minimize their risk for exposure to fluids or tissues during handling, including standard droplet and contact precautions; using and disposing of needles, scalpels, and other sharp instruments safely; and minimizing the generation of aerosols.

The Subcommittee on Arbovirus Laboratory Safety of the American Committee on Arthropod-Borne Viruses recommends four biosafety levels for laboratories that handle arboviruses, comprising combinations of laboratory practices and techniques, safety equipment, and laboratory facilities.[2] Laboratory investigations that involve handling of live WNV should be conducted under BSL-3 containment.[2,9] However, because of concerns that strict BSL-3 containment for handling human or animal specimens in the clinical diagnostic setting would severely limit the number of laboratories capable of detecting WNV infections in a timely manner, BSL-2 facilities can, with modest modification of their procedures, achieve an acceptable level of safety for the conduct of certain routine diagnostic procedures involving live WNV, including bird necropsies.[9,10]

Participating laboratory employees should receive training that reinforces awareness of potential occupational hazards and risks and that stresses the importance of timely reporting of all injuries and illnesses of suspected occupational origin. After unintentional laboratory incidents of potential exposure to WNV-infected materials, an exposed person should cleanse any wound or exposed skin immediately and thoroughly, receive first aid, and then report the incident to a supervisor, as was done in the two cases described in this report. No antivirals or other drugs are known to be effective in the prevention or treatment of WNV infection. A baseline serum specimen should be obtained and stored. If the worker has an illness within the 2 weeks after the exposure, prompt medical evaluation, consultation with public health authorities, and collection of additional serum samples for virologic and serologic analysis are recommended.

CDC encourages the reporting of all laboratory-acquired arboviral infections to local, state, and federal public health authorities, regardless of clinical manifestations. Additional information and consultation about WNV are available from CDC's Division of Vector-Borne Infectious Diseases, telephone 970-221-6400 or 970-266-3592 or at http://www.cdc.gov/ncidod/dvbid/westnile.

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Global Progress Toward Laboratory Containment of Wild Polioviruses—July 2001–August 2002

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1 figure, 1 table omitted

SINCE THE WORLD HEALTH ASSEMBLY launched the Global Poliomyelitis Eradication Initiative in 1988 (see sidebar), the number of countries in which wild poliovirus is endemic has decreased from 125 to 10 in 2001. Three of the six World Health Organization (WHO) regions (Americas, European, and Western Pacific) have been certified as free of wild poliovirus transmission.[1-4] The Global Commission for the Certification of the Eradication of Poliomyelitis will declare the world polio-free when all regions have documented the absence of wild poliovirus transmission for at least 3 consecutive years and when laboratories with wild poliovirus–containing materials have implemented appropriate containment conditions.[5] This report describes preparations for laboratory containment and the creation of a global inventory of laboratories and institutions retaining wild poliovirus and summarizes global progress since July 2001.[6] The data indicate that substan-