

Zika Virus: An Emerging Epidemic

INTRODUCTION

Zika virus is a single-stranded RNA virus of the *Flaviviridae* family that is transmitted by *Aedes aegypti* mosquitoes.^[1] Zika virus was first identified in 1947 in Rhesus monkeys, and the first human identified case was in Uganda in 1952. In 2007, an outbreak in Micronesia infected 31 people.^[1,2] Colombia falls behind Brazil with over 25,000 suspected cases and 1331 confirmed Zika virus cases reported since October 2015.^[3]

In the United States, there have been 358 travel-related cases reported, 471 locally acquired cases in the US territories, and 89 pregnant women affected in the United States. The larger number of cases (>5 cases) has been identified in Florida, Texas, New York, and Puerto Rico. Seven of the cases have been suspected to be sexually transmitted from infected males to uninfected females.^[4] The dengue, chikungunya, and yellow fever virus were found in close connection with Zika virus. This is part due to the way these viruses are transmitted. Zika virus along with dengue, chikungunya, and the yellow fever viruses is transmitted through identical routes and species of mosquitoes.^[5]

The majority of individuals infected with Zika virus do not show any signs or symptoms of infection. The Centers for Disease Control and Prevention (CDC) also reports that 80% of individuals infected with Zika virus are asymptomatic. Symptomatic individuals may present with a mild fever, rash, conjunctivitis, muscle aches, joint pains, or headache. The CDC also recommends that nonpregnant patients that present with two or more symptoms should be tested for the virus. Being tested for Zika virus includes discussing recent travel and symptoms, living with someone who has Zika, or having unprotected sex with someone who has lived or traveled to an area with Zika. Patients may also be screened with a questionnaire on the possible exposure to Zika and Zika transmission. Results are sent off to the health department to determine whether testing is appropriate before samples are collected. Various tests that can be used include molecular tests, Trioplex real-time, reverse-transcription polymerase chain reaction (RT-PCR) assay, serologic tests, and Zika *Mycobacterium avium* complex (MAC)-ELISA tests. Molecular tests sample urine collections <14 days after symptom onset. Positive results are indicative of Zika virus. Negative results do not exclude Zika, and additional serum IgM antibody test should be utilized. Trioplex real-time RT-PCR is not a Food and Drug Administration (FDA)-approved test but can be used under Emergency Use Authorization serologic IgM tests antibodies that typically develop after 1 week and within 14 days. Samples collected after 14 days are to be tested for anti-Zika, anti-dengue, and anti-chikungunya virus. Zika MAC-ELISA is an enzyme-linked immunosorbent assay that can detect IgM antibodies to Zika virus in the serum or cerebrospinal fluid of the infected patients. Results may not be conclusive due to cross-reaction with other flaviviruses and other possible nonspecific reactivity. Positive Zika MAC-ELISA tests are confirmed through plaque reduction neutralization testing in a CDC-designated confirmatory testing laboratory.^[6] Symptomatic individuals generally experience relief in symptoms within 2–7 days.^[7] Zika virus was also found to be self-limiting with

symptoms resolving without further treatment. Once resolved, Zika does not appear to affect the patient long-term or in future pregnancies. Individuals are likely to be protected from future infections.^[4]

COMPLICATIONS OF ZIKA VIRUS

Although data remain insufficient, pregnant women in their first trimester of pregnancy are at risk for fetal defects, particularly microcephaly. Microcephaly is a birth abnormality defined by a head circumference <2 standard deviations (SDs) from the average in relation to age, sex, and ethnicity. A head circumference <3 SD is regarded as severe microcephaly.^[4] Some of the complications associated with microcephaly include seizures, developmental delays, problems with movement and balance, vision problems, feeding problems, and behavioral issues. Microcephaly can also be caused by genetic or environmental factors that affect fetal brain development during pregnancy. On February 1, 2016, the World Health Organization declared a suspected correlation between Zika virus and microcephaly. Pregnant women were advised to take added precaution to prevent infections by Zika virus. The current level of monitoring required for pregnant women during pregnancy is being investigated.^[8] A study was conducted in French Polynesia between October 2013 and April 2014 on the association of Zika virus and microcephaly in neonates and fetuses. French Polynesia was chosen as the location because at the time, it had the highest number of recorded outbreaks and a strong infrastructure for detecting infectious disease and complications during pregnancy. Finally, there had to be a sufficient amount of time between the end of the outbreak in order for all possible cases of Zika virus to be detected. The results determined that women had a 1% increased risk of developing fetus with microcephaly in the first trimester of pregnancy if the mother was infected with Zika virus.^[4]

RECOMMENDATIONS

Even though the risk of microcephaly may seem low, it is an important issue for public health. The microcephaly finding also supports a strong need to protect, inform, and monitor pregnant women and to develop effective treatments and vaccines. Currently, there is no vaccine or antiviral treatment available for Zika virus. Pharmacists can assist by educating patients on the prevention of mosquito bites and transmission from infected individuals. Patients should also be informed of the importance of wearing long sleeves shirt and pants, sleeping under mosquito nets, and to remain in well-ventilated areas. In addition to the list above, patients can also utilize air conditioning or screens to keep mosquitoes from entering buildings when traveling to Zika affected areas. Insect repellent is also recommended by the Environmental Protection Agency (EPA). The EPA also states that insect repellent can be used by pregnant and breastfeeding women but advises against its use in babies and children under the age of 2 years old. Vulnerable populations should also wear protective clothing that covers the arms and legs. Baby stroller and carriages should be equipped with mosquito netting. If applying insect repellent to children, spraying directly onto

the child's hands while avoiding the child eyes and mouth. It is recommended that adults apply the spray to their hands before applying it to a child's face. It is also recommended that patients apply sunscreen before applying insect repellent. Clothing that has been pretreated with permethrin can also be purchased. Local pharmacies and pharmacists can also advise patients on the safest and most effective products to use in the prevention of the spread of Zika virus.^[4]

The CDC also recommends that all women who have previously traveled to Zika affected areas be tested for Zika virus. Pregnant women who are asymptomatic do not require testing for Zika virus if the fetus does not have microcephaly or intracranial calcifications. A series of ultrasounds can also be done every 3–4 weeks to monitor fetal anatomy and growth in pregnant women with objective findings of Zika virus.^[9] It is currently not known if a positive Zika virus finding is related to fetal abnormalities and if so, what percentage of infants born to positive mothers will present with these abnormalities. Research has also shown that individuals previously infected with Zika virus, can pass the virus to another noninfected person through blood, semen, and saliva. The life span of Zika virus in semen is unknown, but studies do show that the virus can remain in the semen longer than in the blood. Because of this, condoms are recommended during sexual intercourse to prevent sexually transmitted Zika virus.^[10] Infected individuals may receive supportive care with rest, fluids, analgesics, and antipyretics. The CDC also recommends that the use of aspirin and other nonsteroidal anti-inflammatory drugs should be avoided until dengue fever is ruled out. Individuals should also continue to protect themselves from further mosquito exposure to prevent other mosquitoes from being infected, thus further spreading the disease.

Lawmakers recently passed a Bill to provide monetary incentives for drug companies that invest in the research for the treatment and vaccination of Zika virus. Unfortunately, the Bill does not contain the \$1.9 billion recommended by the public health experts to prepare Americans for Zika virus. In turn, the law offers other incentives regarding other drugs; the pharmaceutical companies may have in the pipeline awaiting approval. Pharmaceutical companies may be given a priority review voucher that may accelerate the review by the FDA on any product as well as right to sell the voucher to other companies.^[8]

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