Title: Zika virus.
Authors: Schnee, Alex
Document Type: Article
Subject Terms: Zika virus
Mosquito vectors
Abstract: Zika is a virus that is predominantly spread by infected mosquitoes of the species Aedes aegypti and Ae. albopictus. Zika virus is a member of the Flaviviridae family and the genus Flavivirus; other viruses in this genus include yellow fever, dengue fever, West Nile virus, and Japanese encephalitis. The Zika virus was first discovered in 1947 in the Zika Forest in Uganda. Human cases of Zika virus infection were limited throughout the twentieth century; however, Zika virus outbreaks in the twenty-first century, particularly in the Americas in 2015 and 2016, have brought Zika virus to international attention.

Full Text Word Count: 2292
Accession Number: 113928186
Database: Research Starters

Zika virus

Zika is a virus that is predominantly spread by infected mosquitoes of the species Aedes aegypti and Ae. albopictus. Zika virus is a member of the Flaviviridae family and the genus Flavivirus; other viruses in this genus include yellow fever, dengue fever, West Nile virus, and Japanese encephalitis. The Zika virus was first discovered in 1947 in the Zika Forest in Uganda. Human cases of Zika virus infection were limited throughout the twentieth century; however, Zika virus outbreaks in the twenty-first century, particularly in the Americas in 2015 and 2016, brought Zika virus to international attention.

Symptoms of the Zika virus. By BethIRRORlin (Own work) [CC BY-SA 4.0 (http://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons
Digitally colorized transmission electron micrograph (TEM) of the Zika virus, a member of the family Flaviviridae. Virus particles, here colored red, are 40 nm in diameter, with an outer envelope, and an inner dense core. By CDC/ Cynthia Goldsmith (http://phil.cdc.gov/phil/details.asp; pid=20538) [Public domain], via Wikimedia Commons

**History**

The Zika virus was first identified in a rhesus macaque monkey in 1947 by a research group studying yellow fever in Uganda. In 1952, antibodies of the Zika virus were discovered in humans, and the first human case of active Zika virus infection was recorded in Nigeria in 1954. Between the 1950s and the 1990s, human cases of Zika virus infection were found in several other countries, including Egypt, Sierra Leone, Indonesia, India, Tanzania, and Vietnam. However, throughout the twentieth century, there was no recorded transmission of Zika virus outside of Africa or Asia.

In 2007, the first large-scale outbreak of Zika virus occurred in the Federated States of Micronesia on Yap Island, which is located in the Pacific Ocean to the north of Papua New Guinea. Nearly three-quarters of Yap residents were infected with Zika during this outbreak. Previously, only fourteen cases of active Zika virus infection had been documented in humans. A second major outbreak occurred in French Polynesia between October 2013 and February 2014; cases were also reported on New Caledonia, Easter Island, and the Cook Islands.

The first reports of locally transmitted cases of Zika virus in the Americas were confirmed in Brazil in May 2015, although it is likely that cases of Zika virus infection were occurring in Rio de Janeiro as early as January 2015. In July, Brazil reported neurological disorders in people with a history of Zika infection, including forty-nine confirmed cases of Guillain-Barré syndrome, and in October, Brazil reported a significant increase in the number of cases of microcephaly among newborns whose mothers had Zika virus infection during pregnancy. Microcephaly is a birth defect in which the baby's head is much smaller than normal, often due to limited brain growth and development. From Brazil, Zika virus then spread to other countries in South and Central America and the Caribbean, as well as to Mexico and the southern United States, including Texas, Florida, and California.

The rapid spread of the Zika virus in the mid-2010s garnered widespread attention from public health organizations and from the mass media. In February 2016, the World Health Organization (WHO) took the
significant step of declaring the outbreak a Public Health Emergency of International Concern, an official designation that aims to provide countries with more resources to fight serious health concerns. The status was prompted chiefly over worries regarding the virus’s ability to cause microcephaly in newborn babies. Many nations and health organizations issued warnings about traveling to areas where the virus was known to be present, especially for pregnant women; concern over the disease even led some athletes to avoid the 2016 Olympic Games in Rio de Janeiro, Brazil.

In November 2016, the WHO announced that Zika virus was no longer considered a global health emergency, although it continued to spread. The end of the emergency status was in part due to the fact that experts believed they now better understood the virus, though some observers worried that lifting the designation would hinder ongoing efforts to stop the Zika pandemic.

While the threat of Zika in the United States remained to some extent, by July 2017, the number of cases being reported had declined since the peak of the outbreak. Additionally, it was reported that a case of locally transmitted Zika virus in Texas that month had been the only locally transmitted case reported so far that year in the continental United States. Strategies involved with reducing this number included mosquito-control methods such as draining standing water and increased use of insect repellent. Regardless, experts maintained that US residents should continue to practice caution, especially when traveling, and that the virus would continue to circulate at some level in the areas where it had been introduced.

Transmission

Infected mosquitoes are the primary vectors of the virus. The virus is spread by the mosquito species Ae. aegypti and Ae. albopictus, which also spread dengue and chikungunya. These mosquitoes prefer to feed on humans and typically live and breed near people. They are primarily active in the daytime, although they may also feed at night. A mosquito becomes infected with Zika virus when it bites a person who is already infected with the virus. The infected blood then travels to the mosquito’s midgut, where the virus enters the mosquito’s circulatory system and travels to its salivary glands. When the mosquito bites another person, it injects the Zika-infected saliva into that person, spreading the disease.

Zika can also be transmitted sexually. In 2008, the first documented case of sexually transmitted Zika virus infection occurred when an American scientist returned to the United States from Senegal and passed Zika to his wife after having unprotected sex. The Zika virus can be sexually transmitted by an infected person before he or she experiences any symptoms, while symptomatic, and after symptoms end. After the onset of the 2015–16 outbreak, scientists conducted research to determine how long the Zika virus remains in the semen and vaginal fluids of people who have had Zika. However, Zika is known to remain in semen for longer periods of time than other body fluids, including urine, blood, and vaginal fluids.

A blood transfusion may also spread the virus. In Brazil, there have been suspected cases of the virus being transmitted through blood transfusions. There has been an increase in testing for Zika virus before blood donations, and there have not yet been any confirmed cases of Zika transmitted by blood transfusion in the United States. During the 2013–14 Zika outbreak in French Polynesia, forty-two donors, or nearly 3 percent of blood donors, were found to have blood infected with the virus.

Zika and Pregnancy

The Zika virus can also be spread from an infected woman to her fetus during pregnancy or childbirth. While the symptoms of Zika virus infection are generally mild, Zika virus infection during pregnancy can have devastating effects. Zika infection during pregnancy carries the risk of miscarriage as well as birth defects such as microcephaly. Microcephaly is a condition in which a newborn’s head is much smaller than it should be and can cause seizures; developmental delays and intellectual disabilities; problems with
movement, balance, and feeding; hearing loss; and ocular defects. Microcephaly can be fatal to the infant, sometimes within minutes of being born.

Not all infants who are born to mothers who had Zika during pregnancy develop observable birth defects, and it is not yet known exactly how Zika causes microcephaly and other defects or at what stage of pregnancy Zika virus infection is most dangerous to the fetus. However, a 2016 study in the *New England Journal of Medicine* suggested that Zika virus can have deleterious effects on fetal development at all stages of pregnancy, with adverse outcomes occurring in 55 percent of pregnancies in which the mother was infected during the first trimester, 52 percent of those in which the mother was infected during the second trimester, and 29 percent of those in which the mother was infected during the third trimester. Zika virus infection during pregnancy can also cause calcium deposits in the brain, excessive fluid in the brain cavities, absent or poorly formed brain structures, abnormal eye development, clubfoot, and inflexible joints in the fetus or infant.

A 2018 study from the US Centers for Disease Control and Prevention (CDC) found that these risks to babies exposed to Zika existed even when obvious conditions such as microcephaly were not present. Approximately one in seven exposed children in US territories (14 percent) were found to have been harmed in one way or another, including various levels of developmental or neurological problems. Studies continued to investigate the effects of Zika on children after birth.

**Symptoms**

Despite the devastating effects that Zika virus infection can have during pregnancy, most cases of Zika virus infection do not cause any symptoms. However, some infected individuals experience a mild fever, a maculopapular (flat, red) rash, conjunctivitis (red eyes), headache, and joint and muscle pain. Symptoms often only last a few days, and while only a few deaths related to Zika virus infection have been reported in the United States and its territories, Zika-induced birth defects have been fatal for a number of newborns in the Americas. An extremely small percentage of people who are infected with Zika virus are thought to develop Guillain-Barré syndrome, in which a person’s immune system attacks nerve cells, causing muscle weakness or even paralysis and death. Once a person is infected with Zika virus, they are likely to be immune to future infections.

**Prevention**

The best way to prevent the Zika virus is to eliminate the likelihood of being bitten by a mosquito in affected areas and by using condoms or abstaining from sex after traveling to locations where Zika virus has been found. Wearing long-sleeved shirts and long pants, using mosquito nets, staying indoors with screens on the windows and doors, removing any standing water where mosquitoes can breed, and applying insect repellent are all effective ways to decrease the chances of being bitten. There is not yet a vaccine for the Zika virus, but after the onset of the 2015–16 outbreak, more than eighteen companies announced efforts to create a vaccine. However, it was estimated it would take at least two years to develop a vaccine and as many as twelve years before it would be approved.

In March 2017, the US National Institute of Allergy and Infectious Diseases (NIAID) launched a Phase 2 clinical trial of a DNA-based vaccine against Zika and aimed to enroll nearly 2,500 healthy adult and adolescent participants in areas of confirmed or potential active mosquito-transmitted Zika infection, including the continental United States and Puerto Rico, Brazil, Peru, Panama, Costa Rica, and Mexico. Another experimental vaccine, using a live, attenuated version of the virus, entered a clinical trial in August 2018.

**Bibliography**

eds.b.ebscohost.com/eds/delivery?sid=3ad9a45-e1db-44c7-a0b7-337141976d2a%40pdc-v-sessmgr02&vid=2&ReturnUrl=http%3a%2f%2fed...


