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# Zika Virus: Basics About the Disease

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## Contents

Introduction.....	1
Transmission .....	2
Symptoms.....	3
Diagnosis and Treatment.....	3
Preventing Transmission .....	3

## Figures

Figure 1. The <i>Aedes aegypti</i> mosquito, the most common vector of Zika virus .....	2
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## Contacts

Author Contact Information .....	4
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## Introduction

In late 2015, health officials in Brazil recognized a marked increase in the number of infants born with microcephaly (from Greek, meaning “small head”), a birth defect that may accompany significant, permanent brain damage.<sup>1</sup> Although not conclusive, the increase in microcephaly is suspected to be related to the emergence of Zika virus infections in Brazil early in 2015.<sup>2</sup>

Zika virus is related to the viruses that cause yellow fever, dengue, West Nile, and Japanese encephalitis viruses.<sup>3</sup> Historically, Zika virus was found in Africa.<sup>4</sup> Since 2007, Zika transmission has also occurred in Southeast Asia and the Western Pacific. In the Americas, transmission was first identified in Brazil in May 2015. As of January 29, 2016, the Pan American Health Organization (PAHO) had received reports of local transmission in 25 countries and territories in the Americas, including Puerto Rico and the U.S. Virgin Islands.<sup>5</sup>

Symptoms of Zika virus infection are usually mild, and the illness often resolves quickly. However, the possible link to microcephaly has raised the level of public health concern in the Americas and elsewhere, and has spurred wide-ranging efforts to protect pregnant women from infection. *Although some aspects of Zika virus infection (such as the behavior of the mosquitoes that carry it) are well understood, many other aspects of this emerging infection in the Americas are unknown.* While study of the Zika virus ramps up, health officials will have to base their decisions on the best available evidence, which could have substantial gaps for the time being.

On February 1, 2016, the World Health Organization (WHO) determined that the rapid spread of Zika infections in the Americas and the suspected link to a serious birth defect constituted a “Public Health Emergency of International Concern” under the International Health Regulations.<sup>6</sup> Under this designation, nations are expected to cooperate, expand monitoring, and share information in order to stem the spread of the disease.

This report discusses scientific and technical aspects of Zika virus infection, including modes of transmission, symptoms, diagnosis and treatment, and prevention. Policy concerns and official actions are evolving and will be discussed in forthcoming CRS products. Unless otherwise cited, information in this report is drawn from the Zika virus information pages of the U.S. Centers for Disease Control and Prevention (CDC),<sup>7</sup> WHO,<sup>8</sup> and PAHO,<sup>9</sup> where readers can also find the most current public health recommendations for the general public, travelers, and pregnant women.

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<sup>1</sup> Pronounced my-kroh-SEF-uh-lee. See <http://www.merriam-webster.com/dictionary/microcephaly>. For more information see U.S. Centers for Disease Control and Prevention (CDC), “Facts about Microcephaly,” <http://www.cdc.gov/ncbddd/birthdefects/microcephaly.html>.

<sup>2</sup> See CRS Insight IN10433, *Zika Virus: Global Health Considerations*, by Tiaji Salaam-Blyther.

<sup>3</sup> This paragraph is drawn from CDC, “Zika Virus Spreads to New Areas—Region of the Americas, May 2015–January 2016,” *MMWR*, vol. 65, no. 3, January 29, 2016, <http://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6503.pdf>.

<sup>4</sup> Zika virus was first isolated in 1947 from a monkey in the Zika forest of Uganda.

<sup>5</sup> PAHO is the Regional Office for the Americas of the World Health Organization (WHO). See <http://www.paho.org>.

<sup>6</sup> WHO, “WHO Announces a Public Health Emergency of International Concern,” press release, February 1, 2016, <http://www.who.int/en/>. For more information on the International Health Regulations, see “International Health Regulations (IHR)” in CRS Report R43829, *Ebola: Selected Legal Issues*, by Jared P. Cole et al.

<sup>7</sup> CDC, “Zika Virus,” <http://www.cdc.gov/zika/index.html>.

<sup>8</sup> World Health Organization (WHO), “Microcephaly/Zika virus,” <http://www.who.int/emergencies/zika-virus/en/>.

<sup>9</sup> Pan American Health Organization (PAHO), “Zika virus infection,” [http://www.paho.org/hq/index.php?option=com\\_content&view=article&id=11585&Itemid=41688](http://www.paho.org/hq/index.php?option=com_content&view=article&id=11585&Itemid=41688).

## Transmission

The primary means of Zika virus transmission is through the bite of an infected mosquito. Zika infections are not commonly transmitted directly between people, although the following direct transmission routes have been reported: from an infected pregnant woman to the fetus, through sexual contact with an infected person, and through blood transfusion from an infected blood donor. Zika virus has been detected in breast milk of infected mothers, but transmission via breast milk has not been reported.<sup>10</sup>

Zika virus is carried by and transmitted through the bite of a specific genus of mosquito, *Aedes*, primarily *A. aegypti* (see **Figure 1**), and possibly *A. albopictus* (also known as the Asian tiger mosquito). Both species have noticeable black and white stripes. These are the same species that transmit the viruses that cause yellow fever, dengue, and chikungunya. As a result, the behavior, geographic ranges, and control methods for these mosquitoes are generally well understood. Neither species is native to the Americas. Both were unintentionally introduced. Their geographic ranges vary from year to year, but in the United States they are limited to warmer regions. *A. aegypti* is found in the South and parts of the Southwest. The range of *A. albopictus* is broader, including parts of the central United States, Ohio Valley, and Eastern Seaboard as far north as New York City. Both species are aggressive daytime biters, well adapted to urban environments.<sup>11</sup>

**Figure 1. The *Aedes aegypti* mosquito, the most common vector of Zika virus**



**Source:** James Gathany, CDC Public Health Image Library, image #9261, <http://phil.cdc.gov>.

Health officials are most concerned about areas where Zika virus *transmission* has been reported, rather than where human infections have been reported. Because *Aedes* mosquitoes are present in the United States, CDC says that “... [w]ith the recent outbreaks [in Central and South America], the number of Zika virus disease cases among travelers visiting or returning to the United States will likely increase. These imported cases may result in local spread of the virus in some areas of the United States. CDC has been monitoring these epidemics and is prepared to address cases imported into the United States and cases transmitted locally.”<sup>12</sup>

The WHO says that an *animal reservoir* for the Zika virus is “unknown.”<sup>13</sup> An animal reservoir is a non-human animal that also harbors a pathogen and contributes to its spread. (Examples are birds and West Nile virus, deer and the Lyme disease bacteria, and bats and Ebola virus.) Research on possible animal reservoirs of Zika virus is underway. If an animal reservoir is present, it could amplify the number of infected mosquitoes and increase the risk of transmission to humans.

<sup>10</sup> CDC, “Zika virus, Transmission,” <http://www.cdc.gov/zika/transmission/index.html>.

<sup>11</sup> CDC, “Surveillance and Control of *Aedes aegypti* and *Aedes albopictus* in the United States,” <http://www.cdc.gov/chikungunya/resources/vector-control.html>.

<sup>12</sup> CDC, “Zika Virus Disease Q & A: Should We Be Concerned about Zika in the United States?” <http://www.cdc.gov/zika/disease-qa.html>.

<sup>13</sup> WHO, “Zika virus fact sheet,” January 2016, <http://www.who.int/mediacentre/factsheets/zika/en/>.

## Symptoms

According to CDC, “About 1 in 5 people infected with Zika will get sick. For people who get sick, the illness is usually mild. For this reason, many people might not realize they have been infected. The most common symptoms of Zika virus disease are fever, rash, joint pain, or conjunctivitis (red eyes). Symptoms typically begin 2 to 7 days after being bitten by an infected mosquito.”<sup>14</sup> Zika virus usually remains in the blood of an infected person for about a week, but it can persist for longer periods in some people.

WHO is concerned that the spike in cases of microcephaly in Brazil is consistent with the recent introduction of the Zika virus into populations that lack immunity to it. Health officials are investigating possible links between Zika infection and other neurological and congenital disorders, including Guillain-Barré syndrome (GBS), an immune disorder often associated with bacterial or viral infections, characterized by muscle weakness and sometimes paralysis.<sup>15</sup>

## Diagnosis and Treatment

CDC reports that no commercially available diagnostic tests are available for Zika virus disease. Zika virus testing is performed at CDC and a few state health departments. Clinicians are advised to contact their state health department to facilitate testing.<sup>16</sup>

No specific therapy or vaccine against Zika infection is approved by the U.S. Food and Drug Administration (FDA) for use in the United States, nor is one available elsewhere in the world. For the time being, treatment of infected persons is supportive, including treating symptoms and maintaining hydration. CDC, the National Institutes of Health (NIH), and pharmaceutical companies are working to develop tests, potential treatments, and vaccines.<sup>17</sup> Officials caution that it is highly unlikely that a vaccine would be available in less than one or two years.

## Preventing Transmission

Absent a vaccine, avoiding bites from infected mosquitoes is the primary means to prevent transmission.<sup>18</sup> According to WHO, “At present, the most important protective measures are the control of mosquito populations and the prevention of mosquito bites in at-risk individuals, especially pregnant women.”<sup>19</sup> Official recommendations for areas in which infected mosquitoes may be present are (1) for everyone, routine use of protective clothing and repellants, and staying indoors with windows closed or screened; and (2) for pregnant women, consideration of

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<sup>14</sup> CDC, “Zika Virus Disease Q & A,” January 29, 2016, <http://www.cdc.gov/zika/disease-qa.html>.

<sup>15</sup> WHO, “WHO statement on the first meeting of the International Health Regulations (2005) (IHR 2005) Emergency Committee on Zika virus and observed increase in neurological disorders and neonatal malformations,” February 1, 2016, <http://www.who.int/mediacentre/news/statements/2016/1st-emergency-committee-zika/en/>.

<sup>16</sup> CDC, “Zika Virus for Healthcare Providers,” <http://www.cdc.gov/zika/hc-providers/index.html>.

<sup>17</sup> Comments of Dr. Tony Fauci, Director of the NIH National Institutes of Allergy and Infectious Diseases, Transcript for CDC Telebriefing: Zika Virus Travel Alert, January 28, 2016, <http://www.cdc.gov/media/archives.htm>.

<sup>18</sup> Mosquito control approaches are beyond the scope of this report. For more information on U.S. domestic mosquito control activities, see CDC, “Mosquito Control,” <http://www.cdc.gov/westnile/faq/mosquitoControl.html>.

<sup>19</sup> WHO, “WHO Announces a Public Health Emergency of International Concern,” press release, February 1, 2016, <http://www.who.int/en/>.

postponing travel to affected areas, and diligent protection against mosquito bites if travel is unavoidable.<sup>20</sup>

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<sup>20</sup> CDC, “Zika Virus Disease Q&A: What can people do to prevent becoming infected with Zika?” <http://www.cdc.gov/zika/disease-qa.html>; and CDC, “Interim Guidelines for Pregnant Women during a Zika Virus Outbreak—United States, 2016,” *MMWR*, vol. 65, no. 2, January 22, 2016, <http://www.cdc.gov/mmwr/volumes/65/wr/mm6502e1.htm>.