

Zika virus in the Americas: A New Global Health Emergency

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Editorial

The World Health Organization (WHO) has warned of the rapid spread of *Zika virus* (ZIKV). In February 2016, Dr. Margaret Chan has declared the ZIKV and its suspected link to birth defects an public health emergency of international concern (PHEIC) [1-3].

ZIKV is a member of the flavivirus family, which also includes Yellow fever virus, Dengue virus, Japanese encephalitis virus, and West Nile virus. Virions are spherical (40-50 nm in diameter) with a positive-sense, nonsegmented, single-stranded RNA genome (~10.8 Kb). This virus has two lineages (or genotypes) different, African and Asian lineages. Information regarding pathogenesis of ZIKV is scarce but mosquito-borne flaviviruses could replicate in dendritic cells near the site of inoculation and spread to lymph nodes and the bloodstream. To date, ZIKV RNA has been detected in blood, urine, semen, saliva, cerebrospinal fluid, amniotic fluid, and breast milk [4-6].

ZIKV is transmitted to humans primarily through the bite of infected mosquitos, *Aedes aegypti* and *Aedes albopictus* [6,7]. The disease is benign and self-limiting, with a high proportion (75-80%) of

asymptomatic cases. The incubation period is short (7-12 days). People infected with ZIKV have symptoms that can include mild fever, skin rashes, conjunctivitis, muscle and joint pain, malaise or headache [4,5]. The illness is usually mild, with symptoms lasting from several days to a week. The diagnosis of infection ZIKV is performed in serum samples collected during the first week of infection using molecular methods such as RT-PCR to detect viral RNA. Specific IgM antibodies (ZIKV-IgM) can then be detected 4 days after onset of the infection but can give cross-react with other flaviviruses such as Dengue virus and Yellow fever virus [6,8-10].

ZIKV was known as a zoonotic pathogen with sporadic human infections in Africa and Southeastern Asia. This virus was first identified in 1947 in sentinel monkey that was being used to monitor for Yellow fever virus in Uganda [4-6,8-11]. For over 50 years, few cases are reported in areas of Africa, Southeast Asia, and the Pacific Islands. The first large outbreak of disease caused by ZIKV was reported from Micronesia [11]. From 2007-2016, ZIKV was documented in 61 countries worldwide (Table 1).

Period	Countries and Territorios with <i>Zika virus</i>
1947-1952	Uganda, United Republic of Tanzania
1954	Nigeria
1960-1983	Central African Republic, Senegal, Pakistan, Burkina Faso, Cote D'ivoire, Cameroon, Sierra Leone, Gabon, Indonesia, Malaysia, Costa Rica, Cambodia
2007-2009	Micronesia, Gabon
2012-2014	French Polynesia, Isla de Pascua, Cook Islands, New Caledonia, Malaysia, Philippines, Cambodia, Indonesia, Thailand
Jan 2015	New Caledonia
Feb 2015	Brazil, Solomon Islands
Apr 2015	Vanuatu
Jul 2015	Samoa, Fidji
Oct 2015	Colombia, Cabo Verde
Nov 2015	Samoa, El Salvador, Guatemala, Mexico, Paraguay, Suriname, Venezuela
Dec 2015	French Guiana, Honduras, Martinique, Panama, Puerto Rico
Jan 2016	Bolivia, United States, Ecuador, Virgin Islands, Dominican Republic, Costa Rica, Guadeloupe, Saint Martin, Nicaragua, Barbados, Maldives, Guyana, Jamaica, Curaçao, Samoa American, Samoa, Haiti, Thailand, Tonga
Feb 2016	Aruba, Bonaire

Mar 2016	Cuba, Dominique
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Table 1: Countries and territories showing historical distribution of Zika virus spread, 1947-2016 [14].

The WHO has estimated that 3-4 million cases of ZIKV in South, Central, and North America over the next 12 months. Brazil is the country most affected and health authorities have reported that potentially infected population could exceed one million cases. By 30 March 2016, many countries and territories in the Region of the Americas reported mosquito-borne transmission of the virus. Three countries have now reported locally acquired infection in the absence of any known mosquito vectors, probably through sexual transmission [11] (Table 2).

Mechanism of transmission	Countries
Mosquito-borne transmission	Aruba, Barbados, Brazil, Bolivia, Bonaire, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Dominican Republic, Ecuador, El Salvador, French Guiana, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Nicaragua, Panama, Paraguay, Puerto Rico, Saint Martin, Saint Vincent and the Grenadines, Sint Maarten, Suriname, Trinidad and Tobago, United States Virgin Islands, Venezuela
Person-to-person transmission	Argentina, Chile, USA

Table 2: Classification of ZIKV transmission in the Americas (2016) [11].

Human ZIKV infection appears to have changed in character while expanding its geographical range. The change is from an endemic infection causing mild illness to an infection causing large outbreaks, probably linked with neurological disorders including congenital microcephaly (CM) and Guillain-Barré syndrome (GBS).

There is a possible association between ZIKV and CM in newborn with maternal ZIKV infection. Infants with CM can have neurological sequelae, seizure, intellectual disability, vision or hearing problems, and developmental problems. [3,11]. In the last six months, an increase of this neurological condition has been reported in Brazil (944 cases). Other countries that have reported cases were Cabo Verde (2 cases), Colombia (32), French Polynesia (8), Martinique (1) and Panama (1) [11].

The incidence of neurological symptoms associated with ZIKV infection is a distinctive feature. Some adults with ZIKV and neurologic conditions like GBS were also described [5,12]. Thirteen countries have reported an increased incidence of GBS potentially related to ZIKV infection: Brazil, Colombia, Dominican Republic, El Salvador, French Guiana, French Polynesia, Haiti, Honduras, Martinique, Panama, Puerto Rico, Suriname, and Venezuela [11].

Vector-borne diseases account for 22% of the estimated global burden of communicable diseases. No effective vaccine or medication

is available for some diseases, and vector control is the only option. Prevention of ZIKV infection is to avoid mosquito bites. The use of air conditioning systems, mosquito nets, appropriate clothing that covers the entire body, and applying insect repellents are the main preventive measures. In particular, WHO recommends that pregnant women avoid travel to endemic areas with ZIKV. The sexual partners of pregnant women, living in or returning from areas with the virus, should use safer sexual practices or abstinence from sexual activity for the pregnancy [4,6,11,13,14].

At present, information regarding ZIKV is scarce. To prevent and control ZIKV infection in humans, we must understand the viral pathogenesis, the lineages circulating, the modes of transmission (mosquito-borne transmission and person-to-person transmission), the risks associated with infection, the impact of climate change in the vectors, the etiology of neurological disorders, and the natural history of ZIKV disease.

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