



Review

Zika in the Americas, year 2: What have we learned? What gaps remain? A report from the Global Virus Network



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ARTICLE INFO

Article history:

Received 26 May 2017

Accepted 1 June 2017

Available online 6 June 2017

Keywords:

Zika virus

Arbovirus

Congenital manifestations

Maternal-fetal transmission

Antiviral therapy

Vaccines

ABSTRACT

In response to the outbreak of Zika virus (ZIKV) infection in the Western Hemisphere and the recognition of a causal association with fetal malformations, the Global Virus Network (GVN) assembled an international taskforce of virologists to promote basic research, recommend public health measures and encourage the rapid development of vaccines, antiviral therapies and new diagnostic tests. In this article, taskforce members and other experts review what has been learned about ZIKV-induced disease in humans, its modes of transmission and the cause and nature of associated congenital manifestations. After describing the make-up of the taskforce, we summarize the emergence of ZIKV in the Americas, Africa and Asia, its spread by mosquitoes, and current control measures. We then review the spectrum of primary ZIKV-induced disease in adults and children, sites of persistent infection and sexual transmission, then examine what has been learned about maternal-fetal transmission and the congenital Zika syndrome, including knowledge obtained from studies in laboratory animals. Subsequent sections focus

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on vaccine development, antiviral therapeutics and new diagnostic tests. After reviewing current understanding of the mechanisms of emergence of Zika virus, we consider the likely future of the pandemic.

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1. Introduction

Following on the heels of the Ebola epidemic in West Africa, the Zika virus (ZIKV) outbreak in the Western Hemisphere has led to the rapid mobilization of scientific resources to study the disease and initiate the development of specific countermeasures. As part of this response, the Global Virus Network (GVN) formed a task force of investigators from its worldwide Centers of Excellence to develop a coordinated program of research and to serve as a resource for scientists, physicians and public health officials dealing with the outbreak.

In this article, members of the GVN Zika task force and other experts review what has been learned about the disease in humans since an association with severe congenital manifestations was identified in 2015 (Weaver et al., 2016). The first section describes the make-up of the task force and its research program. The following sections review the emergence of the virus in the Americas, Africa and Asia, its transmission, and current control measures. We then review the spectrum of primary Zika virus (ZIKV)-induced disease in adults and children, sites of persistent infection and modes of sexual transmission, then examine what has

been learned about maternal-fetal transmission and congenital Zika syndrome (CZS), including knowledge obtained from studies in laboratory animals. Subsequent sections focus on vaccine development, antiviral therapeutics and new diagnostic tests. The concluding section of the paper reviews what has been learned about the mechanisms of emergence of Zika virus and considers the probable future course of the epidemic.

2. The Global Virus Network Zika taskforce (Natalia Mercer, Edward McSweegan)

The mission of the GVN is to strengthen medical research and the public health response to emerging viruses and persisting viral threats (Mann, 2011). Since its inception, the network has sought to carry out its mission through collaborative research projects, international meetings and training courses, professional publications and commentaries, and the engagement of expert medical virologists to advise on outbreak responses and research priorities. The GVN currently consists of 38 Centers and 6 Affiliates in 24 countries, focusing on all aspects of medical virology. For further information, readers are referred to the report of the most recent

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