ZIKA VIRUS
WHAT IS IT? WHERE DID IT COME FROM? HOW DID IT GET HERE?
EPIDEMIOLOGY

- A single stranded RNA virus
- Genus: Flavivirus
  - Classified amongst better known: Dengue Virus (DEN), West Nile Virus (WNV), Yellow Fever (YF) Virus, Japanese encephalitis (JE) virus
EPIDEMIOLOGY

• Vector: spread by the bite of an infected female Aedes mosquito.
  • Distinctive black & white markings
  • Usually bites during the daytime
  • Breeds in standing water, particularly manmade containers [1]
ZIKA VIRUS DISEASE

- Presents similarly to Dengue and Chikungunya
- Asymptomatic infection 80%
- Or a mild febrile illness 20%
  - Symptoms include:
    - Fever
    - Rash
    - Joint pains
    - Red eyes
  - In less than 1%, neurologic syndromes can occur
    - Guillain-Barré syndrome
    - Microcephaly in the developing fetus\(^2\)
THE ORIGIN OF THE VIRUS

- Discovered: 1947
- As scientists worked on YF transmission.
  - A. J. Haddow, MD
  - Aedes Africanis
  - Rhesus monkey
- Officially named in 1948, after the Zika Forest in Uganda. [3]
ZIKA VIRUS: AN EMERGING VIRUS

- Between 1947 and 2006
- Only 14 reports of human cases documented
  - First native case in 1954
    - A 10 yr old girl in Nigeria who had a mild febrile illness and recovered completely.\(^4\)
  - First experimental infection in a human volunteer in 1956
    - Experienced a mild febrile illness and recovered completely.\(^5\)
ZIKA VIRUS: AN EMERGING VIRUS

• In 2007
  • An outbreak occurred on the island of Yap (Federal States of Micronesia).
    • 49 confirmed and 59 probable cases of Zika virus disease
  • An estimated 73% of Yap residents >3 years of age had been recently infected with Zika virus
  • Aedes hensilli was the mosquito identified[6]
ZIKA VIRUS: AN EMERGING VIRUS

• In 2013
  • An epidemic of Zika virus emerged in French Polynesia where Dengue is endemic.
  • A larger scale of people were exposed at an estimated 28,000 cases; approximately 11% of the population.
  • And yet the true incidence of exposure was likely under reported as infection is most commonly asymptomatic.
In contrast to **YAP**, serious effects become obvious when the virus affects a lot of people in **French Polynesia**.

- Correlations to the more uncommon clinical neurologic manifestations of Guillain-Barré syndrome are unmasked and first associated to Zika virus. [7]

- Smaller outbreaks then followed from French Polynesia to the cook islands, Easter Island and the Solomon Islands. [8]
ZIKA VIRUS: AN EMERGING VIRUS
• Northeastern Brazil, 2015
• The Aedes mosquito is endemic here as is Dengue fever.
• However, up to 60,000 cases with non-Dengue and non-Chikungunya began accumulating.
• Thus, scientists take note at the Oswaldo Cruz foundation and began investigating.
• On June 2015, the first domestic transmission of Zika virus was confirmed and documented in Brazil.
  • They used phylogenetic analysis and traced the virus to the Asian clade of Zika virus
  • confirmed by PCR DNA sequencing[9]
• The precise means by which Zika Virus was introduced to the Western Hemisphere is unknown.

• Brazil reported **1.5 million cases**, and more than 4,000 suspected cases of microcephaly in babies.
  • The predominant incidence however was in the poorer northeast.

• Zika rapidly spread throughout Latin America and the Caribbean, such that within 1 year most countries in the region reported local transmission. [10]
HOW IT GOT TO THE AMERICAS

- Postulates from Journal of Virology and Scientific American:
  - The viremic traveler from the French Polynesia via:
    - FIFA Confederations Cup, which was held in Brazil from 15 June to 30 June 2013
    - World cup soccer competition July 2014 (what an upset!)
    - Va’a world sprint Championship canoe race in Rio de Janeiro Brazil in August 2014
THE ZIKAVIRUS, CLASS DIVIDE, AND CLIMATE CLASH

• In our current scholarly articles; Asian Pac J Trop Biomed and New England Journal of Medicine:
  • Emergence of the world as a global village.
  • Climate change
    • summer heat waves, drought, and heavy rains with flash floods.
  • Human factors
    • many inhabitants in large cities
    • Lack of: electricity, running water, garbage collection, sewers and drains for rain.
  • Inadequate health service
  • Dev of vector resistance to insecticides[11-12]
AN ESTABLISHED GLOBAL THREAT

- On **Nov 1, 2015** the **Brazil Ministry of Health** declared a public health emergency as the number of cases of microcephaly continued to increase.
- On **February 1, 2016** The World Health Organization (**WHO**) declared the cluster of microcephaly cases and other neurological disorders a health emergency.
- On **February 8, 2016**, the Centers for Disease Control (**CDC**) elevated its response efforts to a Level 1 activation.
  - The WHO launched the global Strategic Response Framework to encompass surveillance, response activities and research.
• Local transmission via domestic mosquito vector has been reported in Puerto Rico (*US territory), but not elsewhere in the United States.

• Cases of Zika fever have been reported in travelers returning to the United States.

  -secondary transmission is possible via sex.
US States
• Travel-associated cases reported: 618
  • Florida cases – 128
• Locally acquired vector-borne cases reported: 0
• Total: 618
  • Sexually transmitted: 11
  • Guillain-Barré syndrome: 1

US Territories
• Travel-associated cases reported: 4
• Locally acquired cases reported: 1,110
• Total: 1,114
  • Guillain-Barré syndrome: 8
THE ZIKA VIRUS TIME LINE

How the Zika virus spread

- **Active transmission**
- **Known previous transmission**
- **Antibodies also detected**

1. 1947 - First documented in monkeys in Uganda
2. 1960 - First human cases in Nigeria
3. 1970s - Cases in Pakistan, India, Malaysia, and Indonesia
4. 2007 - Epidemic on island of Yap, Micronesia
5. 2013 - Epidemic on French Polynesia
6. 2014-16 - Zika appears in northern Brazil and spreads through the Americas

SOURCE: WHO and Lancaster University, Feb 1
AS OF 1 JUNE 2016, THE WHO REPORTS 60 COUNTRIES AND TERRITORIES REPORT CONTINUING MOSQUITO-BORNE TRANSMISSION.
• We specialize in Infectious Diseases & Travel Health.
• For an appointment call: 407.830.5577

2. CDC.gov


