Zika Virus

“The ultimate goal of the world public health community should be the containment and the subsequent elimination of ZIKV as a global health security threat.”


**History**

“A description is given of the adaptation to mice of two strains of Zika virus. Zika is the name of a forest area near Entebbe, Uganda, where both strains of virus were isolated.” Pg. 533


“The isolation of what is believed to be a hitherto unrecorded virus is described. The first isolation was made in April 1947 from the serum of a pyrexial rhesus monkey caged in the canopy of Zika Forest. The second isolation was made from a lot of A. africanus taken in January, 1948, in the same forest. The virus has been called Zika virus after the locality from where the isolations were made.” Pg. 519


“The only reported infection in man with Zika virus may have been the result of accidental exposure in the laboratory.” Pg. 414


“An account is given of the past history of yellow fever cases and epidemics in eastern Africa, and of the field and laboratory studies which led to the incrimination of Aedes (Stegomyia) simpsoni (Theobald) and Ae. (S.) africanus (Theobald) as vectors of the virus, the former mainly in a peri-domestic habitat and the latter in forest, particularly the forest canopy.” Pg. 440

**Virology**

"Sylvatic DENV strains are ecologically and evolutionarily distinct lineages that circulate in a forest cycle in Southeast Asia and West Africa between monkeys and arboreal canopy-dwelling mosquitoes of the genus Aedes. Although sylvatic-DENV transmission is mainly confined to the forest, there is clear evidence that these viruses come into regular contact with humans in Southeast Asia and Africa and can cause severe disease in isolated cases as well as transient spillover in urban settings.”  Pg. 539


"The time between infection and the onset of clinical manifestations can be inferred to be >9 days, given the patients’ travel history.”  Pg. 3


"The operation of a simple common factor controlling this periodicity is particularly indicated by the many differences between the two viruses, underlined by findings at the Zika Forest that CHIK circulates for only a few months whereas Zika virus has scanned 11, 12 and 13 months in three separate series of isolations. Since CHIK is an alphavirus and Zika is a flavivirus the two would not interact antigenically, but the absence of YF isolations meanwhile lent credence to the view that the presence of Zika virus within the primary host system had interfered with this efficiency, leaving YF to fill in the gaps left by Zika virus, or else that YF might have been suppressed to lower and more sporadic levels of incidence.”  Pg. 558


“During an epidemic of jaundice in Eastern Nigeria infection with Zika virus was shown to have occurred in three patients, one by isolation of the virus and two by a rise in serum antibodies. Two of these patients gave evidence of liver damage. Serological studies indicate a relationship between jaundice and the development of virus neutralizing bodies in the serum”  pg. 145

Transmission

“In Asia, evidence suggests that the primary mosquito vectors are Ae. aegypti and/or Ae. albopictus [13,28], though several ecologically or geographically distinct mosquito vectors may be responsible for the transmission and/or maintenance of ZIKV throughout Asia." Pg. 5


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“ZIKV transmission by sexual intercourse has been suggested by Foy et al. (10) who described a patient who was infected with ZIKV in southeastern Senegal in 2008. After returning to his home in Colorado, United State, he experienced common symptoms of ZIKV infection and symptoms of prostatitis. Four days later, he observed signs of hematospermia, and on the same day, his wife had symptoms of ZIKV infection. Because the wife of the patient had not traveled out of the United States during the previous year and had sexual intercourse with him 1 day after he returned home, transmission by semen was suggested” pg. 359-360


“Due to the high ZIKAV RNA load detected in breast milk, and even though no replicative ZIKAV particles were detected, ZIKAV transmission by breastfeeding must be considered.” Pg. 3

Symptoms

“Zika fever is a mosquito-borne illness caused by a flavivirus. Human infections with Zika virus (ZIKV) could cause fever, malaise and cutaneous rash.” Pg. 2


“Rash, which was the only sign noted in previous ZIKA infections documented by isolation of virus, was no seen in our series of patients. It is possible that rash was present and not noted.” Ppg. 392


“This raises the hypothesis of a sequential arboviral immune stimulation responsible for such unusual clustering of GBS cases during concurrent circulation of ZIKA and two dengue serotypes. The risk of developing GBS would be consequently underlain by a specific sequence of DENV and ZIKA infections.” Pg. 3


“In endemic areas, but also in the setting of travel medicine, ZIKV infection represents both a clinical and diagnostic challenge since the symptoms are very similar to other arboviral diseases, no specific commercial serological tests are available, and cross-reactive DENV serology (IgG or IgM) during ZIKV infection has been described in previously reported cases [11] which may lead to incorrect diagnoses.” Pg.2

**Vaccine Development (Preventative Measures)**

“The prospect of licensing effective tetravalent vaccines against human DENV raises the potential for the control or even eradication of the human-DENV transmission cycle.” Pg. 539-540


“Previous immunization with Zika or WSL virus might alter the subsequent replication of YF within this cell system and the resultant YF virus particles might be less infective but still antigenic.” Pg. 116


“Men who reside in or have traveled to an area of active Zika virus transmission who are concerned about sexual transmission of Zika virus might consider abstaining from sexual activity or using condoms consistently and correctly during sex. Couples considering this personal decision should take several factors into account. Most infections are asymptomatic, and when illness does occur, it is usually mild with symptoms lasting from several days to a week; severe disease requiring hospitalization is uncommon. The risk for acquiring vectorborne Zika virus in areas of active transmission depends on the duration and extent of exposure to infected mosquitoes and the steps taken to prevent mosquito bites (http://www.cdc.gov/zika/prevention). After infection, Zika virus might persist in semen when it is no longer detectable in blood.” Pg. 1


“Finally, the reported cases highlight the need of improving pre-travel advice and consultation for travelers planning to visit countries, where various arboviruses are endemic. Such advice should include effective preventive measures of mosquito bites, and avoidance of the use of acetylsalicylic acid, which is contraindicated in suspected or confirmed dengue fever due to the increase risk of bleeding” Pg. 35

Zika Virus Today (Connection with Microcephaly)

“This case shows severe fetal brain injury associated with ZIKV infection with vertical transmission. Recently, ZIKV was found in amniotic fluid of two fetuses that were found to have microcephaly, which was consistent with intrauterine transmission of the virus.” Ppg.6


“...microcephaly is defined as occipitofrontal circumference less than the third percentile, based on standard growth charts (e.g., Fenton, Olsen, CDC, or WHO growth curves) for sex, age, and gestational age at birth (13). For a diagnosis of microcephaly to be made, the occipitofrontal circumference should be disproportionately small in comparison with the length of the infant and not explained by other etiologies (e.g., other congenital disorders). If an infant’s occipitofrontal circumference is equal to or greater than the third percentile but is notably disproportionate to the length of the infant, or if the infant has deficits that are related to the central nervous system, additional evaluation for Zika virus infection might be considered” pg. 64

Staples, J. Erin. "Interim guidelines for the evaluation and testing of infants with possible congenital Zika virus infection—United States, 2016." MMWR. Morbidity and mortality weekly report 65 (2016).

10 of 29 infants with microcephaly (34.5%) had severe ocular abnormalities; these infants were born after a ZIKV outbreak in the state of Bahia in Brazil. Ppg.5


This report describes evidence of a link between Zika virus infection and microcephaly and fetal demise through detection of viral RNA and antigens in brain tissues from infants with microcephaly and placental tissues from early miscarriages. Histopathologic findings indicate the presence of Zika virus in fetal tissues. These findings also suggest brain and early gestational placental tissue might be the preferred tissues for postmortem viral diagnosis. Ppg. 159

Martines, Roosecelis Brasil. "Notes from the field: Evidence of Zika virus infection in brain and placental tissues from two congenitally infected newborns and two fetal losses—Brazil, 2015." MMWR. Morbidity and Mortality Weekly Report 65 (2016)
Implications

“Because the virus has spread outside Africa and Asia, ZIKV should be considered an emerging pathogen.” Pg. 1349

“The discovery of ZIKV on the physically isolated community of Yap Island is testimony to the potential for travel or commerce to spread the virus across large distances.” Pg. 1349

“This situation requires the highest vigilance, especially since this disease is not well known and that some questions remain unanswered, concerning the reservoir(s) and modes of transmission, the clinical presentation, and possible complications. Some uncertainties remain on the outcome of co-infections with other arboviroses such as the dengue fever.” Pg. 306

“What would happen if an A. africanus was infected with both yellow fever and Zika viruses? Would it transmit one or both or neither? Would the infection of the vertebrate host be mild in virtue of interference or would the virulence of one of the viruses be exalted? Interference has been demonstrated between dengue and yellow fever viruses.” Pg. 41

“As the number of cases of ZIKV infection is increasing dramatically, some necessary steps should be taken to eradicate this deadly infection and to inhibit the entry of it in future as well. There is an urgent need of a rapid molecular diagnostics specific for ZIKV so that the infection may be detected in a short period of time and necessary action can be taken before the situation gets out of control. After the development of the diagnostic tools, effective specific therapeutics needs to be developed, for the treatment of ZIKV infection. ZIKV specific vaccine is the need of the hour, which may be developed using modern molecular biology techniques. Apart from the development of diagnostic and therapeutic, researchers and policy makers should come on the same table to discuss the detailed information about the ZIKV outbreak, which may be helpful in the better understanding of the ZIKV infection, prevention and for the development of effective future diagnosis and treatment. We need to proceed with a sense of urgency in this context.” Pg. 5

“It is likely that the rapid spread of ZIKV around the globe will be a strong impetus for collaborative research on the biologic properties of the virus, particularly since the risk of neurotropic and teratogenic virus infections places a high emotional and economic burden on society.” Ppg.7