

Pathogen name: Zika virus, often abbreviated to ZIKV.

Disease caused by Zika virus: Zika virus disease, also referred to as Zika fever.

Description: Zika virus is a flavivirus with a positive sense single-stranded RNA genome, and is enveloped¹. It was first isolated from a rhesus monkey in Uganda in 1947^{1,2}. It has since spread to the other regions. According to the CDC, local transmission of Zika virus has been reported for parts of Africa, Southeast Asia, pacific islands, parts of South America, Central America and Mexico³. No locally acquired infections have been reported in the continental USA.

Natural Transmission: Zika virus causes a zoonotic disease and can infect humans and non-human primates with mosquitos of the Genus *Aedes* acting as a vector. (A type of the common *Culex* mosquito has recently been shown to be competent to carry Zika virus in its salivary glands in a laboratory setting, but whether they can transmit the virus during feedings is still unknown.) Mosquitos become infected by feeding from an infected human or monkey and can transmit the virus to subsequent targets of feedings. *A. aegypti* and *A. albopictus* (the Asian tiger mosquito) are known vectors^{4,5} for the virus and are both present in parts of the continental USA. Transmission directly from human to human is possible through contact with infected blood (such as during a blood transfusion) or can be transmitted sexually⁶. The virus is thought to persist for longer periods of time in semen and urine than in the blood of infected patients⁷. Zika virus is thought to be transmissible from mother to child during pregnancy and has been suggested to be capable of crossing the placenta⁶. Zika virus has been detected by RT-PCR and immunofluorescence in brain tissue of newborn with microcephaly who died shortly after birth⁸.

Inactivation protocol: Specimens containing Zika virus can be inactivated by autoclaving or by treatment with 10% household bleach for 20 minutes. Surfaces should be decontaminated with 10% household bleach or with 70% ethanol.

Symptoms: The incubation period varies from 3 to 12 days and symptoms typically last 2 to 7 days⁹. Symptoms include fever, development of a rash, joint and/or muscle pain and conjunctivitis^{9,10}. Many infected patients will remain asymptomatic. Zika virus is likely present in the blood before patients show symptoms.

Treatment: No specific treatment is available for Zika virus disease and usually focuses on addressing the symptoms such as fever or pain^{9,10}. No vaccine is currently available to protect from Zika virus¹⁰.

Proposed recommendations for laboratory work: Work with Zika virus is performed in a biosafety cabinet and using BSL2 practices. Personal protective equipment (PPE) such as gloves, safety glasses and a lab coat should be worn at all times during experiments involving Zika virus. Employees working with Zika virus should be aware of the risks involved and be familiar with the symptoms of Zika virus disease. Other personnel not directly working with Zika virus but present in the same space or using shared rooms and/or equipment should be made aware of the use of Zika virus in the facility. Before traveling to regions with reported active transmission of Zika virus for the purpose of collecting or retrieving samples, please connect with the Biosafety program.

Occupational health concerns: Infections with Zika virus in a research laboratory setting are likely to result from direct contact with mucous membranes, such as the eyes or the mouth, or by subcutaneous contact through damaged skin. Use of proper PPE and limiting the use of needles or sharps during

experiments involving Zika virus is crucial. Women of child-bearing age, women who are trying to get pregnant and pregnant women should be particularly cautious as Zika virus disease has been linked to cases of newborn microcephaly¹¹. As mentioned above, Zika virus can be transmitted through sexual contact. Zika virus disease has also been linked to Guillain-Barré syndrome^{11,12}, an autoimmune disease in which nerve cells are damaged leading to muscle weakness and in severe cases paralysis. For use of Zika virus originating from patient samples, as opposed to purified virus obtained from a vendor such as ATCC, the samples should be checked by RT-PCR for the presence of dengue virus and chikungunya virus when those viruses are also present in the region where the patient was infected. These tests should be performed prior to conducting experiments where the viruses could replicate, such as infecting insect cells or infecting animals. Chikungunya virus is a risk group 3 agent and its presence in sample should immediately be reported to the Biosafety Program.

References:

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