

Zika Virus

The following provides information on the use and containment of Zika virus (ZIKV). Investigators should use these guidelines as part of their risk assessment when planning experiments with these viruses and preparing applications to the Institutional Biosafety Committee (IBC). Note the listed containment levels are the minimum that should be employed with these vectors: some experiments, such as the expression of toxins or oncogenes, may require higher levels of containment. The appropriateness of the containment should be considered as part of the investigator’s risk assessment and will be reviewed by the IBC.

<p>NIH Risk Group</p>	<p>To be determined: CDC recommends BSL2 containment in the current version of the BMBL (5th edition) but guidelines were published before the current epidemic and association with human disease. This recommendation for the arbovirus group was based on a) no overt laboratory-associated infections are reported, b) infections resulted from exposures other than by infectious aerosols, or c) if disease from aerosol exposure is documented, it is uncommon.</p> <p>Zika virus (ZIKV) is a single-stranded RNA virus of the Flaviviridae family, genus Flavivirus, Spondweni group. There are two ZIKV lineages: the African lineage and the Asian lineage, which has recently emerged in the Pacific and the Americas.</p>
<p>Biocontainment Level</p>	<p>BSL-2 enhanced (BSL2+):</p> <p>Biosafety containment requirements: BSL2+ means BSL2 containment with BSL3 practices and or PPE. Lab specific procedures (SOPs) will outline specific containment and practices and PPE.</p> <p>ABSL2 enhanced (ABSL-2+) for animal work: ABSL2+ means ABSL2 containment with BSL3 practices and or PPE.</p>

	<p>Some procedures, large quantities and/or high concentrations may require additional BSL-3 precautions, such as respiratory protection, based on the risk assessment of the proposed work.</p>
<p>Minimum PPE requirements</p>	<p>The following personal protective equipment (PPE) will be required when working in the BSL-2+ laboratory: Rear closing, fluid resistant disposable or onsite-laundered lab coat: if sleeve cuffs are not tight, disposable sleeve covers are required Gloves (2 pairs) Safety glasses or face shield.</p> <p>All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The use of needles, syringes, and other sharp objects should be strictly limited. Additional precautions should be considered with work involving animals or large scale activities.</p>
<p>Infectious to Humans/Animals</p>	<p>Yes</p>
<p>Route of Transmission</p>	<p><u>Through Mosquito Bites:</u></p> <ul style="list-style-type: none"> • Zika virus is transmitted to people primarily through the bite of an infected <i>Aedes</i> species mosquito (<i>Ae. Aegypti</i> and <i>Ae. albopictus</i>). These are the same mosquitoes that spread dengue and chikungunya viruses. <ul style="list-style-type: none"> ○ These mosquitoes typically lay eggs in and near standing water in things like buckets, bowls, animal dishes, flower pots and vases. They prefer to bite people, and live indoors and outdoors near people. ○ Mosquitoes that spread chikungunya, dengue, and Zika are aggressive daytime biters, but they can also bite at night. ○ Mosquitoes become infected when they feed on a person already infected with the virus. Infected mosquitoes can then spread the virus to other people through bites. <p><u>From mother to child</u></p> <ul style="list-style-type: none"> • A pregnant woman can pass Zika virus to her fetus during pregnancy. Zika is a cause of microcephaly and other severe fetal brain defects.

	<ul style="list-style-type: none"> • A pregnant woman already infected with Zika virus can pass the virus to her fetus during the pregnancy or around the time of birth. • To date, there are no reports of infants getting Zika virus through breastfeeding. <p><u>Through sexual contact</u></p> <ul style="list-style-type: none"> • Zika virus can be spread through sexual transmission. • In known cases of male to female sexual transmission, the men developed Zika virus symptoms. From these cases, we know the virus can be spread when the man has symptoms, before symptoms start and after symptoms resolve. • The virus is present in semen longer than in blood. • A suspected case of female to male sexual transmission was reported on July 15, 2016. <p><u>Through blood transfusion</u></p> <p>As of February, 1, 2016, there have not been any confirmed blood transfusion transmission cases in the United States.</p> <ul style="list-style-type: none"> • There have been multiple reports of blood transfusion transmission cases in Brazil. These reports are currently being investigated. • During the French Polynesian outbreak, 2.8% of blood donors tested positive for Zika and in previous outbreaks, the virus has been found in blood donors. <p><u>Other Routes</u></p> <p>There may be other routes of transmission. There is a report of a patient with a high titer of ZIKV passing it to a caregiver and the route of transmission has not been established, although suspected to be from sweat or tears.</p> <p>Studies have shown that the virus can persist in blood for at least two weeks, saliva for up to 2 months and semen for up to 6 months.</p>
Laboratory Hazards	<p>Prior to the current outbreak, there were four reports of laboratory acquired Zika virus infections, although the route of transmission was not clearly established in all cases.</p> <ul style="list-style-type: none"> • As of June 15, 2016, there has been one reported case of laboratory-acquired Zika virus disease in the United States.

	<p>Laboratory risks include parenteral inoculation, but may also include direct contact with broken skin and mucous membranes of the eye, nose and mouth, bites from infected laboratory animals and ingestion.</p>
<p>Medical Surveillance and At-Risk Populations</p>	<p>Prior to working with ZIKV all personnel must receive training on the risks associated with this virus, including signs and symptoms of exposure, populations at increased risk, laboratory standard operating procedures, personal protective equipment and biocontainment, and spill and disinfection procedures. In addition, all personnel must undergo medical counseling with the Department of Occupational Medicine. Please discuss any concerns related to working with ZIKV with the Occupational Medicine Physician. In particular women who are pregnant, may become pregnant, male partners of women who are or may become pregnant, and individuals who are immunocompromised are encouraged to discuss the risks associated with ZIKV infection with a physician.</p>
<p>Symptoms</p>	<p>About 1 in 5 people infected with ZIKV become ill. The most common symptoms of Zika are fever, rash, joint pain, or conjunctivitis (red eyes). Other common symptoms include muscle pain and headache. The illness is usually mild with symptoms lasting for several days to a week.</p> <p>The incubation period (the time from exposure to symptoms) for Zika virus disease is not known, but is likely to be a few days to a week.</p> <p>ZIKV infection in pregnancy causes microcephaly of the fetus, as well as other severe fetal brain defects. In addition, ZIKV infection of the fetus may result in deformed limbs, eye defects and hearing loss.</p> <p>Once a person has been infected, he or she is likely to be protected from future infections.</p> <p>ZIKV has also been linked to Guillan-Barre syndrome (GBS) and individuals who are affected by an autoimmune disorder and/or are immunosuppressed/immunocompromised may be particularly at risk. GBS symptoms include weakness of the arms and legs that is usually the same on both sides of the body. In some cases, the muscles of the face that control eye movement or swallowing</p>

	<p>may also become weak. In the most serious cases, this muscle weakness can affect breathing, and people sometimes need a breathing tube to help them breathe.</p> <p>ZIKV infection has also been associated with severe thrombocytopenia, which is a condition where a patient has a low blood platelet count. Platelets (thrombocytes) are colorless blood cells that help blood clot. Platelets stop bleeding by clumping and forming plugs in blood vessel injuries. Typically thrombocytopenia may be mild and cause few signs or symptoms but in severe cases the number of platelets may be so low that dangerous internal bleeding occurs.</p> <p>ZIKV infection has been associated with arthrogyriposis, or crooked joints, caused by faulty muscles - some too tight or contracted and some too flaccid - that have pulled and held the baby's growing body in unnatural positions. Babies with suspected ZIKV infection have been born with such hip, knee, ankle, elbow, wrist and/or finger joint problems.</p> <p>ZIKV infection of immunocompromised adult mice have demonstrated the ability of ZIKV to enter the adult brain and cause neuropathology.</p>
Diagnosis	<p>Visit the Occupational health clinic if you have been exposed to ZIKV</p> <ul style="list-style-type: none"> ▪ A blood or urine test can confirm a Zika infection.
Treatment/Prophylaxis	<p>There is no vaccine to prevent or medicine to treat Zika virus.</p> <ol style="list-style-type: none"> 1. Treat the symptoms: 2. Get plenty of rest. 3. Drink fluids to prevent dehydration. 4. Take medicine such as acetaminophen or paracetamol to reduce fever and pain. 5. Take anti-histamines for pruritic rash. 6. If you are taking medicine for another medical condition, talk to your doctor or other healthcare provider before taking additional medication. 7. To help prevent transmission to partners via sexual contact, abstain from sexual activity or use condoms during sexual activity during and following infection.

<p>Disinfection</p>	<p>Effective disinfectants require a minimum of 20 minutes contact time. There is currently no EPA approved disinfectant efficacy test method against Zika virus. However, as an enveloped virus, products with proven efficacy against non-enveloped viruses, including other flaviviruses, have been reported to be effective:</p> <ul style="list-style-type: none"> • Sodium hypochlorite (0.5%: use fresh 1:10 dilution of bleach) • 70% Ethanol • 2% glutaraldehyde <p><i>Inactivation</i> Inactivated by heat and low pH.</p> <p>The survival outside of the host is unknown</p>
<p>Exposure Procedures</p>	<ol style="list-style-type: none"> 1. Immediately wash affected areas with soap and water, or if exposure to eyes or mucous membranes occurred, immediately flush affected area with water for 10-15 minutes. See exposure procedures for further information. 2. Notify lab supervisor or Principal Investigator of the exposure. 3. Go directly to the Occupational Medicine Clinic at the Redwood Health Center for medical evaluation and follow-up; contact information is below. After 5pm you will be seen by an Urgent Care Physician. After 8pm, or if the injury is serious/life threatening, go to the University of Utah Hospital Emergency Department or call an ambulance (911). 4. Ensure that the physician is aware that you were exposed or potentially exposed to ZIKV. 5. Upon returning to work, fill out the Employers First Report of Injury E1 Form. This form can be downloaded from the human resources website under “Forms.” 6. Notify Occupational and Environmental Health and Safety of the exposure (801-581-6590). 7. Follow up with the physician at Occupational Medicine, as requested.

Redwood Health Center

Occupational Medicine Clinic
1525 West 2100 South
Salt Lake City, UT 84119
Phone: (801) 213-9777
Hours: M-F 8:00AM – 5:00PM

After Hours

Redwood Urgent Care

1525 West 2100 South
Salt Lake City, UT 84119
M-F 5:00PM – 8:00PM
Sat.-Sun.: 9:00AM – 8:00PM
(801) 213-9700

After 8 PM

Emergency Department at University Hospital
(main floor northeast side of the hospital)
50 N. Medical Drive
Salt Lake city, UT 84132
(801) 581-2292

Sources:

Center for Disease Control and Prevention (CDC): <http://www.cdc.gov/zika/index.html>

Emory University: <http://www.ehso.emory.edu/content-guidelines/BARS-Zika-Virus.pdf>