

GUIDELINES FOR WORKING SAFELY WITH ZIKA VIRUS IN THE LABORATORY

INTRODUCTION

The UCLA Institutional Biosafety Committee (IBC) has developed this document to address emerging health and safety concerns associated with Zika virus research being conducted at UCLA. The IBC has conducted a risk assessment and has determined that working with Zika virus is similar to working with other enveloped viruses that are not transmitted by the airborne route, such as Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV). The IBC has determined that this research may be conducted safely and responsibly following the precautions included below.

AGENT-SPECIFIC RISKS

Zika virus (ZIKV) is a member of the *Flaviviridae* family, genus *Flavivirus*, and Spondweni group. The virus is lipid enveloped and icosahedral, with nonsegmented, single stranded, positive-sense RNA genome.

Symptoms: Zika fever symptoms include maculopapular rash, fever, malaise, conjunctivitis, and joint pains. Symptoms (except conjunctivitis) overlap with those of Dengue and Chikungunya infections, although usually much milder. Most people (around 80%) infected with Zika do not develop any symptoms. Incubation period is 3-14 days, with symptoms lasting several days to 1 week on average.

Morbidity: low (<20 % of people affected developed symptoms)

Mortality: very low (<1 %)

Risk Group: 2 (BMBL)

Inactivation: No specific information available for ZIKV; however, most lipid enveloped viruses are sensitive to 70% (v/v) ethanol, sodium hypochlorite, formaldehyde, glutaraldehyde, phenolics, iodophors, and quaternary ammonium compounds.

Transmission: Zika is vector-borne transmitted mainly by the *Aedes aegypti* mosquito, although other *Aedes* species (*A. albopictus*) can transmit the virus. *Aedes* are aggressive daytime biters. Additionally, cases have been reported where Zika virus has been transmitted by sexual contact (through semen as well as one case of female-to-male transmission), intrauterine, and during child birth. No cases have been reported of infection through breast milk, but it is a possibility. Transmission through blood transfusion has occurred as has lab-associated needle stick transmission. In the laboratory, infection through aerosol/droplet-producing procedures is also possible. Live virus has also been found in saliva; however, it

is still unclear at this time whether this could be a route of transmission.

Association with birth defects: During recent Zika outbreaks, mostly in Brazil 2014-2016 (ongoing) and elsewhere, a higher rate of babies born with birth defects, including microcephaly, to mothers infected with Zika virus during pregnancy has been reported. In some cases, Zika virus has been detected in brain tissue from miscarried fetuses affected with microcephaly and in babies born with microcephaly who died shortly after birth.

Association with Guillain-Barré syndrome: Guillain-Barré syndrome (GBS) is an uncommon illness involving the nervous system in which a person's own immune system damages the nerve cells, causing muscle weakness, and sometimes, paralysis. The Brazil Ministry of Health has reported an increased number of people who have been infected with Zika virus who also have GBS. CDC is working with Brazil to study the possibility of a link between Zika virus and GBS. More information on [Zika virus and GBS](#).

Treatment: Currently, there is no treatment for Zika virus infection, no vaccine is available, and no post-exposure prophylaxis is available.

PRECAUTIONS

Personal Health Considerations and Precautions:

- *Females:* Until the association between Zika virus infection and birth defects, including congenital microcephaly, is better understood, pregnancy should be considered a significant factor in risk assessment for individuals working with Zika virus. The involvement of pregnant individuals or individuals who are planning to become pregnant should be minimized for studies with Zika virus.
- *Males:* It has been shown that Zika virus can be transmitted sexually, although the time period is not established yet. Individuals with partners who are pregnant or are considering pregnancy should be aware of the risk associated with sexual transmission of Zika virus. Males who have a potential exposure risk to Zika virus should be advised to wear condoms if sexually active.

Personnel should consult with the Occupational Health Facility (see contact information below) or their personal physician if they have any questions or concerns related to their personal health status and the risks described above.

Occupational Health Facility
10833 Le Conte Avenue, Room 67-120 CHS
Los Angeles, CA 90095-1725
(310) 825-6771

Laboratory Precautions:

- The UCLA Institutional Biosafety Committee (IBC) requires BSL2+ containment for handling Zika Virus. This involves the following:
 - Pre-treatment (autoclaving) of solid waste prior to disposal as medical waste.
 - Inward (negative) directional airflow into the BSL2+ location.
 - Additional Personal Protective Equipment (PPE) including a surgical mask, double gloves and disposable gown. When splash/spray is anticipated, indirectly vented goggles must be worn.

- Additional safety practices, including decontamination of all materials that are brought into and taken out of the biosafety cabinet.
- BSL2+ training for personnel.
- Custodial staff are not permitted to enter facilities/rooms where Zika Virus is handled. Principal Investigators should consider making their laboratories off-master to assist with excluding custodial staff and other unauthorized individuals. Details regarding how the lab will address this issue should be outlined in the laboratory's SOP.
- An Integrated Pest Management (IPM) Program must be in place for all locations where Zika Virus will be handled. This should involve considerations of Facility Design to minimize pest habitats, monitoring (setting traps/performing visual inspections), sanitation and facility maintenance (reducing clutter, performing repairs that exclude pests), communication between the users and pest management, recordkeeping, and pest control (pesticides or not). Details regarding this program should be outlined in the laboratory's SOP. Please contact the EH&S Environmental Health Program Manager at envhealth@ehs.ucla.edu or (310) 794-5399 if you have any questions on how to establish or maintain an IPM Program for your lab.
- Hazard Communication must be provided to all individuals who may potentially be exposed to Zika Virus, including individual who work with the virus, will be present in the facility/room where the virus is being handled, will handle the waste, etc. Additionally, other laboratories in the vicinity of where Zika Virus work will be conducted should be notified that this work is taking place. To assist with providing hazard communication, the IBC would be happy to organize a floor-wide information session upon request. Please contact the IBC Administrative Staff at ibc@research.ucla.edu to schedule a time for this information session.

Animal Facility Precautions:

- Guidelines will be forthcoming.

POST-EXPOSURE SURVEILLANCE

Following a research-related exposure or potential exposure to Zika virus (either in the laboratory or in the field), the following testing is needed:

For symptomatic persons (2 weeks of symptoms or less):

- rRT-PCR on serum and urine **AND**
- IgM antibody on serum

For asymptomatic individuals with lab or clinical percutaneous or mucocutaneous exposure to live Zika virus (lab exposure) or BBP source with Zika diagnosis or likely symptoms:

- rRT PCR on serum and urine within 2 weeks of exposure **AND/OR**
- IgM and IgG antibody on serum after 2 week

For asymptomatic pregnant women with history of travel to Zika endemic areas within 8 weeks prior to getting pregnant or during pregnancy or males up to 6 months after travel or potential exposure:

- rRT-PCR on serum and urine within 2 weeks of travel to Zika endemic area **AND/OR**
- IgM & IgG antibody on serum after 2 weeks

OBTAINING IBC APPROVAL

The following items need to be in place prior to IBC approval:

1. An approved BUA in [SafetyNet](#) describing the work involving Zika Virus
2. An IBC-approved Standard Operating Procedure (SOP) which incorporates the precautions and the agent-specific risks noted above
3. A current (within the past 3 years) Biosafety Inspection for the appropriate containment level
4. A CDC Import/Transport Permit is required if:
 - a. you will be importing the virus or virally-infected materials into the U.S., or
 - b. you will be obtaining the virus or virally-infected materials from someone else in the U.S. who imported these into the U.S. **AND** the original importer's CDC import permit restricted subsequent transfer of the materials as a term of their permit.
 - c. The CDC Import Permit regulations are found at 42CFR Part 71.54, and information on obtaining a [CDC Import Permit](#).
5. A USDA permit is required if:
 - a. you will be importing arthropods (infected or uninfected) that could serve as vectors for Zika virus transmission into the U.S., or
 - b. you will be importing virally-infected specimens or cultures containing animal cells, tissues or animal products (including FBS, porcine trypsin) into the U.S., or
 - c. you will be transferring the materials in (a) or (b) above from someone else who imported these materials into the U.S.
 - d. Guidance on the requirements for USDA Permits for specimens associated with Zika virus is available [via the internet](#); via Email at OV@aphis.usda.gov; by phone at 301-851-3300, option 3; and by FAX at 301-734-3652.

REFERENCES

Zika Virus

<http://www.cdc.gov/zika/>

CDC Guidance for Transportation of Specimens and Working with Zika Virus in the Lab

<http://www.cdc.gov/zika/state-labs/biosafety-guidance.html>

Zika Travel Health Notices

<http://wwwnc.cdc.gov/travel/notices>

Zika and Pregnancy

<http://www.cdc.gov/zika/pregnancy/index.html>

<http://www.cdc.gov/zika/pregnancy/travel-health-notice.html>

<http://www.cdc.gov/zika/hc-providers/index.html>

CDC Health Alert Network Advisory for Zika virus

<http://emergency.cdc.gov/han/han00385.asp>