



Post Exposure Plan for *Dengue virus*

Background Information:

Dengue virus is a mosquito-borne viral infection. It is the cause of Dengue fever and Severe Dengue (also known as Dengue Hemorrhagic Fever or Dengue Shock Syndrome). Dengue Fever presents as a febrile illness, often accompanied by rash, headache, retro orbital pain, joint pains, and/or nausea/vomiting. Severe Dengue is a potentially deadly complication of Dengue Fever accompanied by vascular leakage (sometimes seen as mucosal bleeding), fluid accumulation, liver enlargement, persistent abdominal pain and vomiting, respiratory distress, severe bleeding or organ impairment.

Dengue virus is found in tropical and sub-tropical climates, generally in developing countries of the world but also in Florida, Texas and Hawaii in the U.S. where the appropriate mosquito vectors are present. This virus exists in 5 serotypes and is related to other flaviviruses such as yellow fever. All serotypes have the ability to cause Severe Dengue. The risk of progression to Severe Dengue increases with secondary infections with serotypes different from the primary infection.

The most common mode of transmission is by mosquito bite from the appropriate species while traveling in dengue-affected areas. However, laboratory-acquired and hospital-acquired infections can occur via needlestick, or through mucous membrane exposures with virus-laden aerosols.

Primary hazards in the laboratory :

Exposure to contaminated sharps, creation of splashes or aerosols and contact with naturally or experimentally infected mosquitos.

Acceptable disinfectants:

Dengue virus is susceptible to phenol-guanidine isothiocyanate (TRIzol® LS) and chaotropic salt (AVL Buffer). Viruses are sensitive to 1% sodium hypochlorite, 2% gluteraldehyde, 2% peracetic acid, 70 % ethanol, iodophors, phenolic compounds, and 3-6% hydrogen peroxide.

Exposure controls and personal protection:

Dengue virus is a Risk Group 2 organism. BSL-2 practices, containment equipment, and facilities are required when working with materials known or suspected of containing this agent.



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Personal protective equipment such as lab coats and gloves must be worn when handling infected or potentially infected materials. Eye protection must be used when there is a known or potential risk of generating splashes or aerosols.

Procedures that may generate aerosols or splashes should be conducted in a certified biosafety cabinet.

Personnel should wash their hands frequently while working in and before leaving the laboratory. Personal items including water bottles, cell phones, car keys, etc., should be stored in such a way as to avoid contamination and should be accessed only when the laboratory exercise is completed, lab coats and gloves are removed, and hands are washed.

The Principal Investigator (PI), or their designee, must ensure that all personnel are adequately trained in safe laboratory practices, universal precautions, and proper surface and equipment disinfection before initiating any work with this agent. The PI must also ensure that all personnel are aware of the signs and symptoms of a potential infection with Dengue fever with an emphasis on effects on the immunosuppressed.

At risk populations:

Persons with impaired immune systems, the elderly and infants are at highest risk. Additionally, the risk of the virus progressing to Severe Dengue is higher after a secondary infection with Dengue serotypes different from the initial infection.

Other at risk groups include diabetics, which are at higher risk for severe dengue outcomes. There is some correlation between risk of infection and AB blood group; with O blood types having slightly less risk of infection. And pregnant women infected with dengue virus should have their platelets monitored.

Immediate Action by Route of Exposure:

Needlestick, Laceration, Animal Bite: Wash area thoroughly with soap and running water. Do not apply disinfectant to the skin.

Mucous membranes (Eyes, nose, mouth): Flush the eyes for 10-15 minutes if eyes have been exposed to splash or spray containing virus. Rinse out mouth without swallowing after any exposure.

Inhalation: If contaminated materials are aerosolized and potentially inhaled, rinse mouth twice and spit. Do not swallow.

After First Aid:

Suspected infections related to research exposures must be reported to the University of Colorado, Boulder's Biosafety Officer at 303-492-2817. Please see below for complete instructions related to suspected research exposure. Treating medical providers should also be informed of the possibility of



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Dengue fever infection. The incubation period for this disease ranges from 3-14 days. Symptomatic individuals are recommended to be tested for Dengue fever; if early in their illness, direct testing for the virus may be done; if later in the illness, indirect testing via serology can be done, including serial testing for IgG antibodies if secondary infection is suspected. Consultation with an Infectious Disease practice is strongly recommended.

Post-exposure Prophylaxis:

There is currently no post exposure, pre-symptom prophylaxis for dengue fever. Your health care provider can recommend appropriate treatment.

There is a vaccine, Dengvaxia, which can only be used in people up to 45 years old who have had a lab confirmed previous dengue infection and live in Dengue-endemic areas. As such, this vaccine is not something recommended for CU Boulder researchers. Additionally, Dengvaxia is associated with more adverse reactions in people who have never been infected with the virus.

Symptoms of infection in adults:

Dengue fever

- High fever ($\geq 101^{\circ}\text{F}$ or $\geq 38.5^{\circ}\text{C}$)
- Severe headache, often with retro orbital (behind the eye) pain (60-70% of cases)
- Muscle and joint pain (60-70% of cases)
- Nausea
- Vomiting
- Swollen glands
- Rash (50% of cases)
- Symptoms last 2-7 days after the incubation period of 4-10 days

Severe dengue (not an complete list of signs and symptoms)

- Severe abdominal pain, liver enlargement
- Persistent vomiting
- Rapid breathing
- Bleeding gums; bloody nose (10%)
- Gastrointestinal (blood in vomit, 15 – 30%) or vaginal bleeding (40%)
- Bleeding easily from the skin or mucous membranes; frequent bruising
- Fatigue or restlessness
- Medical treatment must be sought out within 24-48hrs to avoid complications and risk of death



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After First Aid – Treatment and Reporting:

University of Colorado Boulder: Procedures for Work-Related Injuries or Illness, Including Animal Bites, Severe Allergic Symptoms, and Sharps Exposures.

It is the policy of the University of Colorado at Boulder (UCB) that all incidents that result in an injury or severe illness to faculty, staff or students be appropriately documented and reported. If a work-related incident, accident, injury or illness occurs:

a) **Medical Treatment**

- a. **In case of life or limb-threatening emergency call 911** or go immediately to the nearest emergent or urgent care facility. Immediately administer appropriate first aid, including thoroughly washing any wounds or exposed areas with soap and water, if at all possible.
- b. **If you are an employee of the University and you need non-emergency care** for a work-related illness or injury that has occurred during regular weekday working hours, you must be treated at one of the UCB Designated Medical Providers (DMPs: shown below). **Boulder Community Hospital Emergency Department has the ability to rapidly test for work-related infectious disease or potential biological exposures; all other DMPs may not have this rapid capability.** Testing can be done on the exposed personnel; it may be difficult to test any source patient or sample at the DMP.
- c. **After hours or while traveling**, go to the nearest urgent or emergent care facility.
- d. **Sharps injuries** that include exposure to human blood, body fluids, tissues, tissue culture cells are considered to be injuries with a potential for transmitting bloodborne pathogens. Prompt evaluation and treatment is necessary for these injuries. (go to Boulder Community Hospital Emergency Department)

b) **Reporting**

- a. Report the work-related injury or illness to your supervisor immediately. You or your supervisor should notify the Biosafety Officer at 303-492-2817 or at Cher.Masini@colorado.edu. (The BSO may confer with IACUC administrator, veterinarian, or Occupational Health RN.)
- b. You must file a worker's compensation injury report form **within 4 days of the work-related injury** / exposure or illness onset. Report the incident on the URM website and use the on-line reporting form.
- c. Sharps injuries must be reported on the URM's needle stick exposure report form.
- d. All injury reporting forms can be found at the URM's website at <https://www.cu.edu/risk/file-claim>

c) **Eligibility (who is eligible to be seen by UCB Designated Medical Providers?)**

- a. All UCB employees, paid UCB staff, graduate students receiving a traineeship or stipend administered by UCB, undergraduate work-study students and paid undergraduate student assistants are eligible to be seen by UCB DMPs. If you are an UCB employee and you visit your regular primary care provider for a work-related injury and your visit is



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coded as a work-related injury, your primary insurance may not cover the cost of your visit or treatment with your primary care provider.

Some individuals are not covered by UCB Worker's Compensation: All visiting or resident scholars who do not receive payment via UCB (e.g., Howard Hughes Medical Institute Fellows) must follow the work-related exposure / illness or injury protocol outlined by their parent institution or outside funding source. Contract or consulting employees are also not covered by UCB Worker's Compensation; they need to follow the work-related exposure / illness or injury protocols established by their parent institution or consult with their personal health care provider. Volunteers, contract employees and students not paid by UCB are **not** covered by UCB Worker's Compensation and should be seen by their personal health care provider. If you are a student with a Wardenburg Health care plan, post-exposure lab tests are available and covered.

d) Payment and questions:

- a. All bills from medical providers must be sent to University Risk Management:
University Risk Management (<https://www.cu.edu/risk/file-claim>)
1800 Grant Street, Ste 700
Denver, CO 80203
Fax: 303-860-5680
- b. For further questions, contact URM at: 303-860-5682 or 888-812-9601

UCB Designated Medical Providers

This list changes frequently. For a current listing of DMPs, please refer to the University of Colorado's Risk Management website at: <https://www.cu.edu/risk/dmp>