

**BIOHAZARDOUS AGENT REFERENCE DOCUMENT**

## Dengue virus (DENV)

The Biohazardous Agent Reference Document (BARD) is a general guidance resource that reviews and summarizes the nature of a pathogen or biotoxin, and offers safety requirements for work with the agent in the laboratory. The BARD may replace the formal SOPs used in conjunction with some IBC registrations.

The BARD is provided as an additional guidance tool, and is not a substitute for a risk assessment, biosafety training, lab-specific training, or a formal [IBC master protocol registration](#). This document should be readily available in the laboratory, and it is the responsibility of the Laboratory Supervisor or Principal Investigator to ensure that all personnel have read, understood, and signed the document. The BARD is for informational purposes only, and is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Please consult a health care provider for any medical questions or concerns.

**INSTRUCTIONS**

- 1. Review the information contained in this document.**
- 2. Add any necessary information that is specific to your work in the laboratory (such as strain-specific information). Please be sure that the track changes function is turned on to indicate any changes that you make.**
- 3. Instruct all personnel to review the BARD and sign the last page, indicating that they have read and understood the information.**
- 4. Submit the BARD along with your IBC master protocol registration, amendment, or continuing review.**

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### Dengue virus (DENV)

#### CHARACTERISTICS

<b>Morphology</b>	Member of the Flaviviridae family, enveloped virus.
<b>Strain Specific Characteristics</b>	Four serotypes exist (Dengue 1 – 4), wild-type and attenuated strains.

#### HEALTH HAZARDS

<b>Host Range</b>	Humans, simians, mosquitoes
<b>Modes of Transmission</b>	Blood borne, bite from an infected mosquito, contact with non-intact skin or mucous membranes
<b>Signs and Symptoms</b>	Influenza-type symptoms, fever lasting 2 – 10 days, rash, muscle and joint pain. May progress to Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS): high fever, hemorrhage, liver organomegaly, shock. Mortality rates for DHF can reach 20%.
<b>Infectious Dose</b>	< 10 PFU (plaque forming units)
<b>Incubation Period</b>	Usually 4 – 7 days (range of 3 – 15 days)

#### MEDICAL PRECAUTIONS / TREATMENT

<b>Prophylaxis</b>	None available
<b>Vaccines</b>	Under development
<b>Treatment</b>	Monitor vital signs closely, plasma and/or blood transfusion in cases of sever hemorrhagic fever, solutions with dextran 70 have been used to treat hemorrhagic shock
<b>Surveillance</b>	Monitor for symptoms and test using serology or RT-PCR
<b>UVM IBC Requirements</b>	Report any exposures or signs and symptoms to your supervisor
<b>Additional Medical Precautions</b>	

#### LABORATORY HAZARDS

<b>Laboratory Acquired Infections</b>	14 reported cases of lab-acquired infections, no deaths
<b>Sources</b>	Blood, cerebrospinal fluid, organs, tissues from infected humans & animals; human, non-human primate, and mosquito cell lines, and environmental samples or mosquitoes from infected areas.

#### CONTAINMENT REQUIREMENTS

<b>BSL - 2</b>	Manipulation of known or potentially infected clinical samples and cell cultures of laboratory adapted strains (RG2)
<b>BSL - 3</b>	
<b>ABSL - 2</b>	Work with animals infected with risk group 2 strains
<b>ABSL - 3</b>	
<b>Aerosol generating activities</b>	Centrifugation, homogenizing, vortexing or stirring, changing of animal cages, cell sorting, pipetting, pouring liquids, sonicating, loading syringes
<b>Primary containment device (BSC)</b>	Use for aerosol-generating activities, high concentrations, or large volumes

#### EXPOSURE PROCEDURES

<b>Mucous membranes</b>	Flush eyes, mouth or nose for 15 minutes at eyewash station.
<b>Other exposures</b>	Wash area with soap and water for 15 minutes
<b>Medical Follow-Up</b>	Contact UVMCC Infectious Disease Dept. directly at <b>(802) 847-2700</b> for immediate assistance
<b>Reporting</b>	Report all exposures or near misses to: <ol style="list-style-type: none"> <li>1. Your immediate Supervisor</li> <li>2. The UVM Biosafety Officer at <b>(802) 777-9471</b> and Risk Management at <b>6-3242</b></li> <li>3. Risk Management and Safety; <a href="https://www.uvm.edu/riskmanagement/incident-claim-reporting-procedures">https://www.uvm.edu/riskmanagement/incident-claim-reporting-procedures</a></li> </ol>

#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

<b>Minimum PPE Requirements</b>	Nitrile gloves, lab coat, appropriate eye/face protection. Wash hands after removing gloves.
<b>Additional Precautions (Risk assessment dependent)</b>	Sharps use strictly limited

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VIABILITY	
<b>Disinfection</b>	Susceptible to 1% sodium hypochlorite, 2% glutaraldehyde, 2% peracetic acid, TRIzol, phenolic compounds, 70% ethanol, iodophors, 3-6% hydrogen peroxide; all with a contact time of at least 10 minutes
<b>Inactivation</b>	Inactivated by autoclaving (121°C for 15 minutes), dry heat 160-170°C for at least 1 hour, or low pH (at or below pH 3)
<b>Survival Outside Host</b>	Capable of surviving in dried blood for up to 9 weeks at room temperature

SPILL CLEAN UP PROCEDURES	
<b>Small Spill</b>	Notify others working in the lab. Allow aerosols to settle. Don appropriate PPE. Cover area of the spill with paper towels and apply approved disinfectant, working from the perimeter towards the center. Allow 30 minutes of contact time before clean up and disposal. Dispose in double biowaste bags and biobox.
<b>Large Spill</b>	<b>Inside of a lab:</b> Call UVM Service Operations at 656-2560 and press option 1 to speak to a dispatcher. Ask them to page Risk Management and Safety. <b>Outside of a lab:</b> Pull the nearest fire alarm and evacuate the building. Wait out front of the building for emergency responders to arrive.

REFERENCES	
Canadian PSDS	<a href="https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/dengue-fever-virus-1-2-3-4-pathogen-safety-data-sheet.html">https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/dengue-fever-virus-1-2-3-4-pathogen-safety-data-sheet.html</a>
BMBL	<a href="https://www.cdc.gov/biosafety/publications/bmb15/">https://www.cdc.gov/biosafety/publications/bmb15/</a>
CDC Guidelines	<a href="https://www.cdc.gov/dengue/index.html">https://www.cdc.gov/dengue/index.html</a>
Current Protocols in Microbiology	<a href="http://onlinelibrary.wiley.com/doi/10.1002/9780471729259.mc15d02s27/abstract">http://onlinelibrary.wiley.com/doi/10.1002/9780471729259.mc15d02s27/abstract</a>

STUDENT / EMPLOYEE NAME	SIGNATURE	DATE

**Biosafety Review:**

\_\_\_\_\_  
Jeff LaBossiere, Biological Safety Officer

\_\_\_\_\_  
Date

Principal Investigator: \_\_\_\_\_

IBC Registration #: \_\_\_\_\_