UNIVERSITY OF South Carolina

Dengue Virus (DENV)

General Information

Dengue virus (DENV) is an enveloped, single-stranded, positive sense RNA virus in the family Flaviviridae. The genome is surrounded by an icosahedral nucleocapsid. There are four serotypes of DENV, and an individual can be infected with the virus multiple times in their life.

Host Range

Humans, non-human primates. Mosquitoes serve as a vector (*Aedes aegypti* or *Aedes albopictus*).

Incubation Period

Usually 3-14 days.

Survival Outside Host

DENV is stable in dried blood for up to 9 weeks at room temperature.

Laboratory Hazards

Parental inoculation (needlestick), mucous membrane or open wound exposure, a bite from an infected mosquito.

Symptoms of Exposure

Flu-like symptoms (fever, headache, pain behind the eyes, body aches, joint and muscle pain), nausea, vomiting, swollen glands, and rash. Individuals infected for the second time are at greater risk of developing dengue hemorrhagic fever (DHF). DHF symptoms include severe abdominal pain, persistent vomiting, rapid breathing, bleeding nose or gums, restlessness, bloody vomit or stool, cold and clammy skin, and fatigue. A pregnant woman infected with DENV can pass the virus to her fetus. DENV can have harmful effects to the fetus, including low birth weight, premature birth, or death.

Lab Acquired Infections (LAIs)

At least 8 LAIs have been reported.

Personal Protective Equipment

Disinfection & Inactivation

Phenol-guanidine isothiocyanate (TRIzol® LS), 1% sodium hypochlorite, 2% glutaraldehyde, 2% peracetic acid, 70% ethanol, iodophors, phenolic compounds, and 3-6% hydrogen peroxide. DENV can be inactivated with moist heat (121°C for at least 15 min), and dry heat (160-170°C for at least 1 hour). DENV is also inactivated at a pH of 3.

Waste Management

Refer to USC's Biological and Infectious Waste Management Plan.

Lab Containment

Biosafety Level 2 (BSL-2) for activities with materials and cultures known or reasonably expected to contain DENV.

Animal Containment

Animal Biosafety Level 2 (ABSL-2) for activities with experimentally infected animals.

Medical Surveillance/Treatment

Surveillance: Monitor for symptoms. DENV infections can be confirmed by RT-PCR and ELISA.

Prophylaxis: None

Vaccines: Dengvaxia is only approved for those with laboratory evidence of a previous DENV infection.

Treatment: Supportive therapy for control of symptoms.

Spill Procedures

See USC Biological Spill Procedures

Exposure Procedures

See USC Protocol for Post Exposure Evaluation and Follow-up. Use of sharps should be strictly limited. A biosafety cabinet should be used when there is a potential to create aerosols or droplets.

References

Public Health Agency of Canada (2012) Pathogen Safety Data Sheets: Infectious Substances – Dengue virus. Pathogen Regulation Directorate, Public Health Agency of Canada

WHO, "Dengue and Severe Dengue", https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue

ABSA Laboratory-Acquired Infection (LAI) Database, "Dengue" https://my.absa.org/LAI

CDC Dengue https://www.cdc.gov/dengue/index.html

Government of Canada, "Dengue" https://travel.gc.ca/travelling/health-safety/diseases/dengue

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