

# Adenovirus and Adenoviral Vectors

Adenoviruses are non-enveloped, linear double-stranded DNA viruses and are a common cause of upper and lower respiratory tract infections. Adenoviral vectors (viral vectors are viruses that are specifically used to introduce exogenous DNA into host cells) have a high cloning capacity, can be produced in high titers, and can infect a wide variety of cell types. Adenovirus serotypes 2 and 5 are commonly used for creating recombinant adenoviral vectors.

## Potential Health Hazards

Adenoviruses are effective at targeting the human respiratory and intestinal systems and can cause eye infections and the common cold. Replication-defective recombinant adenovirus have caused corneal and conjunctival damage.

## Modes of Transmission

Wild-type adenoviruses are spread directly by oral contact and droplets. They are indirectly spread by handkerchiefs, eating utensils and other articles freshly soiled with respiratory discharge of an infected person. It is possible for a person who is infected, but asymptomatic, to shed virus for many months or years.

## Laboratory Acquired Infections

There are reports of rare cases of illness caused by working in laboratories with clinical specimens. There is a theoretical risk of infection from exposure to laboratory cultures of wild-type adenovirus or recombinant viruses. Transmission of adenoviruses can occur through ingestion, inhalation of aerosolized droplets, mucous membrane contact, and accidental injection (for example, as the result of a needlestick).

## Survival

Adenoviruses are unusually stable to chemical or physical agents and adverse pH conditions. They are very stable in the environment and can survive 3 to 8 weeks on environmental surfaces at ambient temperatures. Even after treatment with ether or chloroform, they can still be infective.

## Laboratory Practices

**Biosafety Level 2** practices and facilities must be used for activities involving adenoviruses/viral vectors.

- Biohazard signs and labels must be displayed in areas and on equipment where adenoviruses are used and stored. This includes, but is not limited to, laboratory entrance doors, biological safety cabinets, incubators, refrigerators, and freezers.
- Use a biological safety cabinet (BSC) (a.k.a., tissue culture hood) for manipulations that can generate aerosols, such as pipetting, harvesting, infecting cells, filling tubes/containers, and opening sealed centrifuge canisters. If a procedure cannot be done in a BSC and only on an open bench, use a plastic shield to prevent exposure through inhalation or splashing.
- Use aerosol containment devices when centrifuging. These include sealed canisters that fit in the centrifuge bucket, covers for the centrifuge bucket, heat sealed tubes, or sealed centrifuge rotors. Rotors should be removed and opened inside a BSC. Centrifuge tubes should be filled and opened in a BSC.
- Vacuum lines must be protected with liquid disinfectant traps and a micron filter.

## Personal Protective Equipment

Personal protective equipment (PPE) includes, but is not limited to -

- Disposable gloves (nitrile, latex, etc.).
- Lab coat when working in the laboratory. Remove when leaving the area.
- Goggles for splash protection.
- N95 respirator for spills outside the BSC.
  - *Must be medically cleared, trained and fit-tested annually by Occupational Health*

