UNIVERSITY OF SOUTH ALABAMA

Guidelines for Research Involving Viral Vectors: Adenovirus

Adenovirus. 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).

Host Range

Humans and animals are the natural reservoirs for wild-type adenoviruses. Recombinant adenovirus vectors infect a variety of mammalian cell types, and some strains can transform cells in culture**.**

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

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

- Disposable gloves (nitrile, latex, etc.)
- Lab coat when working in laboratory. Remove when leaving.
- Goggles for splash protection.
- Closed toe shoes.

Precautions When Using Animals

- Inoculation of BSL-2 biohazardous materials (including, but not limited to: viral vectors and human tumor cell lines) must be performed within a Class II BSC*.
- Tissue harvest (including blood collection) must be performed in the necropsy suite or in a Class II BSC.
- ABSL-2 signage must be placed on the animal room door when BSL-2 agents are in use. See Department of Comparative Medicine for your room assignment and signage.
- Depending on hazard assessment as performed by the IBC, IACUC, and Attending Veterinarian, cages may be considered biohazardous. Please meet with Comparative Medicine prior to initiation of the animal experiments to discuss handling of soiled cages and other waste materials.
- All cages containing animals inoculated with biohazardous agents must be marked with:
    - The agent
    - The PI
    - The date of administration

    - Any special handling requirements of soiled bedding/cages.
- ABSL-2 carcasses are considered biohazardous and are incinerated.

*Deviation from using a Class II BSC must be approved by the IBC and/or IACUC Committee

Animal use requests are made to the Institutional Animal Care and Use Committee (IACUC).

A complete copy of USA's Animal Biosafety (ABSL-2) Guidelines can be found at: https://southalabama.edu/departments/research/compliance/animalcare/animal.biosafety.guidelines.pdf

Recombinant Adenoviral Research

Protocols involving recombinant adenoviral vectors must be approved by the Institutional Biosafety Committee (IBC).

Employee Exposure

Eye exposure - Rinse eyes with eyewash for at least 15 minutes.
Skin exposure - Cleanse the affected skin area immediately with surgical disinfectant soap, diluted Clorox (0.05%) or other approved disinfectant.
Report Incidents and Seek Treatment - Report actual or suspected exposure incidents to your supervisor immediately. An online incident report must be completed within 72 hours of the incident. This form can be found at: https://jagasp2.southalabama.edu/incident/logon.aspx
If possible, identify and secure the offending sample to contain its biohazardous content and to allow for testing if necessary.

Spills and Disposal Procedures

• If the spill area is large or in a common use area, mark the area so that others may avoid it.
• Using materials from you spill kit:
    o Don the appropriate PPE
    o Cover the spill with absorbent material
    o Pour disinfectant over the entire area and allow to stand for 30 minutes.
• Contact the PI and assess the magnitude of the spill and formulate further plans of action.
• Safely pick up any broken glass with tongs or sweep in to a dust pan.
• Place spill material in to an autoclave bag.
• Make sure that the area is cleaned and disinfected thoroughly.
• Soak contaminated clothes and shoes in a tray with approved disinfectant.
• Report all spills containing biohazardous or recombinant material to the Office of Research Compliance and Assurance at 251-460-6863.

Disinfectants

Disinfectants should be allowed a minimum of 20-30 minutes contact time. Use one of the following:

- Sodium hypochlorite (use 1-10% dilution of fresh bleach)
- 5% Phenol

Note: Alcohol is not an effective disinfectant against adenovirus.

Decontamination

Autoclave cultures for 30 minutes at 121°C or 250°F (15 lbs per square inch of steam pressure). Disinfect work surfaces using an effective germicide (see above). This may be followed by an alcohol wipe to lessen the corrosive nature of the germicide.

Transport Requirements

Materials must be appropriately contained and labeled for transport within the University. Shipping infectious substances, diagnostic specimens, and/or shipping with dry ice off-campus require training and certification. See Shipping and Packaging Biological Materials posted on the USA Biosafety training website for additional information.

Information and References

University of Iowa Environmental Health and Safety
https://ehs.research.uiowa.edu/adenovirus-and-adenoviral-vectors