UC RIVERSIDE | Environmental Health & Safety

Monkeypox Virus Research Guidance

Effective Date:	

Introduction

Monkeypox virus is the causative agent of Monkeypox disease and belongs to the *Orthopoxvirus* genus in the family *Poxviridae,* which also includes smallpox. Monkeypox disease presents similarly to smallpox signs and symptoms including the characteristic rash. The virus is endemic to the Democratic Republic of Congo and can also be found in Central and West Africa. It has a 10% fatality rate in humans and can also infect other species including squirrels, non-human primates, black-tailed prairie dogs, African brush-tailed porcupines, rats, and shrews. The virus is transmitted between humans and animals via bite or contact with infected body fluids. Human to human transmission can occur through the respiratory tract, by direct contact with the body fluids of an infected person, or contact with virus-contaminated objects.

Past studies from Africa suggests that the smallpox vaccine is at least 85% effective in preventing monkeypox. Smallpox virus vaccination is effective against monkeypox and, per the Cal/OSHA Aerosol Transmissible Disease Standard (CCR Title 8, §5199), will be offered to researchers working with monkeypox virus.

Guidance Summary

This guidance describes the regulatory and appropriate biosafety requirements for research involving monkeypox virus including the appropriate facility containment, work practices, personal protective equipment, and waste management.

Compliance/Responsibilities

The Principal Investigator (PI) is responsible for submitting a BUA application, renewal, and/or amendment that accurately reflects the current and proposed research being conducted in the laboratory. The BUA must include all research involving recombinant DNA activities (research, clinical, or teaching) and/or infectious or biohazardous agents. PIs are responsible for amending their BUA(s) to include any modifications to personnel, locations, materials, procedures, etc.

The Biosafety Officer (BSO) and IBC Administrator conducts an initial review of each BUA submission and determines the general category of biohazardous material and recombinant DNA work that requires a risk assessment. During the IBC meeting, the BSO serves as the secondary reviewer to present any additional comments or discussion topics not already presented to the committee by the primary reviewer.

The Institutional Biosafety Committee (IBC) provides the final decision for approval, deferral, or denial of the BUA application after conducting a thorough risk assessment of the research proposal. The primary assigned reviewer and BSO presents their comments and discussion to the full committee during the meetings. The committee then votes to approve, defer, or deny the BUA.

Environmental Health & Safety (EH&S) provides for the referrals and costs of vaccines for applicable individuals. EH&S is responsible for documenting acceptance or declination of vaccines offers.

Guidance

SELECT AGENT

Monkeypox virus identified as belonging to the **Central African clade** fall under the Federal Select Agent Program regulation 42 CFR § 73. UC Riverside **does NOT** have an active Select Agent Program registration to work with this material. Identification of Central African monkeypox virus in a specimen must be:

- Reported IMMEDIATELY to the IBC and Biosafety program at ehsbio@ucr.edu.
- Reported within 7 calendar days after identification to the CDC.
- Transferred in accordance with regulations or destroyed on-site by a recognized sterilization or inactivation process.
- Secured against theft, loss, or release during the period between identification and transfer or destruction.

Principal Investigators should be aware that Select Agent Program registration to work with Central African strains of monkeypox virus may take about a year to get approval.

SELECT AGENT EXCLUSION

West African strains of monkeypox virus are not subject to the Select Agent regulations. **The 2022 outbreak of monkeypox so far has been identified via PCR as the West African clade.**

All Principal Investigators planning experiments with strains that do not fall under the Select Agent Program should anticipate the following requirements for their BUA submission:

SUGGESTED BIOSAFETY LEVEL

UC Riverside complies with all applicable regulations and guidelines such as the NIH Guidelines, 6th BMBL, CDC guidelines, and state and federal regulations. Below is a list of proposed biosafety levels based on procedures. The list is **not all-inclusive**, but is intended to provide guidance for researchers and the IBC in determining an appropriate containment level.

BSL-2

CDC recommends BSL-2 facilities with standard BSL-2 work practices may be used for the following activities:

- Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
- Molecular analysis of extracted nucleic acid preparations utilizing a validated extraction protocol
- Electron microscopic studies with glutaraldehyde-fixed grids
- Routine examination of bacterial and mycotic cultures for diagnostic purposes other than monkeypox virus[1]

- Routine staining and microscopic analysis of fixed smears for diagnostic purposes other than monkeypox virus[1]
- Routine chemistry, hematology, and urinalysis of non-lesion specimens

[1]Unless the cultures or smears are from lesion specimens. While awaiting results from an orthopoxvirus test, culture of lesion specimens for diagnostic purposes other than monkeypox virus from a suspect monkeypox virus case is recommended to occur in BSL-2 facilities, with smallpox vaccinated staff using BSL-3 practices* (see Manipulating Diagnostic Specimens Suspected to Contain Monkeypox Virus). If staff are not vaccinated, it is recommended to use BSL-3 facilities.

BSL-2 Laboratory with BSL-3 Work Practices

- When possible, successfully vaccinated (i.e. smallpox vaccination within the past 3 years) persons should perform laboratory work that involves handling specimens that may contain monkeypox virus
- Laboratories without vaccinated personnel can perform routine specimen processing in BSL-2 facilities, but with more stringent BSL-3 work practices

In addition to standard BSL-2 practices and containment, additional BSL-3 practices and precautions must include:

1. All work **must** be done in a certified Class II biological safety cabinet. If procedures that can generate aerosols cannot be contained within a BSC, a combination of personal protective equipment (with particulate respirator) and other containment devices designed to create a barrier between the specimen and the laboratorian must be used.
2. No culturing of the virus is occurring.
3. Safety cups or sealed rotors must be used when centrifuging outside of the biosafety cabinet. Ideally, these rotors or cups should be unloaded in a BSC.
4. All work surfaces must be decontaminated with an Environmental Protection Agency (EPA)-registered disinfectant (EPA List Q) after the completion of work or at the end of the day.
5. All individuals handling monkeypox virus or samples suspected to contain monkeypox virus are required to have an Occupational Health medical consult, medical clearance, and must sign the smallpox vaccine Acceptance/Declination form. Contact the Occupational Health Director at 951-827-5107 or Biosafety Officer at 951-827-4246 if you have questions.

Additional practices and precautions may be included at the discretion of the IBC based on risk assessment.

EXCLUSIONS:
Culture-based testing for monkeypox virus should be performed by staff who are vaccinated against smallpox and in laboratories with validated protocols and BSL-3 containment facilities.

BSL-3

- Virus isolation in cell culture and initial characterization of viral agents recovered in cultures of Monkeypox specimens
- Infection studies with animal models

- Inactivation of culture samples by validated methods before transfer of inactivated samples outside BSL-3 laboratory

References

Submit or manage a Biohazard Use Authorization (BUA): https://app.riskandsafety.com/

Cal/OSHA Injury and Illness Prevention Program: https://www.dir.ca.gov/title8/3203.html

Cal/OSHA Aerosol Transmissible Diseases Standard: https://www.dir.ca.gov/title8/5199.html

CDC Biosafety in Microbiological and Biomedical Laboratories: https://www.cdc.gov/labs/BMBL.html

CDC Monkeypox Information: https://www.cdc.gov/poxvirus/index.html

CDC 2022 U.S. Monkeypox outbreak: https://www.cdc.gov/poxvirus/monkeypox/response/2022/index.html

CDC Monkeypox Laboratory Procedures: https://www.cdc.gov/poxvirus/monkeypox/lab-personnel/lab-procedures.html

Public Health Agency of Canada Monkeypox Pathogen Safety Data Sheet: https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/monkeypox-virus.html

NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules https://osp.od.nih.gov/biotechnology/nih-guidelines/

Sklenovská N, Van Ranst M. Emergence of Monkeypox as the Most Important Orthopoxvirus Infection in Humans. *Front Public Health*. 2018; 6:241. Published 2018 Sep 4. doi:10.3389/fpubh.2018.00241

World Health Organization Disease Outbreak News: https://www.who.int/emergencies/disease-outbreak-news

Vaccinia (Smallpox) Vaccines: https://www.cdc.gov/vaccines/vpd/smallpox/hcp/vaccines.html

CA Department of Public Health Monkeypox information: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Monkeypox.aspx

Document History

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Contact Information

Contact: Email: Phone #:	**Tran Phan**, Biosafety Officer/High Containment Lab Director **tran.phan@ucr.edu** 951-827-4246
Contact: Email: Phone #:	**Nicole Perkins**, Assistant Biosafety Officer/IBC Administrator **nicole.perkins@ucr.edu** 951-827-1115
Contact: Email: Phone #:	**Karla Hill**, Occupational Health Director **karla.hill@ucr.edu** 951-827-5107