

Monkeypox

Monkeypox is viral disease that is caused by the monkeypox virus. Monkeypox was first discovered in 1958 when two outbreaks of a pox-like disease occurred in colonies of monkeys kept for research. The first human case of monkeypox was recorded in 1970 in the Democratic Republic of the Congo (DRC). Since then, monkeypox has been reported in people in several other central and western African countries. A majority of monkeypox cases in people that have occurred outside of Africa are linked to international travel or imported animals. Although the natural reservoir of monkeypox remains unknown, African rodents and non-human primates may harbor the virus and infect people.

Disease Summary

- **Transmission:** Person-to-person through large respiratory droplets via prolonged face-to face contact; contact with bodily fluids or contaminated objects/surfaces; abrasions in the mouth from eating infected animals; bite or contact with an infected animal's blood, body fluids, or rash.
- **Incubation Period:** 5 -21 days. A patient is considered infectious from 5 days prior to the onset of the rash until the lesions have crusted over and new skin has formed.
- **Symptoms and Clinical Presentation:**
 - Symptoms usually start within 5 days of exposure and include fevers/chills, headache, muscle aches, back pain, fatigue, and *lymphadenopathy*. Swollen lymph nodes often occur in submandibular, cervical, or inguinal areas and start before a rash appears, which helps to distinguish monkeypox from smallpox and varicella (chickenpox). Onset of perianal or genital lesions in the absence of subjective fever has been reported.
 - Rash or lesions may appear 1-3 days after initial symptoms, usually beginning on face and spreading to palms, soles, extremities, and trunk. Skin lesions generally develop at the same stage, compared to varicella where lesions characteristically develop in different stages.
 - Not all patients with monkeypox develop rashes
 - Symptoms are usually self-limited and spontaneously resolve within 14-21 days
 - The rash associated with monkeypox can be confused with other diseases that are more commonly encountered in clinical practice (e.g., secondary syphilis, herpes, chancroid, and varicella zoster). Historically, sporadic reports of patients co-infected with monkeypox virus and other infectious agents (e.g., varicella zoster, syphilis).
- **Case Fatality Rate:** 1-10% in Africa (West African clade more mild than Central African clade).



a) early vesicle, 3mm diameter



b) small pustule, 2mm diameter



c) umbilicated pustule, 3-4mm diameter



d) ulcerated lesion, 5mm diameter



e) crusting of a mature lesion



f) partially removed scab

Areas of erythema and/or skin hyperpigmentation are often seen around discrete lesions.

Lesions can vary in size and may be larger than those shown.

Lesions of different appearances and stages may be seen at the same point in time.

The rash associated with monkeypox involves vesicles or pustules that are deep-seated, firm or hard, and well-circumscribed; the lesions may umbilicate or become confluent and progress over time to scabs.

Case Definition

Person Under Investigation

- Persons under investigation (PUI) are individuals who are reported as suspicious but have not been tested in an LRN laboratory. This includes cases that health departments have been consulted on because of clinician concern.

Possible Case

- Meets one of the epidemiologic criteria **AND** has fever or new rash **AND** at least one other sign or symptom with onset 21 days after last exposure meeting epidemiologic criteria

Probable Case

- Meets one of the epidemiologic criteria **AND** has new rash *with or without* fever **AND** at least one other sign or symptom with onset 21 days after last exposure meeting epidemiologic criteria **AND**
- Demonstration of detectable levels of anti-orthopoxvirus IgM antibody during the period of 4 to 56 days after rash onset

Confirmed Orthopoxvirus Case

- Meets possible case definition **AND**
- Demonstration of orthopoxvirus DNA by polymerase chain reaction testing of a clinical specimen **OR** demonstration of presence of orthopoxvirus using immunohistochemical or electron microscopy testing methods

Confirmed Monkeypox Case

- Meets possible case definition **AND**
- Demonstration of presence of monkeypox virus DNA by polymerase chain reaction testing or Next-Generation sequencing of a clinical specimen **OR** isolation of monkeypox virus in culture from a clinical specimen

Clinical Criteria

- **New rash (any of the following)**
 - Macular (flat)
 - Papular (raised)
 - Vesicular (filled with clear fluid)
 - Pustular (round, firm, filled with opaque fluid, umbilication in the center)
 - Generalized or localized / Discrete or confluent
 - Scabs (the contagious period ends once the rash scabs and falls off)
- **Fever (either of the following)**
 - Subjective
 - Measured temperature of $\geq 100.4^{\circ}\text{F}$ [$>38^{\circ}\text{C}$]
- **Other signs and symptoms:**
 - Chills and/or sweats
 - New lymphadenopathy (periauricular, axillary, cervical, or inguinal)

Epidemiologic Criteria

Within 21 days of illness onset:

- Report having had contact with a person or people who have a similar appearing rash or received a diagnosis of confirmed or probable monkeypox **OR**
- Is a man who regularly has close or intimate in-person contact with other men, **OR**
- Traveled to a country with confirmed cases of monkeypox **AND** at least one of the above criteria **OR**
- Traveled to country where MPXV is endemic **OR**
- Contact with a dead or live wild animal or exotic pet that is an African endemic species or used a product derived such animals (e.g., game meat, creams, lotions, powders, etc.)

Exclusion Criteria

A case may be excluded as a possible, probable, or confirmed monkeypox case if:

- An alternative diagnosis* can fully explain the illness **OR**
- An individual with symptoms consistent with monkeypox but who does not develop a rash within 5 days of illness onset **OR**
- A case where specimens do not demonstrate the presence of orthopoxvirus or monkeypox virus or antibodies to orthopoxvirus as describe in the laboratory criteria

Note: If suspicion for monkeypox is not high, clinicians may consider instructing the patient to isolate at home for 5 days after the fever/prodromal symptoms. During this period, the patient should watch for the development of a rash. If no rash develops after 5 days, the patient may resume normal activity. However, if a rash develops, the patient should contact their PCP (or Virtual ExpressCare if no PCP), who should then alert NYC DOHMH as below.

Key Screening Steps

1. **Identify:** Assess the patient for signs and symptoms, travel history, and epidemiological criteria. For assistance, contact facility Infection Prevention and Control or on-call hospital epidemiologist.
2. **Isolate:** Provide a mask to the patient, initiate prompt triage and isolation, and follow infection prevention guidance.
3. **Inform:** Notify department and facility leadership, infection prevention and control, and local on-call hospital epidemiologist. Call NYC DOHMH Provider Access Line to ascertain risk: 866-692-3641. If determined to be a Person Under Investigation per NYC DOHMH, call Central Office Special Pathogens Program/Emergency Management: 646-864-5442

Infection Prevention

Hand Hygiene

Perform hand hygiene before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves. Use soap and water for at least 20 seconds or use alcohol-based hand rubs. If hands are visibly soiled, use soap and water.

Patient Placement

Place patient in a single patient **Airborne Infection Isolation Room (AIIR)**. If an AIIR is not available, isolate patient in a private examination room. Keep door closed and minimize entry and exit.

Limit transport and movement of the patient outside of the room. When outside of the AIIR, patients should wear a facemask to contain secretions.

Keep a log of all persons who care for or enter the rooms or care area of these patients.

Transmission-based Precautions and PPE

Adhere to **Standard+ Airborne + Contact Precautions**. Use gown, respirator, goggles or face shield, and gloves. Follow the **SP Level 1 PPE Donning and Doffing Checklist**. Do not reuse or extend the use of PPE.

Environmental Infection Control

The **Central African Clade of Monkeypox virus** is classified as a **Category A infectious substance**: capable of causing permanent disability or life-threatening/fatal disease in healthy humans if exposure occurs.

The West African Clade of Monkeypox virus is classified as a **Category B infectious substance**: not capable of causing permanent disability or life-threatening/fatal disease in healthy humans if exposure occurs. ***Note current May 2022 MPX Outbreak is due to West African Clade.***

Keep all waste, supplies, or medical equipment in the patient room until Monkeypox is ruled out or further guidance is provided.

If Monkeypox is ruled out, clean and disinfect the patient's care area in accordance with routine procedures. Management of laundry, food service utensils, and medical waste should also be performed in accordance with routine procedures.

If the **Central African Clade** of Monkeypox virus is ruled in, all cleaning, disinfection, and transport of waste will be **escalated to and managed by vendors with expertise in handling Category A waste**. Once the patient vacates a room, all unprotected individuals, including HCP, should not be allowed in that room until sufficient time has elapsed for enough air changes to remove potentially infectious particles and the room has been cleaned and disinfected by designated vendor.

Diagnostic Testing

Consultation and approval from NYC DOHMH is required if specimen collection is warranted.

Preferred laboratory test is PCR detection of viral DNA.

Best specimen collection site = skin, fluid, or crusts collected directly from skin lesions (biopsy if possible). **See next page for more information regarding monkeypox specimen collection.**

Further information regarding specimen collection can be found here:

<https://www.cdc.gov/poxvirus/monkeypox/clinicians/prep-collection-specimens.html>

Treatment

There are no specific licensed treatments available for Monkeypox infection. There is one vaccine that has been licensed in the United States to prevent Monkeypox. Therapeutics that can be considered for use under expert guidance from clinical leadership and public health authorities include cidofovir, brincidofovir, tecovirimat, and vaccinia immune globulin.

Additional Information

- CDC Monkeypox website: <https://www.cdc.gov/poxvirus/monkeypox/about.html>; <https://www.cdc.gov/poxvirus/monkeypox/outbreak/current.html>
- UK Monkeypox website: <https://www.gov.uk/guidance/monkeypox>
- NETEC Monkeypox website: <https://netec.org/2021/07/19/monkeypox-july-2021/>

Monkeypox Specimen Collection – NYC DOHMH Public Health Lab

To collect vesicular and pustular material:

1. Sanitize the patient's skin with an alcohol wipe and allow skin to dry.
2. For each of the two dry swabs collected from each lesion, label a swab holder and remove swab from outer sheath. Collect cells from the lesion base by gently but firmly rolling the dry swab back and forth across the base of an uncapped lesion. Return each swab to the outer sheath or to a sterile container and cap firmly. Depending on the swab used, the end of the applicator may have to be cut and placed into a screw-capped tube with an O-ring.
3. Repeat this process on different lesions.
4. After specimen collection is completed, all protective materials worn by the specimen collector (gloves, mask, gown, etc.) and all used sample collection materials (alcohol, wipes, holders, etc.) must be placed in red biohazard bags and autoclaved or incinerated prior to disposal. Needles, blades, etc. used to open vesicles should be disposed of in an appropriate sharps container. **Thorough hand-washing using soap** should be done immediately after specimen collection and following removal of personal protective equipment.
5. Other sample types such as serum and whole blood may also be requested.

	FOR SPECIMENS COLLECTED FROM NYC RESIDENTS AND TESTED AT THE NYC PUBLIC HEALTH LABORATORY
Specimen Types	1. Dry Swab ONLY (two for each lesion)
Collection	Two separate dry swabs (either polyester, nylon, or Dacron) should be used to collect infected cells from the base of the open lesion (do NOT use viral transport media). Place each swab in an individual sterile container (conical tube or urine cup).
Storage and transport	Refrigerate (2–8°C) or freeze (-20C or below) specimens within an hour of collection.
Submission information	<p>A <u>New York City Public Health Test Requisition (available upon request)</u> must accompany each sample/collection site.</p> <p>Label all tubes and swab holders with the patient's name, unique identifier, date of collection, source of specimen (vesicle/pustule), collection site, and name of person collecting the specimen.</p>
Shipping Address	Dr. Scott Hughes New York City Public Health Lab Biothreat Response Unit 455 1 st Avenue New York, NY 10016
Questions	Call the NYC Biothreat Response Laboratory at 212-671-5834 (business hours) or Poison Control at 212-764-7667; ask for PHL duty officer (after hours).