Tracking Monkeypox (MPV) in Nebraska

September 1, 2022
<table>
<thead>
<tr>
<th>Structure</th>
<th>RNA</th>
<th>DNA</th>
<th>Virus Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic</td>
<td>No</td>
<td>No</td>
<td>Variola virus 360 nm, HIV-1 120 nm</td>
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<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Herpesvirus 200 nm, SARS 120 nm</td>
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<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Rabies 180×80 nm</td>
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<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Measles 150 nm</td>
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<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Dengue virus, Zika virus 50 nm</td>
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<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Hepatitis C virus 50 nm, Hepatitis B virus 42 nm</td>
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<td>Hepatitis A virus, Poliovirus 30 nm</td>
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<td>Parvovirus 20 nm</td>
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</table>
## Monkeys - Presentation

### Poxvirus Diseases

<table>
<thead>
<tr>
<th>RNA Type</th>
<th>Presence</th>
<th>Genus</th>
</tr>
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<tbody>
<tr>
<td>cubic</td>
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<td>Reoviridae, Caliciviridae, Picornaviridae</td>
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<tr>
<td>spiral</td>
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<td>Flaviridae (Arbovirus), Togaviridae, Coronaviridae, Rhabdoviridae, Paramyxoviridae, Orthomyxoviridae</td>
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<tr>
<td>complex</td>
<td>yes</td>
<td>Arenaviridae, Retroviridae</td>
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</table>

<table>
<thead>
<tr>
<th>DNA Type</th>
<th>Presence</th>
<th>Genus</th>
</tr>
</thead>
<tbody>
<tr>
<td>cubic</td>
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<td>Papilloviridae, Paroviridae, Adenoviridae, Iridoviridae, Herpesviridae</td>
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<tr>
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<td>Hepadnaviridae</td>
</tr>
<tr>
<td>complex</td>
<td>yes</td>
<td>Poxviridae</td>
</tr>
</tbody>
</table>

**Orthopoxviruses**
- Camelpox virus
- Cowpox virus
- Ectromelia virus
- Horsepox virus

**Monkeys - Virus**
- Racoonpox virus
- Skunkpox virus
- Taterapox virus
- Uasin Gishu virus
- Vaccinia virus (smallpox vaccine)
- Variola (smallpox) virus
- Volepox virus

1. Arboviruses = "Arthropod borne virus" (transmitted by biting insects)
Monkeypox - Presentation

Orthopoxviruses
- Camelpox virus
- Cowpox virus
- Ectromelia virus
- Horsepox virus
- **Monkeypox virus**
- Raccoonpox virus
- Skunkpox virus
- Taterapox virus
- Uasin Gishu virus
- Vaccinia virus (smallpox vaccine)
- **Variola (smallpox) virus**
- Volepox virus
## Monkeypox - Presentation

**Map of Monkeypox Cases in the U.S.**

- **New York**: 3,291 cases
- **California**: 3,273 cases
- **Florida**: 1,870 cases
- **Texas**: 1,642 cases
- **Georgia**: 1,387 cases
- **Illinois**: 1,058 cases
- **Pennsylvania**: 531 cases
- **New Jersey**: 512 cases
- **Maryland**: 484 cases
- **District Of Columbia**: 432 cases
- **Washington**: 332 cases
- **Massachusetts**: 325 cases
- **Virginia**: 314 cases
- **Arizona**: 308 cases
- **North Carolina**: 303 cases
People more likely to get monkeypox include:

- People who have been identified by public health officials as a contact of someone with monkeypox
- People who are aware that one of their sexual partners in the past 2 weeks has been diagnosed with monkeypox
- People who had multiple sexual partners in the past 2 weeks in an area with known monkeypox
- People whose jobs may expose them to orthopoxviruses, such as:
  - Laboratory workers who perform testing for orthopoxviruses
  - Laboratory workers who handle cultures or animals with orthopoxviruses
  - Some designated healthcare or public health workers

Close or Intimate Contact

Monkeypox can spread to anyone through close, personal, often skin-to-skin contact, including:

- Direct contact with monkeypox rash, scabs, or body fluids from a person with monkeypox.
- Touching objects, fabrics (clothing, bedding, or towels), and surfaces that have been used by someone with monkeypox.
- Contact with respiratory secretions.
Monkepox and Pregnancy
A pregnant person can spread the virus to their fetus through the placenta.

Infected Animals
It's also possible for people to get monkeypox from infected animals, either by being scratched or bitten by the animal or by preparing or eating meat or using products from an infected animal.

Scientists are Still Researching
- If the virus can be spread when someone has no symptoms
- How often monkeypox is spread through respiratory secretions, or when a person with monkeypox symptoms might be more likely to spread the virus through respiratory secretions.

A person with monkeypox can spread it to others from the time symptoms start until the rash has fully healed and a fresh layer of skin has formed. The illness typically lasts 2–4 weeks.
Monkeypox symptoms

People with monkeypox get a rash that may be located on or near the genitals (penis, testicles, labia, and vagina) (butthole) and could be on other areas like the hands, feet, chest, face, or mouth.

- The rash will go through several stages, including scabs, before healing.
- The rash can initially look like pimples or blisters and may be painful or itchy.

Other symptoms of monkeypox can include:

- Fever
- Chills
- Swollen lymph nodes
- Exhaustion
- Muscle aches and backache
- Headache
- Respiratory symptoms (e.g. sore throat, nasal congestion, or cough)

You may experience all or only a few symptoms

- Sometimes, people have flu-like symptoms before the rash.
- Some people get a rash first, followed by other symptoms.
- Others only experience a rash.
Vaccine protection

The preferred vaccine to protect against monkeypox is JYNNEOS, which is a two-dose vaccine. It takes 14 days after getting the second dose of JYNNEOS for its immune protection to reach its maximum.

The ACAM2000 vaccine may be an alternative to JYNNEOS. ACAM2000 is a single-dose vaccine, and it takes four weeks after vaccination for its immune protection to reach its maximum. However, it has the potential for more side effects and adverse events than JYNNEOS. It is not recommended for people with severely weakened immune systems and several other conditions.

HHS Expands Availability of Monkeypox Vaccine to More Than 1.1 Million Doses

The U.S. Department of Health and Human Services (HHS) today announced plans to allocate an additional 786,000 doses of JYNNEOS vaccine, dramatically increasing the supply of monkeypox vaccine doses to states and jurisdictions. The additional vaccine allocation adds to the more than 340,000 doses of JYNNEOS vaccine that have already been delivered to jurisdictions. JYNNEOS vaccine is manufactured by Bavarian Nordic and approved by the Food and Drug Administration to prevent smallpox and monkeypox.
Cleaning & Disinfection

- **Clean and disinfect** the areas where people with monkeypox spent time—Avoid activities that could spread dried material from lesions (e.g., use of fans, dry dusting, sweeping, or vacuuming) in these areas. Perform disinfection using an EPA-registered disinfectant with an Emerging Viral Pathogens claim, which may be found on EPA’s List Q. Follow the manufacturer’s directions for concentration, contact time, and care and handling. Linens can be laundered using regular detergent and warm water. Soiled laundry should be gently and promptly contained in a laundry bag and never be shaken or handled in a manner that may disperse infectious material. Covering mattresses in isolation areas (e.g. with sheets, blankets, or a plastic cover) can facilitate easier laundering.
Personal Protection

- **Provide appropriate personal protective equipment (PPE) for staff, volunteers, and residents**—Employers are responsible for ensuring that workers are protected from exposure to *Monkeypox virus* and that workers are not exposed to harmful levels of chemicals used for cleaning and disinfection. PPE should be worn by staff, volunteers, or residents in these circumstances:
  - **Entering isolation areas**—Staff who enter isolation areas should wear a gown, gloves, eye protection, and a NIOSH-approved particulate respirator equipped with N95 filters or higher.
  - **Laundry**—When handling dirty laundry from people with known or suspected monkeypox infection, staff, volunteers, or residents should wear a gown, gloves, eye protection, and a well-fitting mask or respirator. PPE is not necessary after the wash cycle is completed.
  - **Cleaning and disinfection**—Staff, volunteers, or residents should wear a gown, gloves, eye protection, and a well-fitting mask or respirator when cleaning areas where people with monkeypox spent time.
Tracking Monkeypox (MPV) in Nebraska
Mark Rupp, M.D.

September 1, 2022
Timeline

• Worldwide outbreak noted late Spring 2022
• 1st case in United States: May 18, 2022
• 1st case in Nebraska: June 27, 2022 (total cases 26 (8/29/22))
• White House monkeypox vaccine plan (June 28, 2022)
• WHO: Public Health Emergency of International Concern (July 23, 2022)
• US declares Public health Emergency (August 4, 2022)
• JYNNEOS vaccine approved 2019; Intradermal dose approved: Aug 9, 2022
UNMC/Nebraska Medicine Response

- Dissemination of information to public and providers
  - NETEC
  - UNMC/NM
  - NE ICAP
- Testing
- Treatment
- Prevention/Vaccination

- Next steps and future look
National Emerging Special Pathogen Training and Education Center (NETEC): UNMC/Emory/Bellevue

https://repository.netecweb.org/exhibits/show/monkeypox/monkeypox
How does monkeypox spread? 9 common questions and how to protect yourself

Published August 3, 2022

https://www.nebraskamed.com/infectious-diseases/monkeypox
UNMC/Nebraska Medicine Provider Resources

https://now.nebraskamed.com/infectious-diseases-protocols/
NE ICAP Resources

Monkeypox Resources and Updates

You can find resources, information and updates on the ongoing 2022 Monkeypox outbreak. Click on the dropdown menu below to show the most up-to-date resources from different organizations.

Monkeypox Resources

- Monkeypox Testing and Transport
- HAN Advisories
- CDC/WHO
- FDA
- Healthcare Resources

https://icap.nebraskamed.com/monkeypox-resources-and-updates/
Advice to Public - What to do if you have monkeypox

• Most persons recover fully in 2-4 weeks without need for medical treatment
• Persons at high risk (e.g. children, pregnant women, immunosuppressed, genital or rectal lesions) may need treatment.
• Isolate until skin lesions have healed and new layer of skin has formed (https://www.cdc.gov/poxvirus/monkeypox/if-sick/preventing-spread.html)
• Keep rash/lesions covered; do not shave area with rash; do not touch or scratch lesions
• Wash hands frequently; wear a well-fitting mask if around other people
• Tylenol or Motrin for pain; salt-water rinse for oral lesions or “magic mouthwash”
• Notify close contacts so they can monitor, test, and vaccinate (https://www.cdc.gov/poxvirus/monkeypox/if-sick/notifying-close-contacts.html)
• Disinfect surfaces with EPA-registered disinfectant (https://www.epa.gov/pesticide-registration/disinfectants-emerging-viral-pathogens-evps-list-q)
Testing

- **Low threshold** to test those persons with rash and risk factors
- Tests employ nucleic acid amplification (NAAT) to detect the DNA of the virus
- Specimens can be tested via Nebraska Public Health Lab: [https://www.nphl.org/](https://www.nphl.org/) and can be ordered via NUlirt [https://www.nphl.org/documents/Outbreak%20ordering%20quickstart.pdf](https://www.nphl.org/documents/Outbreak%20ordering%20quickstart.pdf)
- Specimens can also be tested at commercial labs: ARUP, Mayo, Quest, etc.
- UNMC/NM is developing FDA-approved in-house assay to improve speed and convenience of testing (same-day results)

[https://netec.org/2022/07/26/how-to-collect-a-monkeypox-specimen-for-diagnostic-testing/](https://netec.org/2022/07/26/how-to-collect-a-monkeypox-specimen-for-diagnostic-testing/)
Treatment

• Symptomatic/supportive care; No specific monkeypox treatment

• Tecovirimat (TPOXX)
  • Approved for smallpox Rx (via animal rule). Available via CDC EA-IND for monkeypox. (https://www.cdc.gov/poxvirus/monkeypox/clinicians/Tecovirimat.html)
  • Recommended for those with severe illness, high risk conditions, or lesions in highly sensitive locations
  • Antiviral medication that inhibits envelop wrapping protein P37
  • Oral or IV x 14 days. Take with high fat meal. Several clinical trials via NIH, ACTG, WHO in progress. UNMC/NM Specialty Care Clinic is site for ACTG trial.
  • Limited clinical data – small series indicate clinical response; main side effects: nausea, headache, fatigue
  • Other alternatives: Vaccina IGIV, Cidofovir, Brincidofovir
Vaccination

- Routine smallpox vaccination in US was halted in 1972
- ACAM2000 – live Vaccinia virus, can spread to other sites or to other people, myocarditis/pericarditis 1:175, 200M doses in national stockpile in case of smallpox outbreak
- JYNNEOS
  - Live virus, non-replicating (cannot spread to other sites or other people)
  - 2-doses - 4 weeks apart; 85% effective in studies in Africa
  - 1.1M vials available, 5.5 M vials on order
  - Approval for intradermal administration (5 doses per vial vs 1 dose
  - Post-exposure prophylaxis: Best if within 4 days of exposure
  - Pre-exposure prophylaxis: DoCo Health Dept:
    - 8/29/2022: 1281 vials have been shipped to NE
Public Health Messaging & Communication – Critical!
Target higher risk groups without stigmatization

Gay, bisexual, and other men who have sex with men are taking steps to protect themselves and their partners from monkeypox.

MMWR Morb Mortal Wkly Rep. ePub: 26 August 2022. DOI: [http://dx.doi.org/10.15585/mmwr.mm7135e1](http://dx.doi.org/10.15585/mmwr.mm7135e1).
Public Health & Infectious Diseases Specialists Workforce

• The COVID-19 pandemic with the resultant increased workload, stress, and politicization of public health has resulted in widespread “burnout” of the workforce and a system that is overly taxed and poorly resilient.

• 56% of public health workers report at least one symptom of PTSD

• 51% of ID specialists are “burned-out”


Can we gain control of Monkeypox Outbreak – Yes! Will it be easy – No!

• Disease appears to be primarily spread via close/intimate contact – less risk of airborne or respiratory droplet spread; largely contained to high-risk group (at present)
• Persons who recover have lifelong immunity
• There is an effective vaccine
• There is effective treatment

• Caution....
• Stigmatization will drive outbreak underground
• Virus does not recognize borders – not a “gay-disease” or “African disease”
• May become endemic in wild rodents
• Likely to become low level endemic illness in US
Monkeypox - Presentation

Health Security

Special Pathogens Readiness in the United States: From Ebola to COVID-19 and Beyond
Special Pathogens Laboratories in the United States
Contributions to the US COVID-19 Pandemic Response
Plan-De-Scale-Defend Approach to the COVID-19 Pandemic
Lessons from Conducting a Pandemic Clinical Trial
US Hospital Response to COVID-19
National Special Pathogens Section of Care
Opportunity during Disease
Safety Officer Program for COVID-19 Clinical Care
Rapid Response Single ERD Model
Avoiding Cold-Consistent Case Surveillance Collaboration
Global High-End Laboratory Collaboration
Innovation in Facility Management
EMS Agenda 2026 Meets the COVID-19 Pandemic
Maintaining Standards of Care

NEBRASKA
Good Life. Great Mission.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

https://dhhs.ne.gov/Pages/Monkeypox.aspx
https://www.cdc.gov/poxvirus/monkeypox/index.html
https://www.unmc.edu/healthsecurity/index.html