Mpox

presented by:

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AGENDA

- Terminology.
- Virology.
- Transmission.
- Epidemiological outbreak of disease.
- Clinical presentation.
- Evaluation and diagnosis.
- Differential Diagnosis.
- Management.
- Prevention.

Terminology

- **In November 2022, the World Health Organization changed the name of the disease referred to as "monkeypox" to "mpox" to follow current best practices of not naming diseases after animals or geographic locations and to reduce any stigma that could be associated with the original name.**

World Health Organization. WHO recommends new name for monkeypox disease. https://www.who.int/news/item/28-11-2022-who-recommends-new-name-for-monkeypox-disease (Accessed on December 06, 2022).

Virology

- **Mpox is an infectious viral zoonotic disease caused by the monkeypox virus (MPXV) of the *Orthopoxvirus* genus in the *Poxviridae* family, which includes variola (smallpox), cowpox and other viruses.**

Transmission

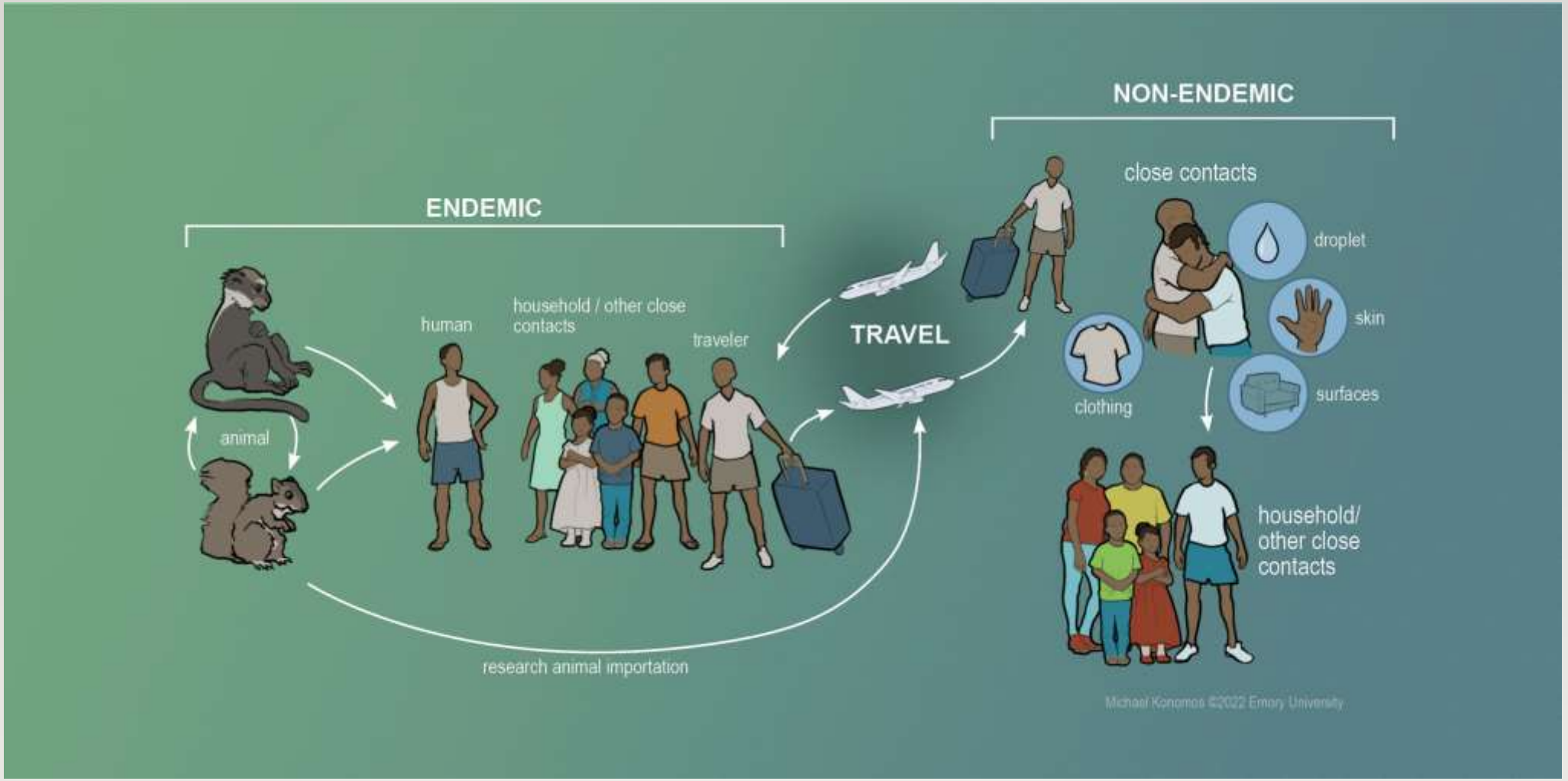
Animal-to-human transmission

- Through **bite or scratch**, **direct or indirect contact** with body fluids, or **cutaneous or mucosal lesion material** of infected animals (giant poached rats, rope squirrels, and monkeys).
- **Eating** inadequately cooked meat of infected animals is a possible risk factor.

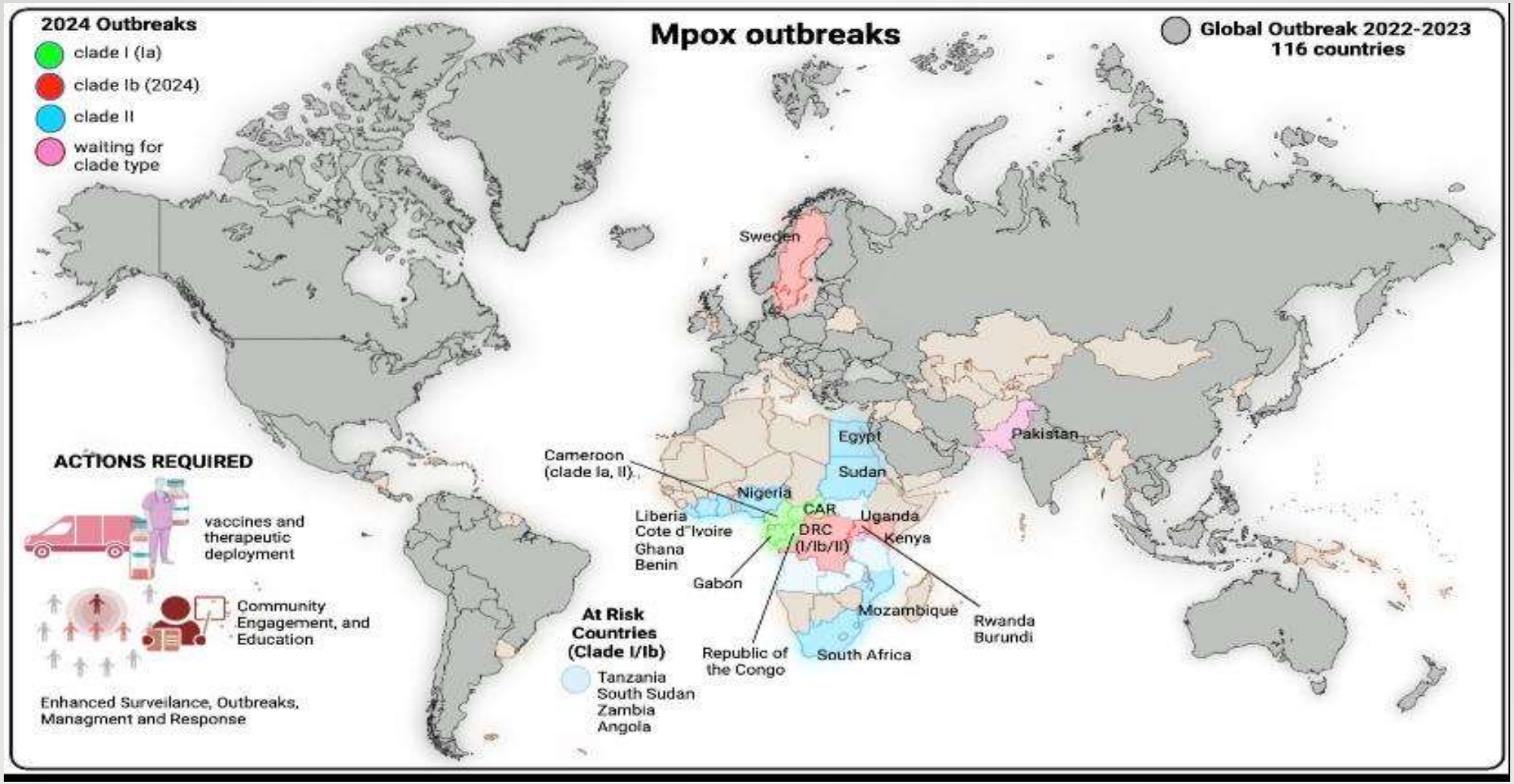
United States Centers for Disease Control and Prevention. Monkeypox: transmission.(Accessed on June 03, 2022).

Human-to-human transmission

Human-to-human transmission results from close contact with infected respiratory droplets, skin lesions or contaminated objects.


NON-ENDEMIC
close contacts
droplet
skin
surfaces
clothing
ENDEMIC
human
household / other close contacts
traveler
TRAVEL
animal
household/ other close contacts
research animal importation
Michael Konomos ©2022 Emory University

Epidemiology



Cohen J (3 August 2024). "Deadlier strain of mpox spreads to multiple African countries".

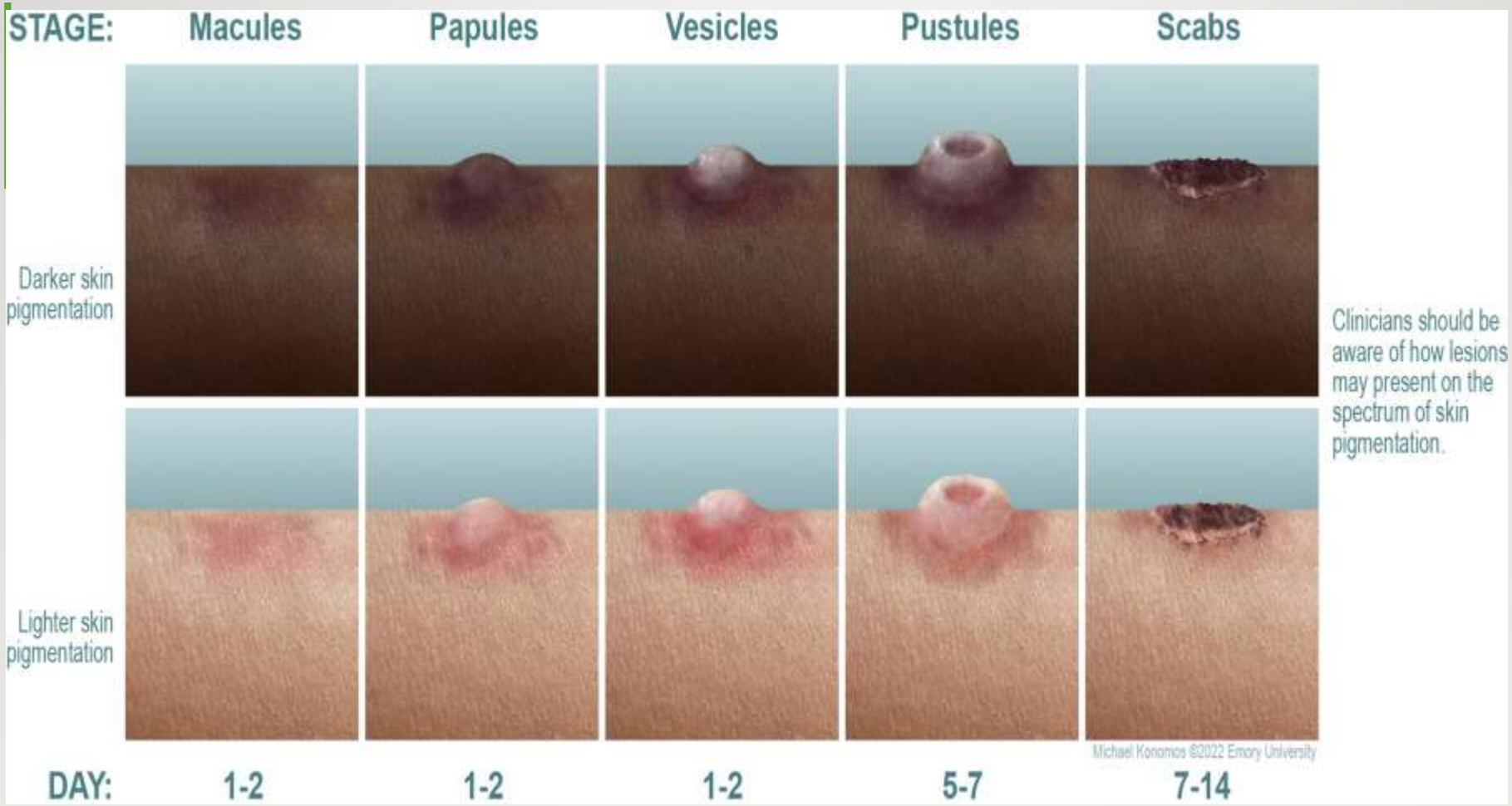
Clinical presentation

- **Incubation period** of mpox virus infection is usually from 5 to 21days.
- patients have typically presented with **systemic symptoms** last one to five days characterized by fever 85 to 90 percent of cases, headache in 80 percent, sore throat, back pain, myalgia in 65 to 85 percent, fatigue and lymphadenopathy in 70 to 100 percent followed by development of a **characteristic rash**.

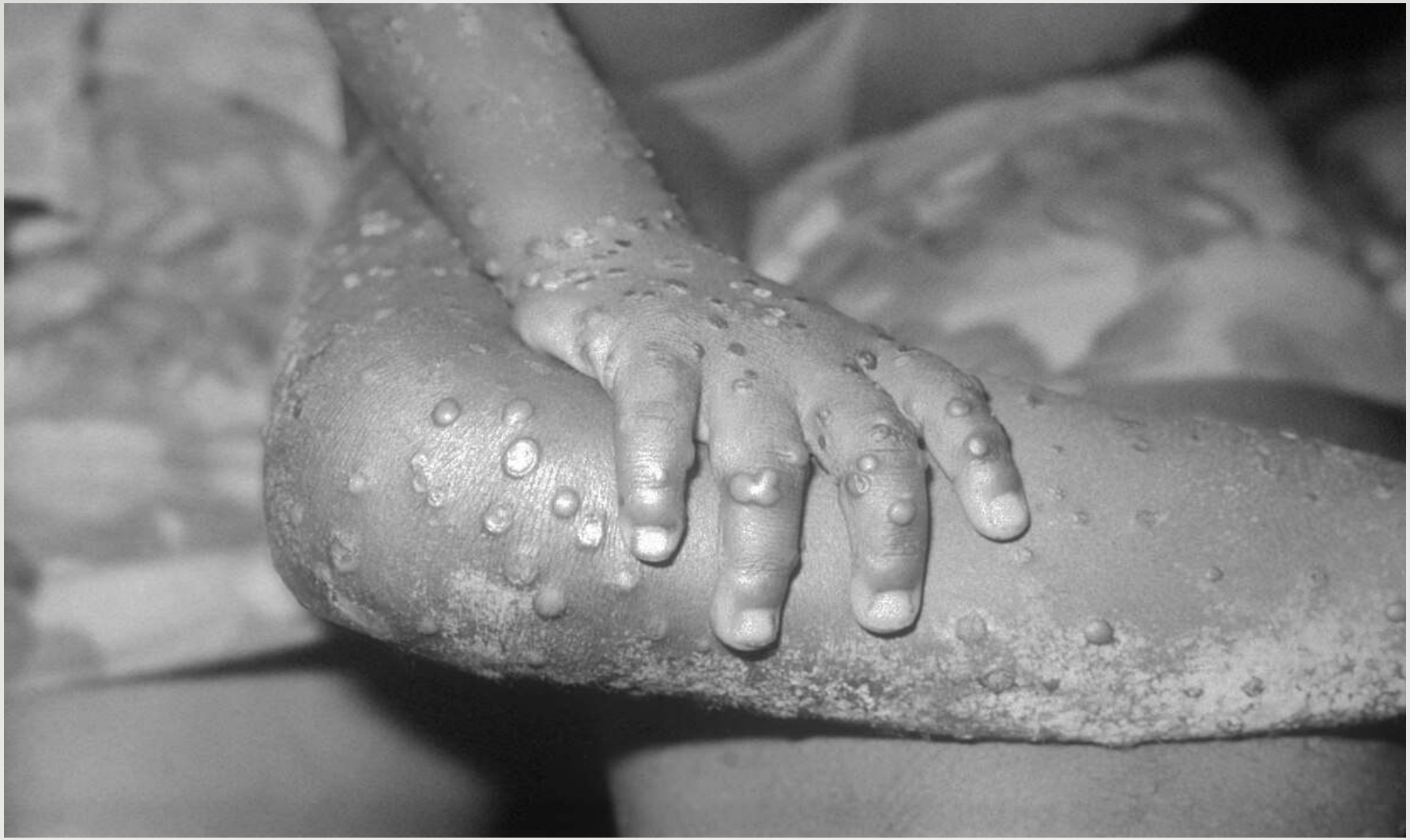
Mpox. U.S. Centers for Disease Control and Prevention (CDC). 15 March 2024. Archived from the original on 2 April 2024. Retrieved 22 August 2024.

❑ Rash

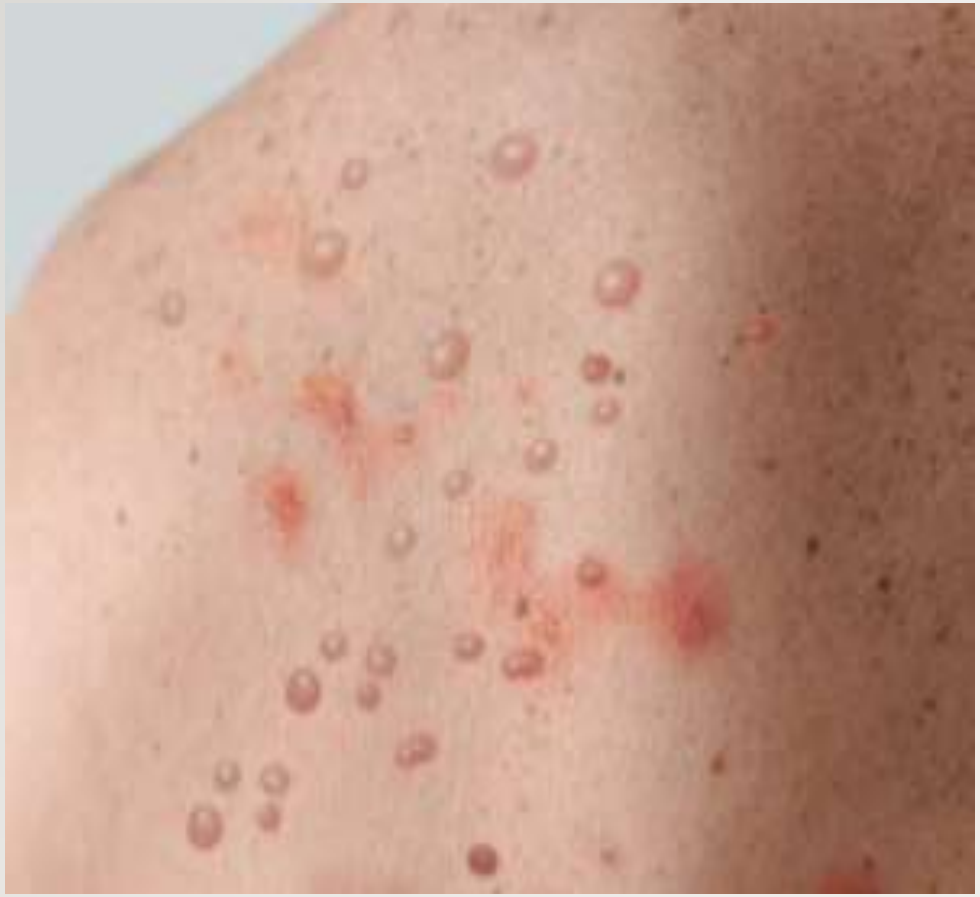
- Usually begins within 1-3 days of the appearance of fever.
- The rash evolves through the following stages sequentially from **macules** (lesions with a flat base) to **papules** (slightlyraised firm lesions), **vesicles** (lesions filled with clear fluid), **pustules** (lesions filled with yellowish fluid), and **crusts** whichdry up and fall off.
- Rash often starts in mucosal areas (genital, perianal, oral mucosa) .
- The lesions typically begin to develop simultaneously and evolve together.
- The rash associated with mpox is often described as painful, but in the healing phase (crusts), it can become itchy.
- Patients are infectious from the time symptoms start (presumed to include prodromal symptoms before the appearance of the rash) until the lesions scab and fall off, with a new layer of skin being formed.

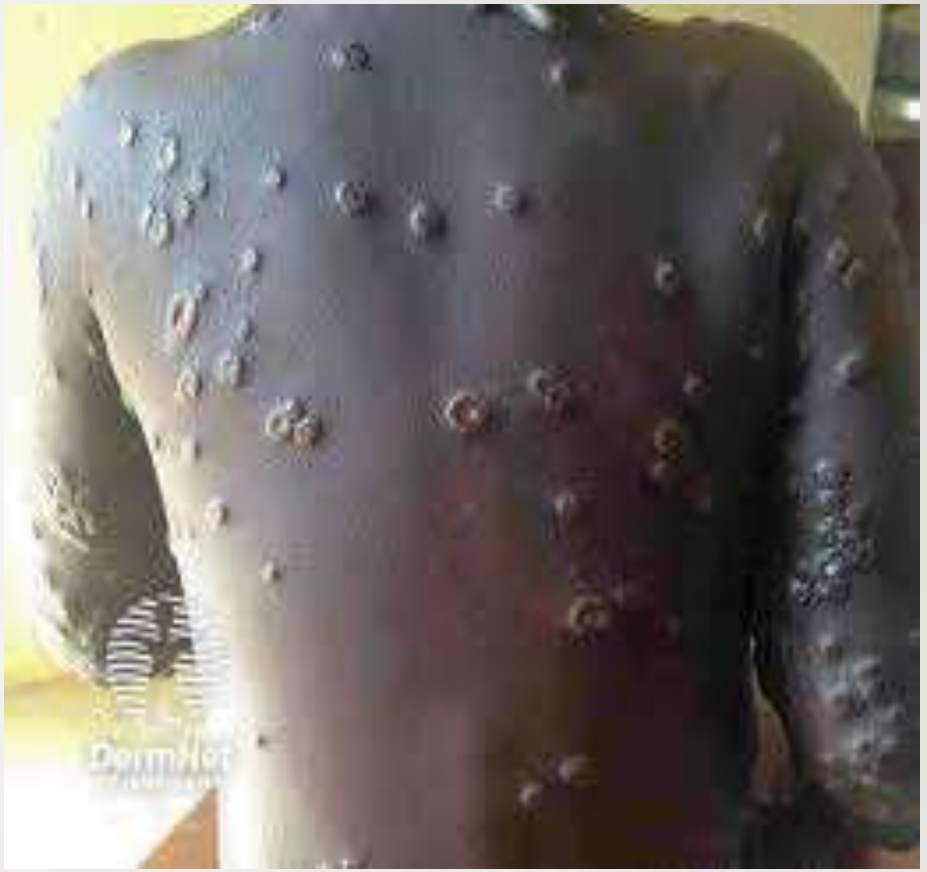


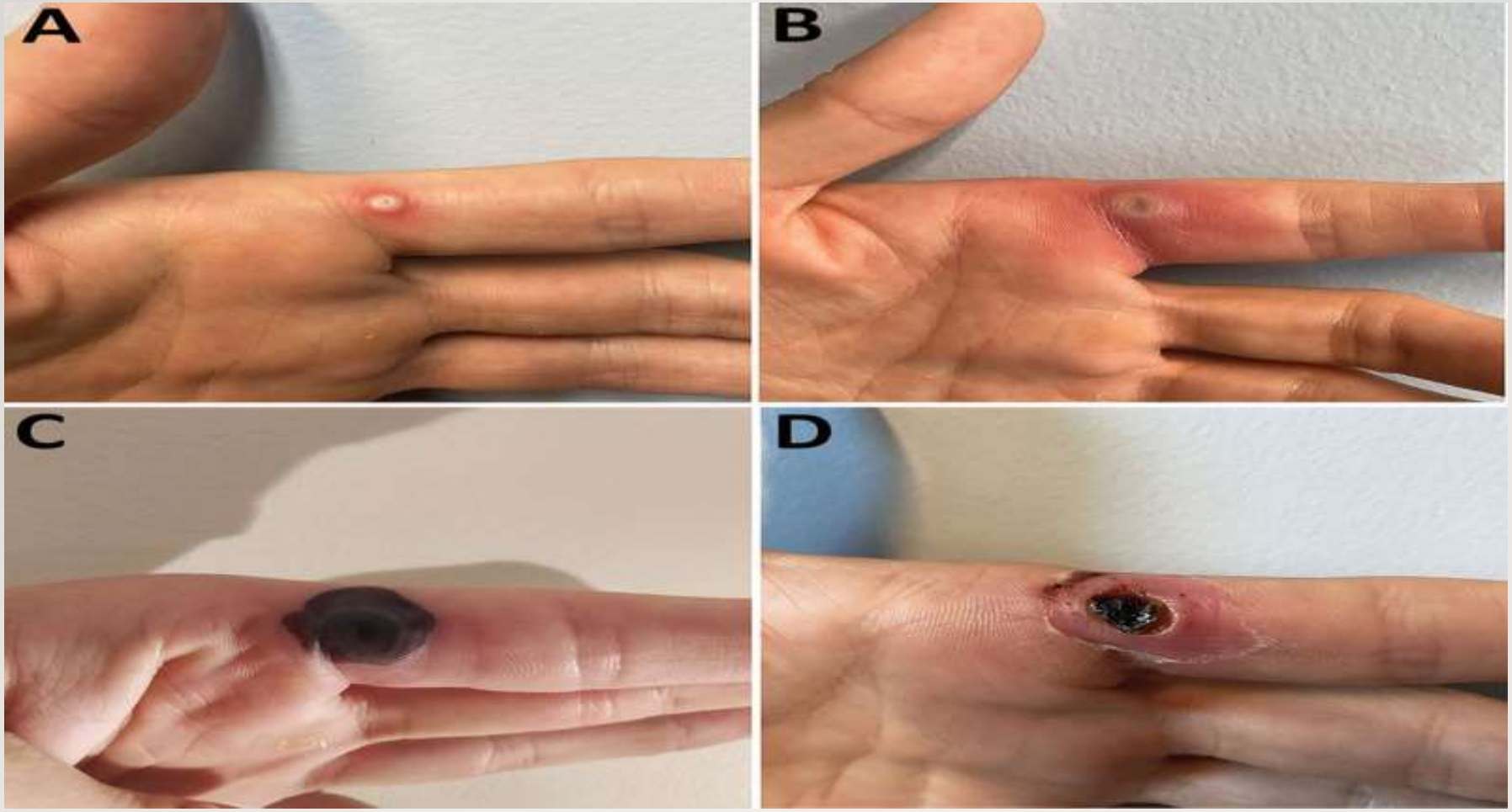
Stages of skin presentation and progression of monkeypox rash.



Mpox rash on arm and leg of a four-year-old







Progression of necrotic mpox lesion after needlestick injury from a pustule

EVALUATION AND DIAGNOSIS

Clinical criteria:

Unexplained rash* (macular, popular, vesicular, pustular) **AND** one or more of the following:

1. high-grade fever (>38.2°C)
2. lymphadenopathy
3. intense headache
4. back pain/myalgia
5. intense asthenia (fatigue and lack of energy)

***Unexplained rash** is a rash for which the following common causes of acute rash do not explain the clinical picture: drug eruption, food allergy, varicella-zoster, herpes zoster, measles, herpes simplex, bacterial skin infections, primary or secondary syphilis; and any other locally relevant common causes of popular or vesicular rash.

Suspected Case is defined as:

An acute illness with fever >38.3°C **Or** unexplained rash **AND** two or more other signs or symptoms include (intense headache, lymphadenopathy, back pain, myalgia and intense asthenia)

Probable Case is defined as:

A case that meets the clinical case definition, is not laboratory confirmed but has an epidemiological link to a confirmed or probable case.

Confirmed Case is defined as:

A person who meets the suspected or probable case definition with laboratory confirmation (monkeypox PCR positive OR Isolation of monkeypox virus in culture)

تعريف الحالة لمرض جدري القردة

الحالة المشتبهة

أى شخص فى أي عمر ولديه طفح جلدى غير معروف السبب مثل (جديرى مائى – الهربس - الحزام النارى - عدوى الجلد البكتيرية – الطفح المصاحب لمرض السيلان –.....)

مع وجود **واحد أو أكثر** من الأعراض التالية:

- ارتفاع فى درجة الحرارة ≥ ٣٨,٥°
- تورم فى الغدد الليمفاوية
- صداع
- آلام بالجسم أو العضلات
- آلام بالظهر
- ضعف عام

تعريف الحالة لمرض جدري القردة

الحالة المحتملة

شخص ينطبق عليه تعريف الحالة المشتبهة **مع وجود واحد أو أكثر** من الآتى :

- إرتباط وبائى مباشر مع حالة مؤكدة فى خلال **٢١ يوم** قبل بداية الأعراض
- وجود تاريخ سفر لدولة موبوءة بجدرى القردة خلال **٢١ يوم** قبل ظهور الأعراض
- كان لديه تاريخ مخالطة جنسية متعددة (معروفة أو مجهولة) في **٢١ يومًا** قبل ظهور الأعراض
- اكتشاف الاجسام المضادة IgM لفيروس الاورثوبوكس خلال **٤ -٥٦ يوم** بعد ظهور الطفح الجلدى

تعريف الحالة لمرض جدري القردة

الحالة المؤكدة

هى الحالة المشتبهة أو المحتملة وتم تأكيدها معمليًا لفيروس جدري القردة من خلال اختبار

- (RT-PCR)
- أو **عمل مزرعة فيروسية** من عينة من الاصابات الجلدية (مثل الحويصلات ،...).

Laboratory diagnosis

Confirmatory

Monkeypox can be confirmed in the laboratory

Best specimens

The best specimens are from lesions (fluid, roof and crust)

Best lab test

The virus can be best identified with nucleic acid tests by PCR. Antigen and antibody detection methods are not specific

Sample handling

Specimens from persons and animals should be handled by trained staff, wearing personal protective equipment and working in suitably equipped laboratories.

- PCR testing of samples from skin lesions is the preferred laboratory test for mpox laboratory diagnosis.
- Polymerase chain reaction (PCR) testing should be performed on specimens taken directly from the rash – skin, fluid or crusts collected by vigorous swabbing. In the absence of skin lesions, testing can be done using swabs throat or anus. Testing blood is not recommended .
- If there are multiple lesions, a few of them can be sampled (using separate swabs). It is recommended to take two swabs from each specimen.
- Serum levels of antiorthopoxvirus IgM and IgG antibodies were detected five and eight days after onset of rash, respectively .
- People presenting higher IgM and IgG levels have shown faster viral clearance and more rapid clinical resolution.

- Orthopoxvirus can also be identified through **electron microscopy**, in which characteristic brick-shaped poxvirus virions can be seen.
- **Histopathologic analysis** may demonstrate ballooning degeneration of keratinocytes, prominent spongiosis, dermal edema, and acute inflammation; however, these findings can also be seen in other viral infections

Differential Diagnosis

Mpox can resemble other infectious illnesses with fever and rash such as:

- Varicella (chickenpox).
- Smallpox (now eradicated).
- Measles.
- Rubella.

Other conditions to ruled out:

- Bacterial skin infections, scabies, syphilis and medication allergies.

National Monkeypox (mpox) Public Health Response Guidelines, - Nigeria Centre for Disease Control (2019).

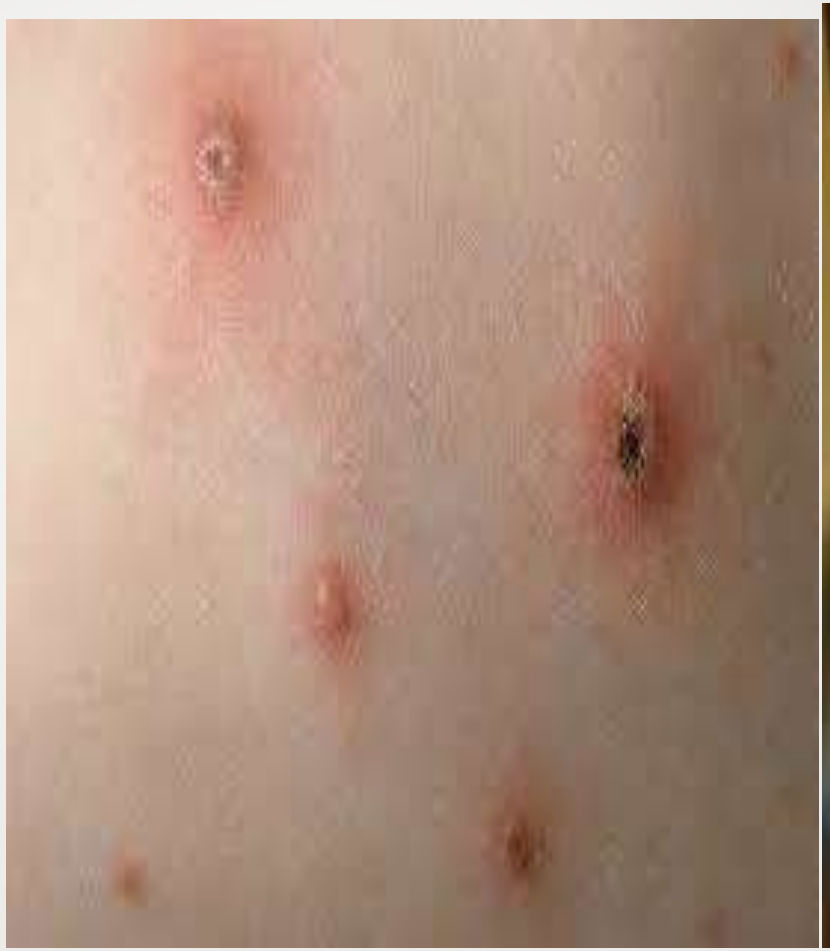
Clinical features

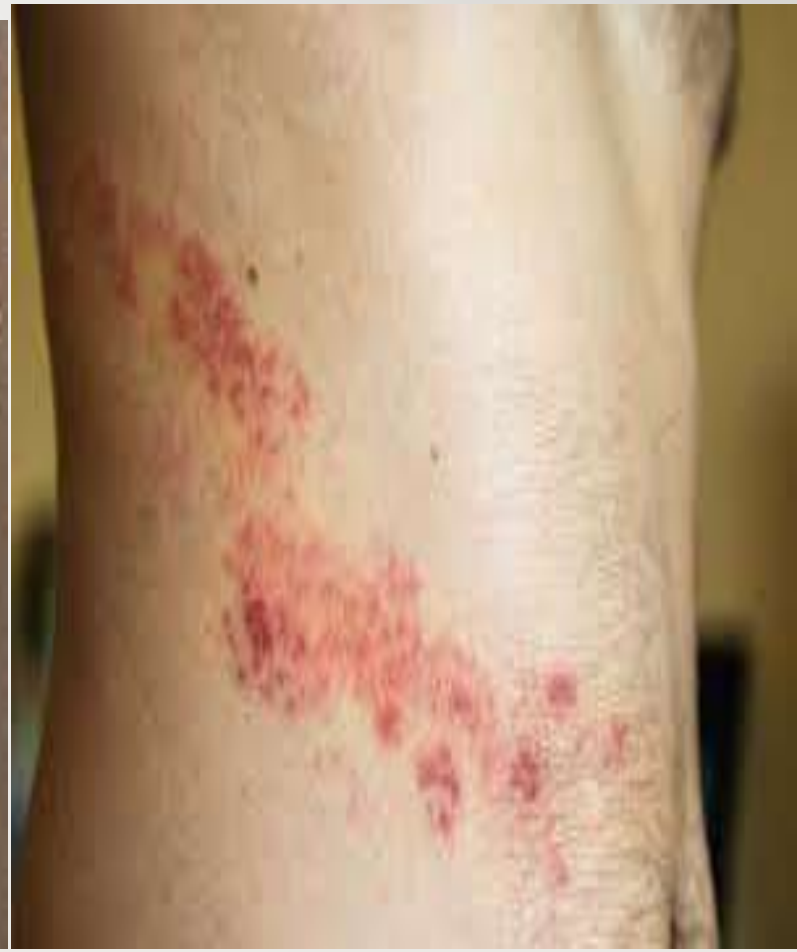
Symptoms	Monkeypox	Chickenpox	Measles
Fever	Fever > 38 °C Rash after 1-3 days	Fever to 39 °C Rash after 0-2 days	High fever to 40.5 °C, Rash after 2-4 days
Rash appearance	Macules, papules, vesicles, pustules present at the same stage on any area	Macules, papules, vesicles, present in several stages	Non-vesicular rash in different stages
Rash development	Slow, 3-4 weeks	Rapid, appear in crops over several days	Rapid, 5-7 days
Rash distribution	Starts on head; more dense on face and limbs; appears on palms and soles	Starts on head; more dense on body; absent on palms and soles	Starts on head and spreads; may reach hands and feet
Classic feature	Lymphadenopathy	Itchy rash	Koplik spots
Death	Up to 11%	Rare	Varies widely

Sklenovská, N., & Van Ranst, M. (2018). Emergence of monkeypox as the most important orthopoxvirus infection in humans. *Frontiers in public health*, *6*, 383729.

Chickenpox

Shingles (Herpes Zoster)





Management

Supportive care

Most immunocompetent patients with mpox have mild disease and will recover without medical intervention .However, maintenance of adequate fluid balance required (because of the possibility of increased insensible fluid losses from the skin, decreased oral intake, and vomiting or diarrhea).Also hemodynamic support, supplemental oxygen or other respiratory support and some patients may require pain relief medication (eg, for pain related to proctitis or tonsillitis). Also hospitalization may be warranted for those who have or are at risk for dehydration (eg, nausea, vomiting, dysphagia, sever tonsillitis), those who require more intensive pain management, and those experiencing severe disease or complications.

Reynolds, M. G., McCollum, A. M., Nguete, B., Shongo Lushima, R., & Petersen, B. W. (2017). Improving the care and treatment of monkeypox patients in low-resource settings: applying evidence from contemporary biomedical and smallpox biodefense research. *Viruses*, *9*(12), 380.

At the present time, there are no (FDA)-approved treatments specifically for mpox. However, there are antiviral agents that have activity against *MPXV* including tecovirimat ,cidofovir and brincidofovir (a lipid-conjugate prodrug of cidofovir). In addition to antiviral agents, vaccinia immune globulin intravenous (VIGIV) has been previously approved by the FDA for treatment of complications due to vaccinia vaccination.

Adalja, A., & Inglesby, T. (2022). A novel international monkeypox outbreak. *Annals of internal medicine*, *175*(8), 1175-1176.

Antiviral therapy

Indications — for the following groups :

- Patients who are severely immunocompromised.
- Patients with active skin conditions placing them at higher risk for disseminated infection.
- Persons who are pregnant or lactating patients, regardless of illness severity or underlying comorbidities at presentation.
- Persons <18 years of age, regardless of illness severity or underlying comorbidities at presentation.
- Patients with protracted or life-threatening manifestations of mpox, including ocular disease.

Tempestilli, M., Mondi, A., D'Avolio, A., Forini, O., Pinnetti, C., Mazzotta, V., ... & Antinori, A. (2024). Pharmacokinetics of tecovirimat in subjects with Mpox. *International Journal of Antimicrobial Agents*, *63*(2), 107068.

Management of complications

- **Bacterial superinfection** the patient should receive appropriate antibiotic coverage in addition to antiviral therapy; regimens should generally include agents that are used to treat soft tissue infections (eg, those that cover both staphylococcal and streptococcal species).

- Surgical debridement of **infected wounds**.

- Use of corticosteroids in persons with **neurologic manifestations**, such as encephalitis, edema or demyelination.

- If mpox lesions involve the **eye** trifluridine (or vidarabine) eye drops or ointments should be applied every four hours for 7 to 10 days in addition to tecovirimat.

Prevention

- **Avoid close contact** with people who have a rash that looks like mpox.
- **Avoid handling** clothes, sheets, blankets or other materials that have been in contact with an infected animal or person.
- **Isolate** people who have mpox from healthy people.
- **Wash** your hands well with soap and water after any contact with an infected person or animal. If soap and water aren't available, use an alcohol-based hand sanitizer.
- Using personal protective equipment **(PPE)** when caring for people infected with the virus.
- **Avoid animals** that may carry the virus.
- Thoroughly **cooking** all foods that contain animal meat or parts.
- **Some smallpox vaccines** can prevent mpox, including the **ACAM2000** and **Jynneos vaccines**.

European Center for Disease Control : monkeypox outbreak epidemiological-update. Accessed 31 May 2022.

- **Before 2019**, **ACAM2000** was the only OPXV vaccine available in the United States. made from a live, replication-competent Vaccinia virus, a member of the OPXV genus. There is a risk for serious adverse events associated with its use (progressive vaccinia , eczema vaccinatum and myopericarditis).

- By contrast, **Jynneos** (also known as Imvamune and Imvanex) is a non replicating modified *Vaccinia Ankara* virus vaccine. It was licensed for both prevention of mpox and smallpox in the United States in 2019. Jynneos is considered safer for use in immunocompromised individuals.

As of **August 2024** there are **4 vaccines** in use to prevent mpox. All were originally developed to combat smallpox:

- ✓**MVA-BN** (**Jynneos**, Imvamune or Imvanex) for use against mpox in Europe, United States and Canada.
- ✓**LC16** from (Japan) licensed for use in Japan.
- ✓**OrthopoxVac** licensed for use in Russia.
- ✓**ACAM2000** available for use against mpox in the United States.

The CDC doesn't recommend that everyone get vaccinated against mpox at this time

Indications and Usage of Vaccine:

- **Pre-exposure prophylaxis**

for people at high risk of mpox (laboratory workers that handle mpox-contaminated specimens in laboratories dedicated for mpox diagnosis or healthcare personnel who deal with mpox cases for performing diagnostic testing).

Post-exposure prophylaxis (PEP) – for close contact with a confirmed case

- ✓ **For the public :** The vaccine is given to anyone who has been exposed to high-risk direct contact of a confirmed including contact with skin lesions, exposure to body fluids and sexual intercourse.
- ✓ **For healthcare workers** : The vaccine is given to anyone exposed to medium or high-risk unprotected contact of a confirmed or probable case .

• The vaccine should be given as soon as possible (within four days of exposure). It may reduce symptoms of the disease when administered within 4 to 14 days of exposure, but it may not prevent it.

Vaccine Adverse Reactions

- The most common side effects after JYNNEOS vaccination are **pain**, **redness**, and **itching** at the spot where the vaccine is given. You might also experience **fever, headache, tiredness, nausea, chills, and muscle aches**.
- When JYNNEOS vaccine is given intradermally, some people have reported less pain after vaccination but more side effects like itching, swelling, redness, thickening of the skin and skin discoloration at the spot where the vaccine was given.

Contraindications

- Vaccine should not be given to individuals who are known to have a severe (life-threatening) allergic reaction to a previous dose of JYNNEOS.

Precautions

- History of a severe allergic reaction to gentamicin, ciprofloxacin, chicken, or egg protein
- If an individual is suffering from a severe acute systemic illness, immunization may be postponed until they have fully recovered.


Thank
you