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# A COMPREHENSIVE REVIEW OF MONKEYPOX VIRUS TRANSMISSION, CLINICAL FEATURES, AND PREVENTION

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## ABSTRACT

In may 2022, the world witnessed the re- emergence of the epidemic disease monkeypox. While this was not the first epidemic of this disease, what differentiated the outbreak was the rapid global spread and increase of cases, which led the WHO to declare monkeypox a global health emergency. This paper aims to conduct an in- depth review of the historical epidemiology, transmission, virology, clinical feature and prevention, diagnosis of the monkeypox disease.

**KEYWORDS:** Human monkeypox, Zoonotic disease, small pox vaccine, Endemic disease.

## 1. INTRODUCTION

On may 7, 2022, the United Kingdom (UK) reported it' first case of monkeypox (now referred to as MPOX) in a traveler returning from Nigeria although on outbreak had been ongoing in Nigeria and other African countries since 2017, the disease appeared to remain confined to previously endemic region. HIV/ AIDS is one of the most devastating pandemic in history, with an estimated 35 millions deaths worldwide. The Retroviridae family predominantly targets the immune system, exacerbating vulnerability to secondary infections and illnesses.

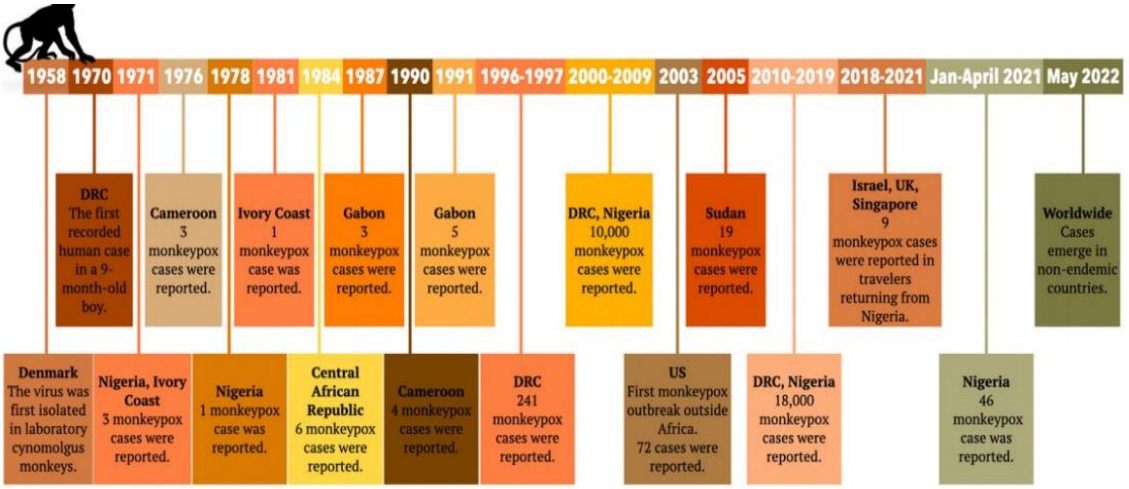


**Figure 1: Time line of monkeypox.**

## 2. HISTORY

Monkeypox was first identified in 1948 in a colony of monkeys in Copenhagen, Denmark. Since then, it was largely been overlooked by the Western world. The virus was first detected in human in the 1970 in West and central Africa, around the time smallpox had been eradicated in these regions. The disease was initially described by von Magnus and was later observed in other captive animals, including primates in zoos and animals, in import facilities. It gained particular attention in 1970 when smallpox surveillance efforts in Africa uncovered cases of human monkeypox, which were clinically in distinguishable from smallpox especially in the congo.

## 3. EPIDEMIOLOGY

The monkeypox virus (MPOX) is a neglected tropical pathogen endemic to various region of Sab- Saharan Africa, with a documented history of infecting humans over the years, numerous confirmed cases of human monkeypox have been reported in Nigeria's, including 10 cases recorded between 1971 as 1978 as of 2022.

The Democratic Republic of Congo (DRC) is the African country most affected by MPXV, followed by Nigeria. MPXV re-emerged in Nigeria on September 22, 2017, after a 40-year hiatus. By the end of 2018, the country reported 311 suspected cases and 181 confirmed or probable cases. Since then, several cases of travel-associated monkeypox have been documented in various countries, including Israel (one case in 2018), the United Kingdom (two cases in 2018 and one in 2019), and Singapore (one case in 2019), all linked to exposures in Nigeria.

## 4. TRANSMISSION

Though the exact mode of MPXV transmission is still uncertain, studies suggest that transmission can occur by three possible means: animal to human, human to human, and from the contaminated environment to human.

- ***Animal to human***

Animal-to-human transmission, also known as zoonotic transmission, occurs through direct contact with infected animals' blood, respiratory droplets, lesion material, and body fluids; inoculation from infected animals' mucocutaneous lesions, particularly when the skin barrier is lost due to scratches, bites, or other trauma; or during handling of infected monkeys, including hunting, skinning, trapping, cooking, and playing with carcasses. Ingestion of inadequately cooked meat from infected animals or nonhuman primates, such as Gambian giant squirrels, terrestrial rodents, rats, rabbits, dormice, porcupines, antelopes and gazelles, and tree squirrels, can also result in transmission.

- ***Human to animal***

A members from Paris, France, who were infected recent publication in the Lancet describes some convincing evidence of human-to-canine transmission of MPXV. The Italian greyhound, who otherwise appeared to be in good health, had frequent and close contact with the two household with MPX, and even shared a bed with them.

- **Human-to-human**

Monkeypox virus primarily occurs through close contact with an infected individual. The key modes of transmission include:

- **Direct Contact:** Extended physical interaction with the skin lesions, scabs, or bodily fluids (such as saliva or respiratory secretions) of an infected person can lead to infection.
- **Respiratory Droplets:** Transmission can occur through respiratory droplets during close, face-to-face interactions, although prolonged exposure is generally necessary.
- **Fomites:** Items contaminated by an infected person, such as clothing, bedding, or towels, can serve as a source of infection.
- **Vertical Transmission:** Pregnant individuals may transmit the virus to their fetus through the placenta.

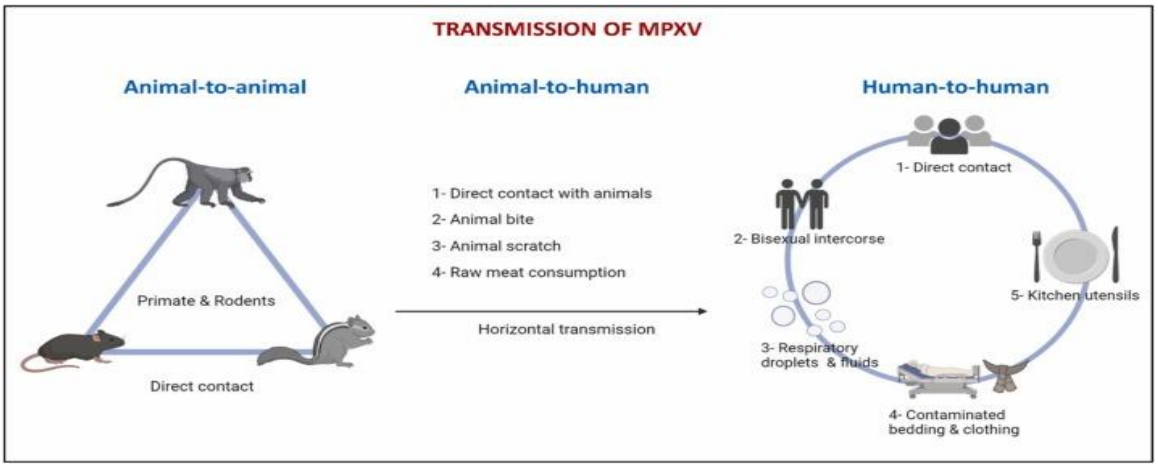


**Figure 2: Diagram show transmission from animal to human and human to animal, human to human.**

## 5. VIROLOGY

Monkeypox is an orthopoxvirus, a double- stranded DNA virus belonging to the same genus as the variola virus (the causative agent of smallpox vaccine), and the cowpox virus electron microscopy of cells infected with the monkeypox virus reveals a brick- shaped virion measuring approximately 200- 250 nm, visually indistinguishable from the virions of variola or vaccines viruses. The monkeypox is notably large consisting of approximately 200 Kilobase Paris and encode around 190 proteins involved in forming viral particle and modulating various host process. Historically, two distinct clades of the monkeypox virus differing by approximately 0.5% in genome sequence, have been identified in separate regions of Africa.

## 6. SYMPTOMS

- Intense
- Swollen lymph nodes
- Fever
- Chills
- Rash
- Myalgia
- Back pain
- Low energy
- High temperature
- Exhusion


**Figure 3: History of monkeypox symptoms.**

The onset of symptoms is associated with secondary Viremia leading to one to two days of Prodromal symptoms (e. g, fever and Lymphadenopathy) before lesions appear during this period, infected individuals may already be capable of transmitting the disease. Lesions typically begin in the Oropharynx before spreading to the skin notably. Serums antibodies are often detectable before the appearance of lesions.

## 7. CLINICAL FEATURE

The clinical features of monkeypox closely resemble those of smallpox. The first documented human case of monkeypox was reported in 1970 in a child from the Democratic Republic of Congo (DRC), formerly known as Zaire. Although the primary animal reservoir for monkeypox remains unidentified, rodents, including Gambian giant rats and rope squirrels, are suspected reservoirs.

The virus is believed to be transmitted to humans through direct contact with infected animals, such as through cuts or abrasions while handling or consuming infected animals. Notably, cases of human monkeypox in the United States have demonstrated that respiratory transmission from infected animals to humans is also possible. Similarly, human-to-human transmission is thought to occur through respiratory Droplets. The presence of enlarged lymph nodes in regions such as the submandibular, cervical, or inguinal areas is particularly noteworthy, as it may distinguish human monkeypox from smallpox infections. Enlarged lymph nodes are observed in approximately 90% of human monkeypox cases.

## 8. DIAGNOSIS

Key factor to consider when diagnosing monkeypox include the onset dates of fever and rash,

recent travel to endemic region within the 21 days preceding symptoms onset, any history of contact with a suspected or confirmed infected individual, the date of specimen collection, and the patients vaccination history for smallpox. Clinically, it's is important to rule out other rash- causing conditions such as chickpox, measles bacterial skin infections, scabies, and syphilis.

Testing IGH and IGM can be conducted in individuals with a history of smallpox vaccination when monkeypox infections is suspected. Additionally, rapid detection of active infections can be performed using the Tetracore orthopox bio threat Alert assay on samples collected from the patients skin lesions. This assay is nonspecific and is primarily useful as reliable negative screening tool in endemic regions.

## 9. PREVENTION

Direct contact with the secretion of an infected person or animal, consumption of undercooked meat, or to a contaminated object are primary modes of monkeypox transmission. These secretions may include respiratory droplets, skin or mucous membrane lesions, blood, or other bodily fluids.

The 2022 outbreak in Europe and North America, which predominantly affected men who have sex with men has raised the possibility of sexual transmission of monkeypox- a mode of transmission that was previously Cidofovir is an antiviral medication that is approved by the FDA/ for the treatment of Cytomegalovirus(CMV) retinitis in patients with acquired immuno deficiency syndrome (AIDS). Data is not available on the effectiveness of cidofovir in treating human cases of Monkyepox. unrecognized.

The Centers for Disease Control and Prevention (CDC) recommend the following measures to minimize the risk of contracting monkeypox: avoid close, skin-to-skin contact with individuals who have rashes resembling monkeypox; refrain from handling objects or materials that have been used by someone with monkeypox; wash hands regularly with soap and water; and use an alcohol-based hand sanitizer before eating or touching your face.


**Figure 4: Prevention of monkeypox.**

## 10. TREATMENT

Currently there is no treatment approved specifically for monkeypox virus infection. Monkeypox virus infection can be self- limited: how- ever, certain population are at risks for severe disease and should be considered for treatment. This includes all pregnant people with monkeypox virus infection regardless of Trimester of infection people who are breastfeeding, and people with oral, ocular, genital, or anal lesions.

Although there are no specific treatment for monkeypox virus infection, two antiviral and vaccine immune Globulin are available from the strategic national stockpile under expended access investigational new drugs protocol held by the center for disease Control and prevention.

The following medical countermeasures are currently available from the strategic national stockpile (SNS) as options for the treatment of Monkeypox.

### 1. Tecoviriment (also known as TPOXX, ST-2465)

VTPOXX is an antiviral medication that is approved by the United States food and drug Administration FDA) for the treatment of smallpox in adults and children. Dates are not available on the effectiveness of Tecoviriment in treating monkeypox infection in people, but the studies using a variety of animals species have in treating disease caused by

Orthopoxvirus. Tecoviriment is available as a pill or an injection. For children who weigh less than 28.6 pounds, the capsules can be opened, and medicine mixed with semi- solid food.

**2. Cidofovir**

Cidofovir is an antiviral medication that is approved by the FDA/ for the treatment of Cytomegalovirus (CMV) retinitis in patients with acquired immunodeficiency syndrome (AIDS). Data is not available on the effectiveness of cidofovir in treating human cases of Monkyepox.

**3. Brincidofovir (also known as CMXOOL or Tembexa)**

Brincidofovir is an antiviral medication that was approved by the FDA on June 4, 2001 for the treatment of human smallpox disease in adult and paediatric patients, including neonates. Data is not available on Diffectivence of brincidofovir in treating case of Monkeypox in people. It has shown to be effective againstOrthropoxvirus in the vitro and animal studies. CDC is currently developing an EA- IND to help facilities use of brincidofovir as a treatment for Monkeypox.

## 11. CONCLUSION

Monkeypox remains a significant public health challenge, particularly in endemic regions like the DRC and Nigeria. Effective control requires a multipronged approach, including public awareness, robust surveillance, early diagnosis, and access to vaccines and antiviral therapies. Strengthening global health infrastructure is essential to mitigate future outbreaks and ensure rapid responses to emerging zoonotic threats.

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