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## Monkey Pox- A Cause of Renowned Interest

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### Introduction

Monkeypox (M-pox) is an emerging and neglected disease caused by Monkeypox virus of Orthopoxgenus and Poxviridae family (Berthet *et al.*, 2021). Though, once considered a rare and self-limiting infection, monkey pox has seen resurging interest in past few months due to its reemergence. World Health Organization declared it as a Public Health Emergency of International Concern (PHEIC; UN, 2024).

Monkey pox is a zoonotic viral disease that is pathogenic to both humans and animals. Although the primary host remains unidentified, human monkeypox was traditionally limited to the African sub-continent, wherein the disease was considered a significant threat to public health. Clinically, it resembles small pox in terms of clinical signs and symptoms showing rashes, but is less severe than small pox in terms of case fatality rate, complications and scarification.

The human small pox vaccine provides cross-immunity against monkey pox but since small pox vaccination has been discontinued since 1978 so the population naive to smallpox has arisen and the number of unvaccinated susceptible individuals is increasing day by day causing a serious threat of advancement of frequency and geographical area of human monkey pox. M-pox also shares an uncanny resemblance with chicken pox, an unrelated viral disease caused by a Herpes virus. Though historically confined to rural Africa, Monkey pox is now spreading in other parts of the world as well. Although the number of cases is limited but it still presents a public health concern (Petersen *et al.*, 2019).

## Historical Perspective

The history of Monkey pox dates back to 1958, when a vesicular illness outbreak occurred in laboratory monkeys in Copenhagen, Denmark. The causative agent, a virus was isolated and identified in 1959. The term “Monkey pox” is a misnomer as despite the name, the largest reservoirs are rodents and not monkeys. The first human case was reported in 1970, from Democratic Republic of Congo, Sierra Leone and Liberia. The cases were initially suspected to be small pox but were identified as M-pox after testing in reference laboratories (Farasani, 2022; Moore *et al.*, 2023). The virus was initially confined to Democratic Republic of Congo and Central African Republic, the two countries of Central Africa. Slowly expanding its geographical distribution, human cases were reported for the first time from Cameroon. The isolates were suspected to have arrived from Nigeria, as genetic similarities between the Cameroon and Nigerian isolates were observed. In the same year, cases were also reported from United Kingdom, Israel and Singapore, all imported from Nigeria (Berthet *et al.*, 2021). In 2003, an outbreak of monkeypox occurred in the United States, which clinically showed febrile illness along with vesiculo-pustular eruptions in the patients; all of whom had acquired the infection from their ill pet dogs, and the dogs were obtained from a common source. This is when monkeypox drew global attention (Reed *et al.*, 2004). In July 2022, two human cases were identified in UAE and the clinical presentation of the disease was in form of myalgia accompanied by low grade fever in one case and genital swelling and dysuria in other case (Farasani, 2022). As of now, two cases of M-pox have been identified in India.

## The Virus

Monkey pox virus is a double stranded DNA virus with linear genome belonging to the Family Poxviridae, Sub-family Chordopoxvirinae, Genus Orthopox and Species Monkeypox virus. The virus measures 200-250 nanometers. Pox viruses are characteristically brick shaped with a lipoprotein envelope surrounds the double stranded DNA genome. Similar to other poxviruses, this virus also replicates in the cytoplasm and carries all necessary enzymes and proteins required for viral replication, transcription and assembling, however it relies on host ribosomes for translation of mRNA. Similar to Variola major, Variola minor and Cowpox virus Monkeypox virus is also pathogenic to humans. Two genetic clades of monkey pox virus are characterized; the Central African clade and the West African clade; the Central African clade is considered to be more virulent with a higher case fatality rate (Petersen *et al.*, 2019).

The virus may enter the host via oropharyngeal, nasopharyngeal, intradermal, subcutaneous or even intramuscular route. Virus entry inside the host cell is through micropinocytosis followed by viral endocytosis and fusion of the cell membranes. The virus, after entry inside the host cell spreads to blood, lymph nodes and various other visceral organs.



Following transcription and translation of the viral mRNA Intracellular Mature Virions (IMVs) are produced which encode for viral DNA. These IMVs are then wrapped in membranes derived from the Golgi apparatus to create Intracellular Enveloped Virions (IEVs). Further fusion of IEVs takes place with the cell membrane of the host cell converting them into Cell Associated Virions (CEVs) which are finally released into extra-cellular spaces as Extracellular Enveloped Virions (EEVs) (Karagoz *et al.*, 2023).

### **Transmission**

Transmission is mostly via direct contact with an infected person or animal or through body fluids or through fomites (Karagoz *et al.*, 2023). The disease can be transmitted amongst animals, from animals to humans and amongst humans as well.

### **Clinical Manifestations**

Following entry through the nasopharyngeal route, an incubation period of about 7 to 21 days occurs. The clinical signs include fever, chills, myalgia, body ache, exhaustion, ulcers in mouth and throat, cellulitis or scarring of skin. Secondary bacterial infection may follow leading to dehydration, bronchopneumonia and sepsis. Clinical signs and symptoms vary among individuals (Karagoz *et al.*, 2023).

### **Therapeutic Options**

No specific anti-viral treatment is available and symptomatic and supportive treatment to relieve the clinical signs is done which includes administration of anti-inflammatory and analgesic medications followed by fluid therapy for dehydration (Karagoz *et al.*, 2023).

### **Vaccination And Cross Immunity**

Orthopox viruses share common antigens and thenceforth infection by one virus species confers substantial protection against other species, a phenomenon known as cross-immunity. Vaccination against vaccinia virus also provides immunity against cowpox virus, variola viruses and monkeypox virus. The immunity is provided through the action of neutralizing antibodies. Similarly, smallpox vaccine provides immunity against monkeypox in humans and immunization of monkeys with human smallpox vaccine can confer immunity against monkeypox. Smallpox, having been eradicated in 1978, vaccinations against the disease have been discontinued and this has given rise to an immunologically naïve population susceptible to smallpox and monkeypox and this is confirmed by recent geographical expansion of monkeypox virus (Petersen *et al.*, 2019).

### **Conclusions And Future Perspectives**

Humans and monkeys are disease hosts but the host pathogen interaction and ecology of the virus is poorly understood and require further research. As with other orthopox diseases,



monkey pox is a disease of public health concern that calls for immediate surveillance and vigilance.

## References

- Berthet, N., Descorps-Declère, S., Besombes, C., Curaudeau, M., Nkili Meyong, A. A., Selekou, B., ... & Nakoune, E. (2021). Genomic history of human monkey pox infections in the Central African Republic between 2001 and 2018. *Scientific reports*, 11(1), 13085.
- Farasani, A. (2022). Monkeypox virus: Future role in Human population. *Journal of Infection and Public Health*, 15(11), 1270-1275.
- Karagoz, A., Tombuloglu, H., Alsaed, M., Tombuloglu, G., AlRubaish, A. A., Mahmoud, A., ... & Alshaimi, E. (2023). Monkeypox (mpox) virus: Classification, origin, transmission, genome organization, antiviral drugs, and molecular diagnosis. *Journal of infection and public health*, 16(4), 531-541.
- Moore, M. J., Rathish, B., & Zahra, F. M. (2023). Updated 2022 Nov 30. *StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing*.
- Petersen, E., Kantele, A., Koopmans, M., Asogun, D., Yinka-Ogunleye, A., Ihekweazu, C., & Zumla, A. (2019). Human monkeypox: epidemiologic and clinical characteristics, diagnosis, and prevention. *Infectious Disease Clinics*, 33(4), 1027-1043.
- Reed, K. D., Melski, J. W., Graham, M. B., Regnery, R. L., Sotir, M. J., Wegner, M. V., ... & Damon, I. K. (2004). The detection of monkeypox in humans in the Western Hemisphere. *New England Journal of Medicine*, 350(4), 342-350.
- WHO declares mpox virus a public health emergency of international concern. (2024, August 15). UN News. <https://news.un.org/en/story/2024/08/1153176>.

