

# Mpox (monkeypox) virus Fact sheet

# January 2023

# **Key points**

- Mpox (monkeypox) is a zoonotic disease which causes smallpox-like skin disease in humans.
- Human-to-human spread is the main route of transmission in the current global outbreak.
- All mammals are considered potentially susceptible to mpox.
- Human-to-animal transmission of mpox may occur, and infected humans should avoid close contact with pets, domestic animals or wildlife while they are symptomatic.

#### **Introductory statement**

Mpox (monkeypox; MPX) is a zoonotic disease which causes disease similar to smallpox in humans. The current outbreak of MPX in humans involves over 50,000 cases worldwide from 100 countries (Sept 2022). WHO declared a Public Health Emergency of International Concern on 23 July 2022 (WHO 2022e).

# Aetiology

Mpox is caused by an orthopoxvirus.

There are two distinct genetic clades of the virus: the Central African clade [now Clade I] (which is associated with more severe illness) and the West African clade [now Clade II] (WHO 2022d). Historically, the vast majority of human cases have been due to Clade I. All cases which have occurred outside of Africa have been due to Clade II.

### **Natural hosts**

MPX has a wide host range; **all mammals should be considered susceptible to MPX** (CDC 2022b). It is considered unlikely that non-mammalian species would be susceptible to MPX, but this is unconfirmed. Non-mammalian species have **not** been found to be infected with other orthopoxviruses (CDC 2022b).

**The animal reservoirs** of MPX are unknown, but **rodents** are strongly suspected to maintain the virus in West and Central Africa. Likely maintenance hosts are African dormice, giant pouched rats and rope squirrels (Reynolds et al. 2019; CDC 2022b).

**Infection with MPX** has been confirmed in a range of rodents (prairie dogs, squirrels, marmots, groundhogs, chinchillas, giant-pouched rats, gerbils, guinea pigs, hamsters), hedgehogs, shrews, giant anteaters, monkeys and apes, and a dog. Infection of mice, rats and domestic rabbits is possible but may vary with species and strain; adult animals with functional immune systems are generally resistant to infection (Parker and Buller 2013; Reynolds et al. 2019; CDC 2022b). The wider susceptibility of carnivores and hoofstock is unknown.

Infection of a **domestic dog** with MPX was reported for the first time in 2022. The dog had been cosleeping with its human owners, both of whom were infected with MPX (Seang et al. 2022).

# World distribution

Historically, disease was seen primarily in humans in African countries (the majority in the Democratic Republic of Congo). Outbreaks in humans have occurred in previous years in the USA, UK, Israel and Singapore (Bunge et al. 2022; WHO 2022b). The current outbreak (2022) in humans has spread across 100 countries globally.

# **Occurrences in Australia**

In June 2022, MPX was declared a nationally notifiable disease for 6 months. As of 19 September 2022, 132 confirmed or probable cases of MPX were recorded in humans (DHAC 2022a). There have been no cases reported in non-human animals in Australia and MPX had not been identified in Australia before May 2022.

# **Epidemiology**

**Human-to-human transmission** is the main route of spread for the current global outbreak. It can occur through close contact with respiratory secretions, skin lesions or fomites. Transmission via the placenta or during and after birth can occur. It is unclear at this stage if MPX can be transmitted sexually (WHO 2022b).

Animal-to-human transmission can occur through close contact with skin or mucosal lesions, blood and body fluids. This can include petting, cuddling, sharing sleeping areas and food, hunting and consuming bushmeat (CDC 2022b). Risk factors for animal-to-human transmission have not been well studied (Bunge et al. 2022).

A 2003 MPX outbreak in the USA followed importation of infected exotic African rodents, which passed the disease on to local captive rodent species and initiated the human cases, all of which were thought to be related to exposure to infected animals (Adalja and Inglesby 2022). Infections were documented among 9 "pocket pet" species (rodents, opossums and hedgehogs) as well as imported rodents (Reynolds et al. 2019).

Infected giant anteaters were the index species for an outbreak of MPX at Rotterdam Zoo in 1964 in which illness or mortality occurred in seven non-human primate species (Reynolds et al. 2019).

Incubation period in humans is usually 6-13 days but can range from 5-21 days (WHO 2022b).

It was previously thought that MPX outbreaks in humans would not occur in the absence of a nearby source of virus in animals (Reynolds et al. 2019). The current increase in MPX cases in humans could be related to waning immunity with the cessation of routine smallpox vaccination due to eradication of smallpox. The smallpox vaccine was approximately 85% protective against MPX, with unvaccinated individuals accounting for 80-96% of cases reported in the literature (Bunge et al. 2022). The increasing median age of human cases supports the role of waning smallpox immunity.

**Human-to-animal transmission** has occurred following close contact (Seang et al. 2022), see also *Prevention and control*. There have been no reports of human-to-animal transmission of MPX in

Australia, however, risk management is recommended, to reduce the possibility of animals becoming infected. If animals were to become infected, there is concern over the possible establishment of a new animal reservoir for the disease, and the virus could become endemic in new geographic areas (WOAH 2022b).

### **Clinical signs**

Many host species can carry MPX without apparent signs of illness. Disease is generally self-limiting in humans, with signs including skin lesions, fever, rash and swollen lymph nodes. Disease is rarely fatal but fatalities and severe disease can be seen in otherwise sick or immunocompromised patients (WHO 2022b).

Non-human primates develop signs of disease similar to humans (CDC 2022b; WHO 2022b). Infected animals may have poxvirus-like skin lesions as well as fever, lethargy, lack of appetite, coughing or nasal secretions/crust.

#### Diagnosis

PCR detection is the preferred diagnostic test. Antigen and antibody detection methods do not distinguish between different orthopoxviruses (WHO 2022a).

#### **Prevention and control**

Transmission of MPX **from infected humans to pets and wildlife in care** is possible. The information below is based on Australian Department of Health and Aged Care (DHAC), World Organisation for Animal Health (WOAH), USA Centers for Disease Control and Prevention (CDC) and World Health Organization (WHO) recommendations.

**People** who have confirmed or suspected mpox should avoid close physical contact with animals, including pets (cats, dogs, rodents etc.), livestock and wildlife to prevent spreading the virus (DHAC 2022b; WHO 2022c; WOAH 2022b).

If you are concerned about an **animal potentially infected with MPX, following contact with an infected human** contact the Australian **Emergency Animal Disease Watch Hotline (1800 675 888)**.

**Animals** that have had **close contact** with a person with symptomatic mpox should be kept isolated from other animals and people for 21 days after the most recent contact (CDC 2022a; WOAH 2022b).

Further details on managing disease risk in animals (associated with infected humans) can be found in the WOAH "Risk Guidance on Reducing Spillback of Monkeypox Virus from Humans to Wildlife, Pet animals, and Other Animals" <u>www.woah.org/app/uploads/2022/10/woah-monkeypox-</u> <u>guidelines.pdf</u>.

A MPX **vaccine** has been approved for use in humans, but availability is limited. Mass human vaccination is not currently recommended (WHO 2022a). Careful consideration of human vaccination risks and benefits is recommended in the <u>ATAGI Clinical guidance on vaccination against</u> <u>Monkeypox</u> (ATAGI 2022). There is no vaccine for animals.

# Surveillance and management

Wildlife disease surveillance in Australia is coordinated by Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia's States and Territories report monthly on significant wildlife cases identified in their jurisdictions. NOTE: access to information contained within the National Wildlife Health Information System dataset is by application. See the WHA website for more information: <a href="https://wildlifehealthaustralia.com.au/ProgramsProjects/eWHIS-WildlifeHealthInformationSystem.aspx">https://wildlifehealthaustralia.com.au/ProgramsProjects/eWHIS-WildlifeHealthInformationSystem.aspx</a>. There are no cases of monkeypox virus in eWHIS.

Mpox is a nationally notifiable disease for humans but not for animals. WOAH encourages countries to report cases of MPX in animals (WOAH 2022a). If you suspect a case of MPX in an animal, you should call the **Emergency Animal Disease Watch Hotline** (**1800 675 888**).

#### Research

Studies to identify drivers for the current epidemic require further study of rodent dynamics and human MPX cases (Zumla et al. 2022). More information is needed on the susceptibility of other mammalian species, including Australian mammals, to MPX.

#### **Conclusions**

Mpox virus infections in humans are increasing rapidly worldwide and the epidemiology of the disease in humans appears to be changing. Transmission of MPX from humans to animals is considered possible. People with MPX should avoid contact with animals, including pets, domestic animals and wildlife, to prevent spreading the virus.

### **References and other information**

Information on the current outbreak and its epidemiology is evolving rapidly and the latest information on MPX is available from:

- the World Organisation for Animal Health (WOAH) <u>www.woah.org/en/disease/monkeypox</u> and <u>www.woah.org/app/uploads/2022/10/woah-monkeypox-guidelines.pdf</u>
- World Health Organisation (WHO) <u>www.who.int/news-room/fact-sheets/detail/monkeypox</u> and <u>www.who.int/news-room/questions-and-answers/item/monkeypox</u>
- Australian government website www.health.gov.au/health-alerts/monkeypox-mpx/about

#### References

Adalja A, Inglesby T (2022) A novel international monkeypox outbreak. *Annals of Internal Medicine* **175**, 1175-1176.

ATAGI (2022) Clinical guidance on vaccination against monkeypox. Available at <a href="http://www.health.gov.au/resources/publications/atagi-clinical-guidance-on-vaccination-against-monkeypox">www.health.gov.au/resources/publications/atagi-clinical-guidance-on-vaccination-against-monkeypox</a> [Accessed 26 July 2022].

Bunge EM, Hoet B, Chen L, Lienert F, Weidenthaler H *et al.* (2022) The changing epidemiology of human monkeypox—a potential threat? A systematic review. *PLOS Neglected Tropical Diseases* **16**, e0010141.

CDC (2022a) 'Monkeypox Pets in the Home.' Available at <a href="http://www.cdc.gov/poxvirus/monkeypox/prevention/pets-in-homes.html">www.cdc.gov/poxvirus/monkeypox/prevention/pets-in-homes.html</a> [Accessed 13 Sept 2022].

CDC (2022b) 'Monkeypox: information for veterinarians.' Available at <a href="http://www.cdc.gov/poxvirus/monkeypox/veterinarian/index.html">www.cdc.gov/poxvirus/monkeypox/veterinarian/index.html</a> [Accessed 25 July 2022].

DHAC (2022a) 'Monkeypox.' Available at <u>www.health.gov.au/health-alerts/monkeypox-mpx/about</u> [Accessed 26 July 2022].

DHAC (2022b) Monkeypox Virus Infection - CDNA Interim National Guidelines for Public Health Units. Canberra). Available at <u>www.health.gov.au/resources/publications/monkeypox-virus-infection-cdna-national-guidelines-for-public-health-units</u> [Accessed 19 Sept 2022].

Parker S, Buller RM, (2013) A review of experimental and natural infections of animals with monkeypox virus between 1958 and 2012. Future Virology. 8: 129+.

Reynolds MG, Doty JB, McCollum AM, Olson VA, Nakazawa Y (2019) Monkeypox re-emergence in Africa: a call to expand the concept and practice of One Health. *Expert Review of Anti-infective Therapy* **17**, 129-139.

Seang S, Burrel S, Todesco E, Leducq V, Monsel G *et al.* (2022) Evidence of human-to-dog transmission of monkeypox virus. *The Lancet* **400**, 658-659.

WHO (2022a) 'Monkeypox.' Available at www.who.int/health-topics/monkeypox [Accessed 24 July 2022].

WHO (2022b) 'Monkeypox Fact Sheet.' Available at <u>www.who.int/news-room/fact-sheets/detail/monkeypox</u> [Accessed 24 July 2022].

WHO (2022c) 'Monkeypox Questions and Answers.' Available at <u>www.who.int/news-room/questions-and-answers/item/monkeypox</u> [Accessed 12 Sept 2022].

WHO (2022d) 'Monkeypox: experts give virus variants new names.' Available at <u>www.who.int/news/item/12-</u> 08-2022-monkeypox--experts-give-virus-variants-new-names [Accessed 8 Sept 2022].

WHO (2022e) 'WHO Director-General's statement at the press conference following IHR Emergency Committee regarding the mulit-country outbreak of monkeypox.' Available at <u>www.who.int/news-</u> <u>room/speeches/item/who-director-general-s-statement-on-the-press-conference-following-IHR-emergency-</u> <u>committee-regarding-the-multi--country-outbreak-of-monkeypox--23-july-2022</u> [Accessed 26 July 2022].

WOAH (2022a) 'Monkeypox.' Available at <u>www.woah.org/en/disease/monkeypox/#ui-id-2</u> [Accessed 12 Sept 2022].

WOAH (2022b) 'Risk Guidance on Reducing Spillback of Monkeypox Virus from Humans to Wildlife, Pet animals, and Other Animals.' Available at <a href="http://www.woah.org/app/uploads/2022/10/woah-monkeypox-guidelines.pdf">www.woah.org/app/uploads/2022/10/woah-monkeypox-guidelines.pdf</a> [Accessed 7 Oct 2022].

Zumla A, Valdoleiros SR, Haider N, Asogun D, Ntoumi F *et al.* (2022) Monkeypox outbreaks outside endemic regions: scientific and social priorities. *The Lancet Infectious Diseases* **22**, 929–931.

#### Acknowledgements

We are extremely grateful to the many people who had input into this fact sheet. Without their ongoing support production of these fact sheets would not be possible.

Updated: 24 January 2023

# To provide feedback on this fact sheet

Wildlife Health Australia would be grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to <u>admin@wildlifehealthaustralia.com.au</u>. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

#### Disclaimer

This fact sheet is managed by Wildlife Health Australia for information purposes only. Information contained in it is drawn from a variety of sources external to Wildlife Health Australia. Although reasonable care was taken in its preparation, Wildlife Health Australia does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information or its usefulness in achieving any purpose. It should not be relied on in place of professional veterinary or medical consultation. To the fullest extent permitted by law, Wildlife Health Australia will not be liable for any loss, damage, cost or expense incurred in or arising by reason of any person relying on information in this fact sheet. Persons should accordingly make and rely on their own assessments and enquiries to verify the accuracy of the information provided.



Find out more at <u>www.wildlifehealthaustralia.com.au</u> Email <u>admin@wildlifehealthaustralia.com.au</u> Or call +61 2 9960 6333