

Monkeypox outbreak among pet owners

Published at www.cmaj.ca on June 13, 2003.

Background and epidemiology: Between May 15 and June 11, 2003, 50 people in Wisconsin, Illinois, Indiana and New Jersey were found to have human monkeypox.¹ All of the individuals, ranging in age from 4 to 48 years, had contact with ill prairie dogs purchased as pets from exotic pet stores.

Investigations are underway to determine whether the animals had come from the same supplier.

Human monkeypox, like smallpox, is a member of the genus *Orthopoxvirus*. Its manifestations are similar to those of smallpox but tend to be less severe. Until the recent outbreak in the United

States, monkeypox has been limited mainly to sporadic cases in remote villages in western and central Africa, where it is thought to result from close contact between humans and animals living in the rain forests. Animals that harbour the virus include nonhuman primates, lagomorphs (rabbits) and some rodents. Person-to-person spread has historically been infrequent, usually ending after 1 or 2 generations of transmission, but the epidemiologic features of an outbreak in the Democratic Republic of the Congo suggests higher rates of infection.

Human monkeypox appears to be prevented by smallpox (vaccinia) vaccination (vaccine efficacy in preventing monkeypox is about 85%). In an outbreak of human monkeypox in the Democratic Republic of the Congo in 1996/97, a total of 338 cases were identified (of which 67% were confirmed by viral culture).² The case-fatality rate among individuals not vaccinated with vaccinia was 9.8%. Case-fatality rates in Africa have ranged from 1% to 10%; there have been no deaths in the US outbreak so far. Since vaccinia vaccination has been stopped in children born after 1980, an increase in the frequency of human monkeypox is likely the result of decreased herd immunity. The US Centers for Disease Control and Prevention (CDC) is expected to make vaccines available to health care workers who care for patients with monkeypox.

Clinical management: The cases reported in the United States were typical of human monkeypox (see Box for case definition). After an incubation period of about 12 days, the illness begins with a nonspecific prodrome that lasts 1–10 days and consists of fever, headache, myalgia, chills and drenching sweats. About one third of the patients in the US outbreak had a nonproductive cough. The rash that typically follows this phase is initially papular and progresses through stages of vesiculation,

Box: CDC interim case definition for human monkeypox*

Clinical criteria

- Rash (macular, papular, vesicular or pustular; generalized or localized; discrete or confluent)
- Other signs and symptoms
 - Temperature $\geq 99.3^{\circ}$ F ($\geq 37.4^{\circ}$ C)
 - Headache
 - Backache
 - Lymphadenopathy
 - Sore throat
 - Cough
 - Shortness of breath

Epidemiologic criteria

- Exposure† to an exotic mammalian pet‡ obtained on or after Apr. 15, 2003, with clinical signs of illness (e.g., conjunctivitis, respiratory symptoms and/or rash)
- Exposure† to an exotic mammalian pet‡ with or without clinical signs of illness that has been in contact with a case of monkeypox either in a mammalian pet§ or a human
- Exposure to a suspect, probable or confirmed human case

Laboratory criteria

- Isolation of monkeypox virus in culture
- Demonstration of monkeypox virus DNA by polymerase chain reaction testing in a clinical specimen
- Demonstration of virus morphologically consistent with an orthopoxvirus by electron microscopy in the absence of exposure to another orthopoxvirus
- Demonstration of presence of orthopoxvirus in tissue using immunohistochemical testing methods in the absence of exposure to another orthopoxvirus

Case classification

- *Suspect case:* meets one of the epidemiologic criteria; rash OR 2 or more other signs or symptoms
- *Probable case:* meets one of the epidemiologic criteria; rash AND 2 or more other signs or symptoms
- *Confirmed case:* meets one of the epidemiologic criteria; rash AND 2 or more other signs and symptoms; meets one of the laboratory criteria

*Source: US Centers for Disease Control and Prevention (www.cdc.gov/ncidod/monkeypox/index.htm [released 2003 June 11]).

†Exposure includes living in a household, petting or handling, or visiting a pet-holding facility (e.g., pet store, veterinary clinic, pet distributor).

‡Exotic mammalian pets include prairie dogs, Gambian giant rats and rope squirrels. Exposure to other exotic or non-exotic mammalian pets will be considered on a case-by-case basis; assessment should include the likelihood of contact with a mammal with monkeypox and the compatibility of clinical illness with monkeypox.

§Contact between mammalian pets includes living in a household with, or originating from the same pet-holding facility as, another animal with monkeypox.

pustulation, umbilication (a depression at the apex of a lesion) and crusting. In some patients the early lesions become ulcerated. The rash often begins on the face and is distributed on the head, trunk and extremities. Many patients have initial and satellite lesions on their palms, soles and extremities (see Figure). (For additional photographs go to <http://research.marshfieldclinic.org/crc/monkeypox.asp>). Unlike smallpox, which tends to have lesions at similar stages of evolution, rashes caused by monkeypox tend to occur in crops.³ Also, lymphadenopathy is more common with monkeypox.

The infected prairie dogs involved in the US outbreak reportedly had blepharconjunctivitis, which progressed

to nodular lesions in some cases. Some of the animals succumbed to the disease.

Laboratory studies can identify the virus through culture or DNA amplification of samples from skin lesions. In addition, antibody neutralization assays can detect antibodies against orthopoxvirus. IgM antibodies against varicella virus have also been detected in studies investigating outbreaks of monkeypox; this was either the result of a misclassification (both are eruptive diseases) or coinfection. There is no specific treatment, although the CDC is assessing the potential role of postexposure smallpox vaccination and of the antiviral drug cidofovir.

Patients presenting with the prodromal symptoms and rash as described

above and who have had exposure to potentially infected small mammals should be managed with airborne and droplet precautions. Individuals suspected of having the disease should be isolated, and asymptomatic contacts should be placed under symptom surveillance. Further guidance is offered on the CDC Web site (www.cdc.gov/ncidod/monkeypox/infectioncontrol.htm).

Prevention: Until the epidemiologic features and distribution of this most recently arrived (in North America) pathogen has been elucidated, the CDC recommends that people avoid contact with any prairie dogs or Gambian giant rats that appear to be ill (e.g., are missing patches of fur, have a visible rash on the skin or have discharge from eyes or nose). In addition, the CDC advises hand washing after any contact with prairie dogs, Gambian giant rats or any ill animal.

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References

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Marshfield Clinic

Lesions on the hand of a child with human monkeypox after being bitten by a pet prairie dog.