



## Monkeypox Outbreak in 2022

### Would it become another pandemic?

- Since May 2022, several countries have reported monkeypox cases, and now there are more than 4,000 confirmed cases (Figure 1, as of June 27, 2022)<sup>1</sup>.
  - Monkeypox was initially a zoonotic disease (contracted from a rodent or small mammal) endemic in West and Central Africa.
  - However, most current cases are unprecedented and unusual, different from previous travel-related outbreaks. The highest numbers of cases are currently reported from countries in the European region, followed by the American region<sup>2</sup>. Initial cases had no epidemiological links to areas that have historically reported monkeypox, suggesting undetected transmissions.
  - According to the World Health Organization (WHO)'s report, in 2022, from January 1 to June 15, a cumulative total of 2,103 laboratory-confirmed cases, one probable case, and one death have been reported<sup>2</sup>. Most cases (98%) have been reported since May 2022 (Figure 2).

Figure 1. Cumulative confirmed cases of monkeypox by date of confirmation (as of June 27, 2022)<sup>1</sup>

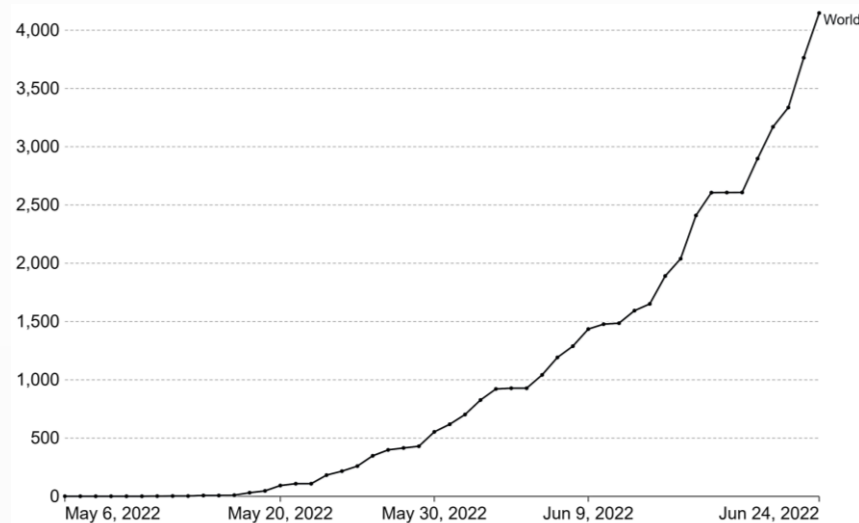
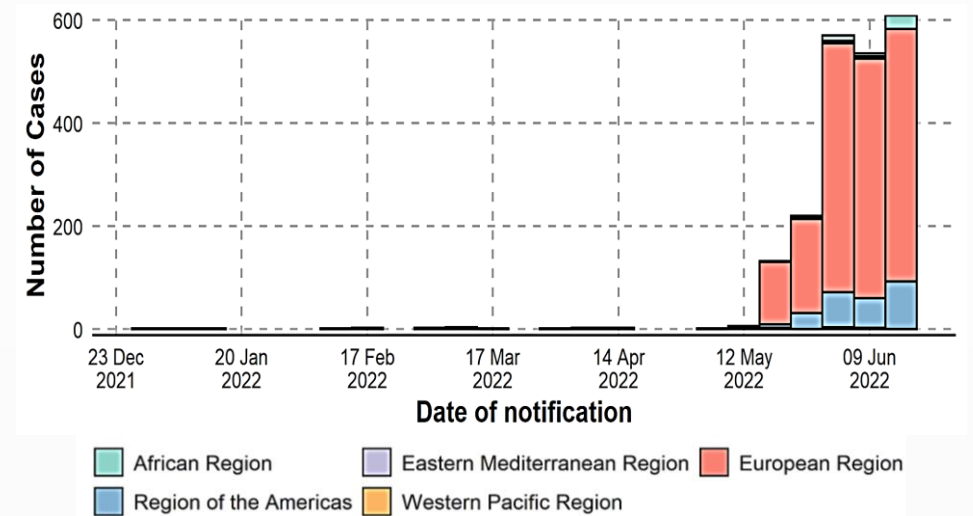


Figure 2. Confirmed cases of monkeypox by region in 2022 (as of June 15, 2022)<sup>2</sup>



- Monkeypox is caused by the monkeypox virus (MPXV), a part of the *Orthopoxvirus* genus (OPXV), which includes variola virus (smallpox) and cowpox virus.
  - Monkeypox is usually a self-limited disease with symptoms lasting 2-4 weeks<sup>3</sup>. The incubation period lasts from 5-6 to 13-21 days.
  - Severe cases can occur, and the case fatality ratio has recently been around 3-6%. Most deaths occur in younger age groups<sup>3</sup>.
  - Monkeypox causes flu-like symptoms, which make it difficult to distinguish it from other diseases. Typical symptoms include fever, headache, muscle aches, lack of energy, swollen lymph nodes, and a skin rash or lesions. It even may lead to a range of medical complications.
- MPXV is transmitted from one to another by close physical contact.
  - MPXV is transmitted by close contact with lesions, body fluids, and even contaminated materials such as bedding, clothing, or eating utensils, and respiratory droplets in a close setting<sup>3-4</sup>.
  - People who closely interact with someone infectious, including health workers, household members, and sexual partners, are at greater risk of infection. Transmission can also occur via the placenta from mother to fetus or child during and after birth (congenital monkeypox).
- Early detection, isolation, and treatment of the infected persons are urgently required to control the spread of the disease.
  - To prevent the spread, any person with suspected or confirmed monkeypox should be isolated until they are not infectious anymore (i.e., their lesions have crusted, and the scabs have fallen off).
  - There are not many choices of therapeutics and vaccination. Tecovirimat\*, an antiviral approved for the treatment of monkeypox by the European Medicines Agency (EMA), is not yet widely available. \*Tecovirimat, the antiviral agent recommended for people who are more likely to get severely ill, such as patients with weakened immune systems.
  - Vaccination against smallpox was demonstrated to be about 85% effective in preventing monkeypox; however, the original smallpox vaccines are no longer available to the general public.
- The WHO convened the meeting on June 23, 2022, to consider a Public Health Emergency of International Concern (PHEIC), reflecting the increasing concern about the international spread of monkeypox<sup>5</sup>.
  - Although the committee decided that the outbreak does not constitute a PHEIC at this moment, the WHO Director-General emphasized the importance of countries sharing information, including case finding, contact tracing, and laboratory investigations<sup>6</sup>.

<sup>1</sup> Mathieu E et al, "Monkeypox" (2022) Published online at OurWorldinData.org

<sup>2</sup> World Health Organization (June 17, 2022). Disease Outbreak News; Multi-country monkeypox outbreak in non-endemic countries: Update.

<sup>3</sup> World Health Organization (May 19, 2022) News-room/Fact-sheets/monkeypox

<sup>4</sup> Centers for Disease Control and Prevention (June 24, 2022) <https://www.cdc.gov/poxvirus/monkeypox/transmission.html>

<sup>5</sup> World Health Organization (June 25, 2022). Meeting of the International Health Regulations (2005) Emergency Committee regarding the multi-country monkeypox outbreak.

<sup>6</sup> <https://edition.cnn.com/2022/06/25/health/monkeypox-who-public-health-emergency/index.html>



## PCR is the best solution for MPXV

RT-PCR test is recommended for controlling the MPXV

1. According to the WHO guideline<sup>7</sup>, PCR is the preferred laboratory test for MPXV.

Because OPXVs are serologically cross-reactive, antigen and antibody detection methods do not provide MPXV-specific confirmation. Additionally, recent or remote vaccination might lead to false-positive results.

2. MPXV infection has a long incubation period, and initial symptoms are typically flu-like, so the PCR test accuracy and sensitivity are essential.

- After infection, an incubation period lasts from 5-6 to 13-21 days<sup>8</sup>, and the duration varies depending on the infection types; complex (invasive) and noninvasive (Figures 3 and 4). The 31 cases were confirmed by PCR in Netherlands until May 31, 2022, and the 95% of the cases had 17.3 days of incubation<sup>9</sup>.
- The prodromal period begins with the initial symptoms (fever, headache, and weakness, etc.), and a rash appears shortly after the prodrome. Also, KDCA\* highly recommends PCR tests in the incubation and prodrome period of MPXV infection<sup>10</sup>. \* KDCA: Korea Disease Control and Prevention Agency

Figure 3. IgM and IgG responses after the MPXV infection<sup>11</sup>

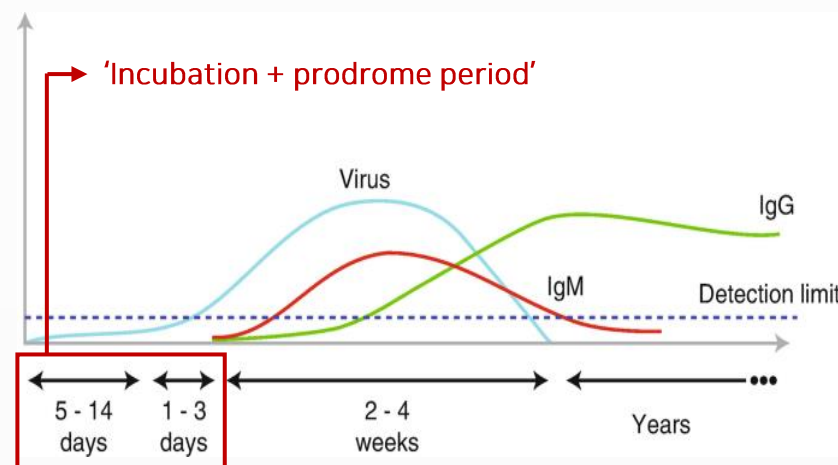
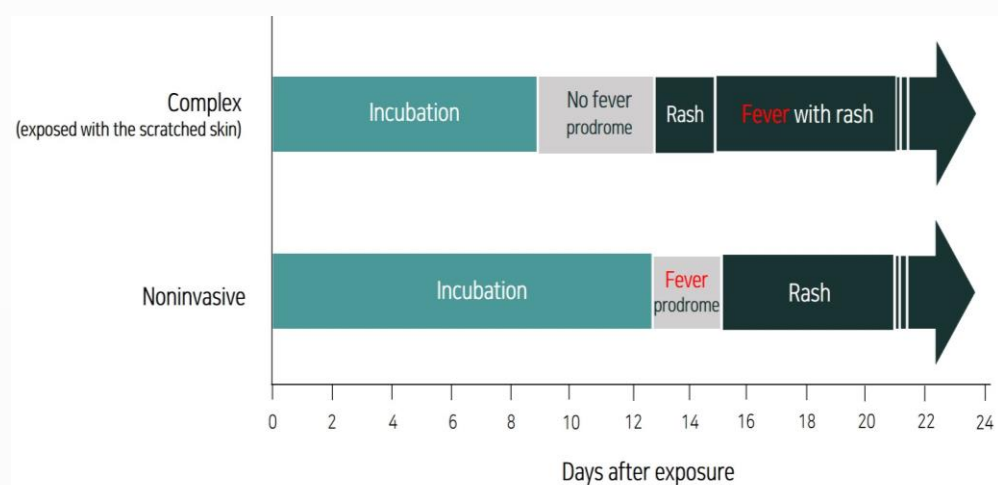


Figure 4. Illness progression among MPXV-infected persons<sup>12</sup>



3. With Seegene's Novaplex™ MPXV Assay (RUO), you can confirm the MPXV infection at once in suspected cases and even though asymptomatic patients.

- According to PAHO\* Laboratory Guidelines<sup>13</sup>, PCR assays are recommended to confirm MPXV infection.
- The positive cases using an OPXV PCR assay followed by confirmation of MPXV via PCR and/or sequencing, or the positive ones using MPXV PCR assay in suspected cases are confirmed as MPXV infection.

\*PAHO: Pan American Health Organization

## Syndromic tests for controlling MPXV

MPXV infection shows similar symptoms to STI and often accompanies STI, increasing the need for syndromic tests

- MPXV infection has a similar transmission route and genital/anal symptoms to sexually transmitted infection (STI). The currently used symptom-based diagnosis is insufficient to distinguish them.
- In particular, in the MPXV infection cases, the lesions in the genital tissues may be similar to symptoms of pathogens such as a varicella-zoster virus (VZV), *Treponema pallidum* (TP), Herpes simplex virus (HSV)1/2, and Lymphogranuloma venereum (LGV). Therefore, co-testing of these pathogens is required for an accurate diagnosis.
- Patients co-infected with MPXV and other pathogens (e.g., VZV and TP) have been reported. A Congo study published in 2020 found that 151 cases (13%) of 1,158 suspected MPXV patients were co-infected with VZV/MPXV and had a higher resistance burden than seen with VZV alone<sup>14-16</sup>.
- Seegene's Allplex™ Genital ulcer Assay can detect HSV1/2, *Haemophilus ducreyi*, *Cytomegalovirus*, LGV, TP, and VZV from urine, genital swab, and liquid-based cytology specimens. The newly launched Novaplex™ MPXV Assay (RUO), when used in combination with Seegene's STI assays, can provide much information for MPXV patient care and help.

### Product Information

#### Novaplex™ MPXV Assay (RUO)

- Launch** ▪ June 27, 2022
- Analytes** ▪ Monkeypox virus (MPXV)

#### Allplex™ Genital ulcer Assay

- Analytes** ▪ *Cytomegalovirus* (CMV)
- Herpes simplex virus type1 (HSV1)
- Lymphogranuloma venereum (LGV)
- Varicella-zoster virus (VZV)
- *Haemophilus ducreyi* (HD)
- Herpes simplex virus type2 (HSV2)
- *Treponema pallidum* (TP)
- Internal Control (IC)

<sup>7</sup> WHO, 2022, Laboratory testing for the monkeypox virus: interim guidance. <https://www.euro.who.int/en/press-releases/2022/05/24/health/what-is-monkeypox-virus-explainer-update-wellness/index.html>

<sup>8</sup> <https://edition.cnn.com/2022/05/24/health/what-is-monkeypox-virus-explainer-update-wellness/index.html>

<sup>9</sup> Guidelines for the Laboratory Diagnosis of Monkeypox\_KDCA (May 22, 2022)

<sup>11</sup> Animal-Origin Viral Zoonoses\_Monkeypox Virus

<sup>12</sup> Mart G et al., 2006, journal of infectious disease

<sup>13</sup> Laboratory Guidelines for the Detection and Diagnosis of Monkeypox Virus Infection (May 23, 2022)

<sup>14</sup> Bizova B et al., Coinfection of syphilis and monkeypox in HIV positive man in Prague, Czech Republic. *Travel Med Infect Dis.* 2022;49:102368.

<sup>15</sup> Hughes CM et al. A tale of two viruses: coinfections of monkeypox and varicella zoster virus in the Democratic Republic of Congo. *Am J Trop Med Hyg.* 2020;104(2):604-11.

<sup>16</sup> Hoff NA et al., Varicella coinfection in patients with active monkeypox in the Democratic Republic of the Congo. *EcoHealth.* 2017;14(3):564-74.