

Notes from the Field

First Human Infection Case of Monkey B Virus Identified in China, 2021

Wenling Wang^{1,8}; Wenjie Qi^{2,8}; Jingyuan Liu^{3,8}; Haijun Du^{4,8}; Li Zhao¹; Yang Zheng⁵; Guoxing Wang²; Yang Pan⁵; Baoying Huang¹; Zhaomin Feng⁵; Daitao Zhang⁵; Peng Yang⁵; Jun Han^{4,†}; Quanyi Wang^{5,†}; Wenjie Tan^{1,†}

Monkey B virus (BV), initially isolated in 1932, is currently designated as *Macacine alphaherpesvirus 1* by the International Committee on Taxonomy of Viruses (1). BV is an alphaherpesvirus enzootic in macaques of the genus *Macaca*, normally transmitted horizontally via direct contact and exchange of bodily secretions, just like herpes simplex virus (HSV) in humans. BV is not evident in its natural macaque hosts, but about 60 additional cases of pathogenic zoonotic BV infection have occurred sporadically and the fatality rate of zoonotic BV infections is 70%–80%. Although the risk for secondary transmission appears to be minimal, one case of human-to-human transmission of herpes B virus has previously been documented (2). Zoonotic BV infections have mainly involved primate veterinarians, animal care personnel, or laboratory researchers in North America. However, there were no fatal or even clinically evident BV infections in China before 2021. Here, we reported the first human infection case with BV identified in China.

This case of BV occurred in a veterinary surgeon (53 years old, male) who worked in an institute specialized in nonhuman primate breeding and experimental research in Beijing. He dissected two dead monkeys on March 4 and 6, 2021 and experienced nausea and vomiting followed by fever with neurological symptoms one month later. As a result, the patient visited doctor in several hospitals but eventually died on May 27.

On April 17, cerebrospinal fluid (CSF) was collected from this patient for next generation sequencing (NGS), 285 reads obtained suggesting possible alphaherpesvirus infection. To further identify the etiological agent, several specimens (including CSF, blister fluid, blood, airway aspirates, nasal swab, throat swab, and plasma) were collected from this patient and 2 close contacts (1 doctor, 47 years old, male; 1 nurse, 25 years old, female), then sent to National Institute for Viral Disease Control and Prevention (IVDC) of China CDC on April 19. Four sets of real-time

polymerase chain reaction (rtPCR) were performed to detect BV (3), varicella zoster virus (VZV) (4), monkeypox virus and orthopoxvirus (5). For BV detection, the forward primer was 5'-TGGCCTACTA CCGCGTGG-3', the reverse primer was 5'-TGGTACGTGTGGGAGTAGCG-3'; and the TaqMan probe was 5'-FAM-CCGCCCTCTCCGAGCACGTG-TAMRA-3'. The rtPCR results showed that only BV genome was detected as positive (Cycle of threshold: 34) in the CSF specimen of the patient, while BV negative in other specimens from the patient and all specimens from close contacts; moreover, all tests were negative for VZV, monkeypox virus, and orthopoxvirus (Figure 1). This result confirmed the first human infection case with BV in China.

The first human infection case with BV was identified by NGS and rtPCR in China, 2021. This implied that BV in monkeys might pose a potential zoonotic threat to the occupational workers. It is necessary to eliminate BV during the development of specific pathogen-free rhesus colonies and to strengthen surveillance in laboratory macaques and occupational workers in China.

Conflicts of interest: No conflicts of interest.

Funding: The National Key Research and Development Program of China (2016YFD0500301) and Viral Center of National Pathogen Resource Center, China CDC (NPRC-32).

doi: 10.46234/ccdcw2021.154

[#] Corresponding authors: Jun Han, hanjun@ivdc.chinacdc.cn; Quanyi Wang, bjcdcxm@126.com; Wenjie Tan, tanwj@ivdc.chinacdc.cn.

¹ Key Laboratory of Biosafety, National Health and Family Planning Commission, National Institute for Viral Disease Control and Prevention, China CDC, Beijing, China; ² Beijing Friendship Hospital, Capital Medical University, Beijing, China; ³ Intensive Care Medicine, Beijing Ditan Hospital, Capital Medical University, Beijing, China; ⁴ Viral Center of National Pathogen Resource Center, China CDC, Beijing, China; ⁵ Beijing Center for Disease Prevention and Control, Beijing, China.

[†] Joint first authors.

Submitted: June 29, 2021; Accepted: June 30, 2021

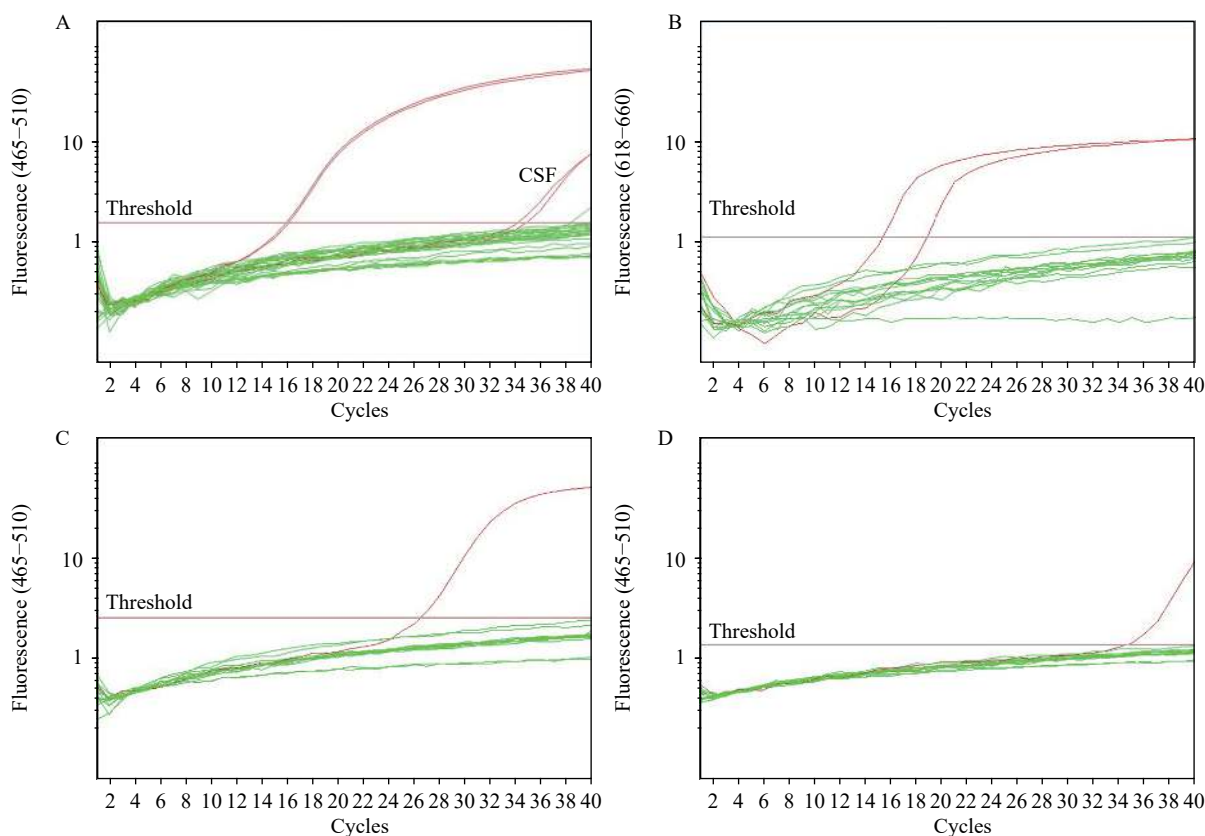


FIGURE 1. Identification of the first human infection case with monkey B virus by rtPCR. (A) The rtPCR test result for BV; (B) The rtPCR test result for VZV; (C) The rtPCR test result for monkeypox virus; (D) The rtPCR test result for orthopoxvirus. Note: For (A)–(D), rtPCR detections targeting to various virus in the 11 specimens collected from the patient (CSF, blister fluid, blood, airway aspirates, nasal swab) and 2 close contacts (throat swab, blister fluid and plasma). Each line represents a specimen, red lines represent positive controls or positive specimens, and green lines represent negative specimens. Abbreviations: CSF=cerebrospinal fluid, rtPCR=real-time polymerase chain reaction, BV=B virus, VZV=varicella zoster virus.

REFERENCES

- Eberle R, Jones-Engel L. Questioning the extreme neurovirulence of monkey B virus (*Macacine alphaherpesvirus 1*). *Adv Virol* 2018;2018: 5248420. <http://dx.doi.org/10.1155/2018/5248420>.
- Holmes GP, Hilliard JK, Klontz KC, Rupert AH, Schindler CM, Parrish E, et al. B virus (*Herpesvirus simiae*) infection in humans: epidemiologic investigation of a cluster. *Ann Intern Med* 1990;112(11):833–9. <http://dx.doi.org/10.7326/0003-4819-112-11-833>.
- Perelygina L, Patrusheva I, Manes N, Wildes MJ, Krug P, Hilliard JK. Quantitative real-time PCR for detection of monkey B virus (*Cercopithecine herpesvirus 1*) in clinical samples. *J Virol Methods* 2003;109(2):245–51. [http://dx.doi.org/10.1016/s0166-0934\(03\)00078-8](http://dx.doi.org/10.1016/s0166-0934(03)00078-8).
- Sugita S, Shimizu N, Watanabe K, Mizukami M, Morio T, Sugamoto Y, et al. Use of multiplex PCR and real-time PCR to detect human herpes virus genome in ocular fluids of patients with uveitis. *Br J Ophthalmol* 2008;92(7):928–32. <http://dx.doi.org/10.1136/bjo.2007.133967>.
- Ye F, Song JD, Zhao L, Zhang Y, Xia LX, Zhu LW, et al. Molecular evidence of human monkeypox virus infection, Sierra Leone. *Emerg Infect Dis* 2019;25(6):1220–2. <http://dx.doi.org/10.3201/eid2506.180296>.