Notes from the Field

A Case of Psittacosis — Qingdao City, Shandong Province, China, May 2023

Ying Li[1,2,&]; Bei Pan[3,&]; Wenzhe Xiao[4]; Lizhu Fang[3]; Lijie Zhang[1]; Fachun Jiang[3]; Jing Jia[1,3,#]; Huilai Ma[1,#]

A case of psittacosis was identified in Qingdao City, Shandong Province on May 4, 2023. The patient, a 69-year-old retired male, was admitted to a medical facility on April 22, 2023. His symptoms, which had persisted for two days prior to his admission, included a fever (reaching 38.4 °C at its peak), an escalating cough, and wheezing, none of which had been previously treated. Upon admission, the patient was placed on continuous low-flow oxygen, administered piperacillin/tazobactam as antibacterial therapy from April 22 to May 1, given ambroxol hydrochloride injections as an expectorant from April 22 to April 27, and provided panting and hydroprednisone as spasmolytic and anti-inflammatory treatment. He maintains a flock of carrier pigeons year-round, which he regularly releases.

On April 23, sputum samples from the patient were processed using 198 targeted next-generation sequencing (NGS) tests for respiratory pathogens. These tests detected *Chlamydia psittaci (C.psittaci)*, with two reads number exceeding 500. As illustrated in Figure 1, the results corresponded to the CP3 strain (*1*). The Shandong Provincial Center for Disease Control and Prevention subsequently confirmed the presence of *C. psittaci* in these samples using metagenomic NGS. Following these results on April 24, oral doxycycline was incorporated into the patient's treatment regimen, leading to an improvement in his condition. The patient was discharged on May 3. Meanwhile, fecal samples from the pigeons were collected for real-time polymerase chain reaction analysis, which returned positive results. It is noteworthy that the patient's family members, who had no close contacts with the pigeons, remained healthy and did not exhibit any signs of illness.

Psittacosis, a zoonotic disease attributable to *C. psittaci*, impacts humans, birds, and diverse animal populations (*2*). Some instances of psittacosis can exacerbate rapidly, leading to fatalities if the treatment is not administered promptly. Prominent reservoirs of infection encompass birds, especially parrots, seagulls, and pigeons. *C. psittaci* is categorized into nine distinct genotypes, reliant on the sequences of the outer membrane protein A gene (*3*). The disease mainly transmits to humans when they inhale bacteria present in bird feces or secretions during close contact, while direct transmission from human to human is uncommon. Despite its rarity (*4*), fewer than 10 cases of psittacosis have been reported annually in the US since 2010 (*5*). In China, most psittacosis cases are sporadic, with a small number of clusters reported in recent years (*6*–*7*). However, it is speculated by experts that there is significant underreporting and potential misdiagnosis of psittacosis (*5*), possibly owing to insufficient awareness about the disease and limited testing resources. In the present diagnostic case, NGS technology was deployed, factoring in the clinical manifestations and the patient's history of pigeon keeping.

This report denotes the inaugural case of psittacosis in Qingdao City, thereby necessitating an immediate call to action for implementing a prevention and control program within the region. This program must include systematic surveillance of pigeons, parrots, zoological gardens, and avian trading markets, with a particular focus on seagulls in Qingdao during the winter and spring seasons. Similarly, it is essential to promote awareness and education about psittacosis in the community.

Employment of multi-pathogen detection methodologies, including NGS, is recommended in scenarios of unexplained fevers. Clinicians need more training in the diagnosis and treatment of such conditions, as well as increased awareness of rare or newly emerging infectious diseases.

Funding: Chinese Field Epidemiology Training Program.

doi: 10.46234/ccdcw2023.121

Corresponding authors: Jing Jia, sdjiajing_1986@163.com; Huilai Ma, mahl@chinacdc.cn.

A

Chlamydia psittaci WC, complete genome

Sequence ID: CP003796.1 Length: 1172265 Number of matches: 1

Range 1: 684766 to 684866 GenBank Graphics

Score	Expect	Identities	Gaps	Strand
187 bits(101)	3e-43	101/101(100%)	0/101(0%)	Plus/Plus

```
Query  1       ATCGCACATTGCTTTAGAATGCACTCTACAAACCCATCCAAATATCACTCTTATAGGAGA  60
               ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  684766  ATCGCACATTGCTTTAGAATGCACTCTACAAACCCATCCAAATATCACTCTTATAGGAGA  684825

Query  61      AGAAATCGCAGAAAAGAATGTGCCTCTAAATACGATAATCC  101
               |||||||||||||||||||||||||||||||||||||||||||
Sbjct  684826  AGAAATCGCAGAAAAGAATGTGCCTCTAAATACGATAATCC  684866
```

B

Chlamydia psittaci CP3, complete genome

Sequence ID: CP003797.1 Length: 1168150 Number of matches: 1

Range 1: 58905 to 59005 GenBank Graphics

Score	Expect	Identities	Gaps	Strand
187 bits(101)	3e-43	101/101(100%)	0/101(0%)	Plus/Minus

```
Query  1       GCAGCCTTCCTAGCCTTAAACATTTGGGATCGCTTCGACATTTTCTGCACCTTAGGGGCA  60
               ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  59005   GCAGCCTTCCTAGCCTTAAACATTTGGGATCGCTTCGACATTTTCTGCACCTTAGGGGCA  58946

Query  61      TCCAATGGATACTTCAAATCAAGTTCGGCTGCATTCAACTT  101
               |||||||||||||||||||||||||||||||||||||||||||
Sbjct  58945   TCCAATGGATACTTCAAATCAAGTTCGGCTGCATTCAACTT  58905
```

FIGURE 1. Comparatively favorable BLAST results gained from targeted next-generation sequencing, with read numbers surpassing 500; results pertain to a psittacosis case identified in Qingdao City, Shandong Province, 2023. The BLAST results are delineated for (A) the most abundant and (B) the second most abundant read counts.

[1] Chinese Field Epidemiology Training Program, Chinese Center for Disease Control and Prevention, Beijing, China; [2] National Institute for Viral Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China; [3] Qingdao Municipal Center for Disease Control and Prevention, Qingdao City, Shandong Province, China; [4] Jiaozhou Center for Disease Control and Prevention, Qingdao City, Shandong Province, China.
[&] Joint first authors.

Submitted: May 19, 2023; Accepted: June 29, 2023

REFERENCES

1. Van Lent S, Piet JR, Beeckman D, van der Ende A, Van Nieuwerburgh F, Bavoil P, et al. Full genome sequences of all nine *Chlamydia psittaci* genotype reference strains. J Bacteriol 2012;194(24):6930 – 1. http://dx.doi.org/10.1128/jb.01828-12.
2. Cui ZQ, Meng L. Psittacosis pneumonia: diagnosis, treatment and interhuman transmission. Int J Gen Med 2023;16:1 – 6. http://dx.doi.org/10.2147/IJGM.S396074.
3. Geens T, Desplanques A, Van Loock M, Bönner BM, Kaleta EF, Magnino S, et al. Sequencing of the *Chlamydophila psittaci ompA* gene reveals a new genotype, E/B, and the need for a rapid discriminatory genotyping method. J Clin Microbiol 2005;43(5):2456 – 61. http://dx.doi.org/10.1128/jcm.43.5.2456-2461.2005.
4. Shi YF, Chen JX, Shi XH, Hu JJ, Li HT, Li XJ, et al. A case of *Chlamydia psittaci* caused severe pneumonia and meningitis diagnosed by metagenome next-generation sequencing and clinical analysis: a case report and literature review. BMC Infect Dis 2021;21(1):621. http://dx.doi.org/10.1186/s12879-021-06205-5.
5. Centers for Disease Control and Prevention (CDC). Surveillance and reporting. 2022. https://www.cdc.gov/pneumonia/atypical/psittacosis/surveillance-reporting/index.html. [2022-3-17].
6. Li N, Li SJ, Tan WM, Wang HH, Xu H, Wang DX. Metagenomic next-generation sequencing in the family outbreak of psittacosis: the first reported family outbreak of psittacosis in China under COVID-19. Emerg Microbes Infect 2021;10(1):1418 – 28. http://dx.doi.org/10.1080/22221751.2021.1948358.
7. Qin XC, Huang JW, Yang ZN, Sun XR, Wang W, Gong EH, et al. Severe community-acquired pneumonia caused by *Chlamydia psittaci* genotype E/B strain circulating among geese in Lishui city, Zhejiang province, China. Emerg Microbes Infect 2022;11(1):2715 – 23. http://dx.doi.org/10.1080/22221751.2022.2140606.