

SYNOPSIS

02/07/2020

Review of “A pneumonia outbreak associated with a new coronavirus of probable bat origin”

Article citation: Zhou P, Yang X, Wang X, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 2020 Feb 03 [Epub ahead of print]. Available from: <https://doi.org/10.1038/s41586-020-2012-7>

One-Minute Summary

- Laboratory analysis of samples from seven patients with severe pneumonia (six are seafood market peddlers or deliverers) admitted to an intensive care unit in Wuhan.

Patient testing:

- All 7 patients tested positive for 2019-nCoV by real-time PCR of respiratory specimens when sampled 7-18 days after symptom onset.
- 5 patients were available for additional sampling (oral swab, anal swab, and blood for PCR) 18-29 days after symptom onset and all tested negative. All 5 patients were still symptomatic and in hospital.
- These 5 patients were also tested by serology and were IgG positive for viral antibody, 3 of whom were also IgM positive.
- Serial antibody detection was done in one patient at 7, 8, 9, and 18 days after symptom onset. There was a rise in IgM and IgG at 8 and 9 days, respectively.

Genomic and viral analyses:

- Whole genome sequences of 2019-nCoV were obtained from five patients and were >99.9% identical to each other, 79.5% identical to SARS-CoV, and 96.2% identical to bat coronavirus.
- Phylogenetic analysis showed that 2019-nCoV is closely related to a bat coronavirus.
- Virus was isolated from a single patient and was shown to use angiotensin-converting enzyme 2 (ACE2) as a receptor for cell entry. ACE2 is the receptor for SARS-CoV.
- *In vitro* neutralization assays showed that 2019-nCoV was not able to infect cells when incubated with 2019-nCoV IgG-positive patient sera or horse anti-SARS-CoV serum, suggesting there is a potential for cross-reactivity with SARS-CoV antibody.

Additional Information

- Antibody detection was done by ELISA using a bat SARSr-CoV Rp3 nucleocapsid protein antigen (shows 92% amino acid identity to 2019-nCoV and no cross reactivity to other human coronaviruses except bat SARSr-CoV).
- The real-time PCR assay used the 2019-nCoV spike (S) gene as a target.
- 2019-nCoV was found to bind to ACE2 receptors from human, bat, swine and civet, but not mouse.
- 2019-nCoV does not use the same cell receptor as MERS-CoV (DPP4) or seasonal coronavirus (APN).

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Review of “A pneumonia outbreak associated with a new coronavirus of probable bat origin”. Toronto, ON: Queens’s Printer for Ontario; 2020.

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