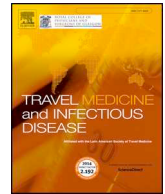




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Potential infectious risk from the pets carrying SARS-CoV-2

Dear Editor,

Since December 2019, novel coronavirus (SARS-CoV-2)-infected pneumonia (COVID-19) occurred in Wuhan, and rapidly spread worldwide. Despite the commonly assumption that SARS-CoV-2 originated from wild animals, the transmission capacity of SARS-CoV-2 from domestic animals to humans is inconclusive. Recently, one preliminary study (albeit not peer-reviewed) suggested that cats could be infected with SARS-CoV-2 [1]. In addition, Hong Kong Department of Agriculture, Fisheries and Conservation also reported a SARS-CoV-2-carrying pet dog from a COVID-19 patient family. Samples from the dog's mouth, nasal cavity, and anus were tested for the virus nucleic acid, and showed weakly positive in oral and nasal samples [2].

These aroused our great concern on the pets, mainly mammals, such as cats and dogs, which may be potential carriers of SARS-CoV-2. In the previous SARS-CoV infection, Martina et al. found an asymptomatic infection of SARS-CoV in cats and their transmission to healthy cats [3]. Mechanically, Yan et al. recently reported the three-dimensional structure of the SARS-CoV-2 surface S protein receptor binding domain and the cell surface receptor angiotensin-converting enzyme 2 (ACE2) full-length protein complex [4]. The findings greatly promoted our understanding of the infectious mechanism of SARS-CoV-2 on human cells. Paralleling this, ACE2 was also expressed in the kidney and myocardial tissues of cats and dogs [5]. Sequencing of domestic cat lung tissues further revealed 85% similarity in the amino acid between cat and ACE2. More importantly, three ACE2 domains associated with SARS-CoV in the cat have the highest homology with human ACE2, suggesting that cats may be involved in SARS-CoV-2 interspecies infection [6].

To prevent pets from transmitting SARS-CoV-2 to humans, surveillance and isolation should be emphasized. First, during the COVID-19 outbreak, the pet owners should not take their pets out to those high-risk areas, even if they do, the pets should be tested. Second, for diagnosed COVID-19 patients, their pets need a surveillance and isolation to rule out the possibility of infection. Finally, for the recovered owners, their pets should be also tested and kept in quarantine. These recovered patients might be re-infected when they lived with the SARS-CoV-2-carrying pets again after discharge. Recently, some previously

recovered COVID-19 patients had a positive virus detection. It was not clear whether it derived from the residual viruses in the body or the viruses in the environment from infected pets.

### Funding source

None.

### Declaration of competing interest

No competing interest.

### References

- [1] Zhang Q, Zhang H, Huang K, Yang Y, Hui X, Gao J, et al. SARS-CoV-2 neutralizing serum antibodies in cats: a serological investigation. *bioRxiv* 2020. <https://doi.org/10.1101/2020.04.01.021196>. (preprint) published online April 3.
- [2] A dog showed weakly positive to novel coronavirus (SARS-CoV-2). *Hong Kong Department of Agriculture, Fisheries and Conservation*. [https://www.news.gov.hk/chi/2020/02/20200228/20200228\\_093205\\_796.html](https://www.news.gov.hk/chi/2020/02/20200228/20200228_093205_796.html); February 28, 2020.
- [3] Martina BE, Haagmans BL, Kuiken T, Fouchier RA, Rimmelzwaan GF, Van Amerongen G, Peiris JS, Lim W, Osterhaus AD. SARS virus infection of cats and ferrets. *Nature* 2003;425:915.
- [4] Yan R, Zhang Y, Li Y, Xia L, Guo Y, Zhou Q. Structural basis for the recognition of the SARS-CoV-2 by full-length human ACE2. *Science* 2020. <https://doi.org/10.1126/science.abb2762>. published online March 4.
- [5] Larouche-Lebel É, Loughran KA, Oyama MA, Solter PF, Laughlin DS, Sánchez MD, Assenmacher CA, Fox PR, Fries RC. Plasma and tissue angiotensin-converting enzyme 2 activity and plasma equilibrium concentrations of angiotensin peptides in dogs with heart disease. *J Vet Intern Med* 2019;33:1571–84. <https://doi.org/10.1111/jvim.15548>.
- [6] Wang C, Tan YD, Guo AZ, Chen HC. Domestic cat ACE2 gene cloning, sequencing and bioinformatic analysis. *Wuhan Univ.J* 2005;51. <https://doi.org/10.3321/j.issn:1671-8836.2005.06.018>.

Haizhou Wang<sup>a,b,1</sup>, Fan Wang<sup>a,b,1</sup>, Hongling Wang<sup>a,b,\*\*</sup>, Qiu Zhao<sup>a,b,\*</sup>

<sup>a</sup> Department of Gastroenterology, Zhongnan Hospital of Wuhan University, Wuhan, China

<sup>b</sup> Hubei Clinical Center & Key Lab of Intestinal & Colorectal Diseases, Wuhan, China

E-mail addresses: [zhnwhl@whu.edu.cn](mailto:zhnwhl@whu.edu.cn) (H. Wang), [qiuzhao@whu.edu.cn](mailto:qiuzhao@whu.edu.cn) (Q. Zhao).

\* Corresponding author. Department of Gastroenterology, Zhongnan Hospital of Wuhan University, Wuhan, China.

\*\* Corresponding author. Department of Gastroenterology, Zhongnan Hospital of Wuhan University, Wuhan, China.

<sup>1</sup> Haizhou Wang and Fan Wang contributed equally to this Correspondence.