

# Serum banks for serological survey of SARS-CoV-2 and emerging infectious diseases

Jinghui Zhao<sup>1</sup>, Yanlong Cong<sup>2</sup>, Junfeng Li<sup>3</sup>, Yixue Sun<sup>4</sup>, Fengjie Wang<sup>3</sup>, Li-Feng Zhao<sup>5</sup>, Honghong Xue<sup>6</sup>, Li Guo<sup>5</sup>, Yongzhi Wang<sup>7</sup>, Xiaocheng Li<sup>1</sup>, and Xuelian Liu<sup>8</sup>

<sup>1</sup>State Key Laboratory of Direct-Fed Microbial Engineering Beijing DaBeiNong Science and Technology Group Co Ltd (DBN) Beijing 100192 China

<sup>2</sup>Jilin University

<sup>3</sup>Jilin Agricultural University Library

<sup>4</sup>Jilin Research & Development Center of Biomedical Engineering Changchun University Changchun 130022 China

<sup>5</sup>College of Animal Science and Technology Jilin Agricultural Science and Technology University Jilin 132101 China

<sup>6</sup>People's Government of Huanxi Township Chuanying District Jilin 132101 China

<sup>7</sup>Jilin Academy of Agricultural Sciences

<sup>8</sup>Jilin DaBeiNong Agriculture and Animal Husbandry Technology Co Ltd Changchun 130102 China

April 05, 2024

## Abstract

In June 2021, Udom et al. published their article in *Transboundary and Emerging Diseases* performing a serological survey revealed evidence of anti-N-IgG antibodies suggesting SARS-CoV-2 exposure in both dogs and cats during the first and second coronavirus disease 2019 (COVID-19) outbreaks in Thailand. Seroprevalence studies have proven an important tool to monitor the progression of the COVID-19 pandemic. The duration of immunity of SARS-CoV-2 is crucial for the course of the pandemic and for this reason the monitoring of antibodies against SARS-CoV-2 is important. The serum samples from different periods and regions were valuable in terms of scientific significance for serological survey of SARS-CoV-2 and emerging infectious diseases. In order to preserve the remaining serum samples and ensure the stability of anti-virus antibodies in storage serum samples, we strongly suggest that standard serum banks should be established worldwide.

DR. JINGHUI ZHAO (Orcid ID: 0000-0002-4564-8543)

Article type: Letters to the Editor

**Title: Serum banks for serological survey of SARS-CoV-2 and emerging infectious diseases**

Yanlong Cong<sup>1</sup>, Junfeng Li<sup>2</sup>, Yixue Sun<sup>3</sup>, Fengjie Wang<sup>2</sup>, Lifeng Zhao<sup>4</sup>, Honghong Xue<sup>5</sup>, Li Guo<sup>4</sup>, \*, Yongzhi Wang<sup>6</sup>, \*, Xiaocheng Li<sup>7</sup>, \*, Xuelian Liu<sup>8</sup>, \*, Jinghui Zhao<sup>8</sup>, <sup>7</sup>, \*

Laboratory of Infectious Diseases, College of Veterinary Medicine, Key Laboratory of Zoonosis Research, Ministry of Education, Jilin University, Changchun 130062, China

Jilin Agricultural University, Changchun 130118, China

3. Jilin Research & Development Center of Biomedical Engineering, Changchun University, Changchun 130022, China
4. College of Animal Science and Technology, Jilin Agricultural Science and Technology University, Jilin 132101, China
5. People's Government of Huanxi Township, Chuanying District, Jilin 132101, China
6. Jilin Academy of Agricultural Sciences, Changchun, 130033, China
7. State Key Laboratory of Direct-Fed Microbial Engineering, Beijing DaBeiNong Science and Technology Group Co., Ltd. (DBN), Beijing 100192, China
8. Jilin DaBeiNong Agriculture and Animal Husbandry Technology Co., Ltd, Changchun 130102, China

**\* Correspondence:**

Li Guo, College of Animal Science and Technology, Jilin Agricultural Science and Technology University, Jilin 132101, China.

piaogl110@163.com

Yongzhi Wang, Jilin Academy of Agricultural Sciences, Changchun, 130033, China

E-mail: yzwang@126.com

Xiaocheng Li, Jilin DaBeiNong Agriculture and Animal Husbandry Technology Co., Ltd, Changchun 130102, China.

E-mail: lxch\_215@yeah.net

Xuelian Liu, State Key Laboratory of Direct-Fed Microbial Engineering, Beijing DaBeiNong Science and Technology Group Co., Ltd. (DBN), Beijing 100192, China.

E-mail: liuxuelian@dbn.com.cn

Jinghui Zhao, Jilin DaBeiNong Agriculture and Animal Husbandry Technology Co., Ltd, Changchun 130102, China.

E-mail: zhaojinghui8791@163.com; zhaojinghui8791@hotmail.com

Yanlong Cong, Junfeng Li, Yixue Sun, Fengjie Wang and Lifeng Zhao contributed equally to this article, and all should be considered first author.

**Keywords:** Serum bank; SARS-CoV-2; Serological survey; Emerging infectious diseases

**Abstract**

In June 2021, Udom et al. published their article in *Transboundary and Emerging Diseases* performing a serological survey revealed evidence of anti-N-IgG antibodies suggesting SARS-CoV-2 exposure in both dogs and cats during the first and second coronavirus disease 2019 (COVID-19) outbreaks in Thailand. Seroprevalence studies have proven an important tool to monitor the progression of the COVID-19 pandemic. The duration of immunity of SARS-CoV-2 is crucial for the course of the pandemic and for this reason the monitoring of antibodies against SARS-CoV-2 is important. The serum samples from different periods and regions were valuable in terms of scientific significance for serological survey of SARS-CoV-2 and emerging infectious diseases. In order to preserve the remaining serum samples and ensure the stability of anti-virus antibodies in storage serum samples, we strongly suggest that standard serum banks should be established worldwide.

**Dear Editor,**

In June 2021, Udom et al. published their article in *Transboundary and Emerging Diseases* performing a serological survey revealed evidence of anti-N-IgG antibodies suggesting SARS-CoV-2 exposure in both dogs and cats during the first and second coronavirus disease 2019 (COVID-19) outbreaks in Thailand (Udom et al. 2021). Seroprevalence studies have proven an important tool to monitor the progression of the COVID-19 pandemic (Cuellar et al. 2020). The duration of immunity of SARS-CoV-2 is crucial for the course of the pandemic and for this reason the monitoring of antibodies against SARS-CoV-2 is important. The serum samples from different periods and regions were valuable in terms of scientific significance for serological survey of SARS-CoV-2 and emerging infectious diseases (Deng et al. 2020; Stranieri et al. 2021; Van Aart et al. 2021; Zhao et al. 2021). In order to preserve the remaining serum samples and ensure the stability of anti-virus antibodies in storage serum samples, we strongly suggest that standard serum banks should be established worldwide.

The key to this study was the 3215 serum samples from dogs (n = 2102) and cats (n = 1113), which were collected from six zones of Bangkok and nearby provinces (Nakhon Pathom, Nonthaburi, Pathum Thani, Samut Sakhon and Samut Prakan) in Thailand. According to the manuscript, “Approximately 3 ml of blood was collected from each animal, and serum was separated by centrifugation and then stored at -20 until use”. Notably, the transportation conditions and time between blood sampling and detection of the serum samples were not mentioned in the manuscript. There is no evidence regarding the stability of SARS-CoV-2-specific antibodies during different storage temperature and time. The stability of the anti-SARS-CoV-2 immunoglobulin may influence the results and conclusion of the study. The transportation storage conditions of the serum samples should be included in description of serological surveys of SARS-CoV-2 in the future (Weidinger et al. 2021).

Besides the SARS-CoV-2, the samples from the serum bank should be used for serological studies of other emerging infectious diseases in the future (Ayouba et al. 2019; Barua et al. 2021; Kumar et al. 2020). The establishment of serum banks should consider the following three points. First, the samples should be collected from people, animals and bats from different regions and times, especially the remaining serum samples from previously serological surveys (Ayouba et al. 2019; Barua et al. 2021; Deng et al. 2020; Kumar et al. 2020). Second, the serum samples should be evaluated using formulated exclusion and inclusion criteria before being included in the serum bank. Third, serum banks should include standard preservation conditions and sample background (Cuellar et al. 2020). All steps from blood sample collection to cold-chain transportation should be in accordance with the standard operating procedures (Weidinger et al. 2021).

Thank you for your attention in considering this comment and we are looking forward to your response.

### **Conflicts of interest**

The authors declare no conflict of interest relevant to this article.

### **Acknowledgments**

This work was supported by the National Natural Science Foundation of China under Grant number 32072893 and 31772750, Key Project of Scientific Research and Planning of Jilin Provincial Department of Education under Grant number JJJ [2019] No.73 and Research and innovation team of new veterinary diagnostic reagents and reference materials of Jilin Provincial Department of science and technology Talent project.

### **REFERENCE**

Ayouba, A., Ahuka-Mundeke, S., Butel, C., Mbala Kingebeni, P, Loul, S., Tagg, N., Villabona-Arenas, C.J., Lacroix, A., Ndimbo-Kumugo, S.P., Keita, A.K., Toure, A., Couacy-Hymann, E., Calvignac-Spencer, S., Leendertz, F.H., Formenty, P., Delaporte, E., Muyembe-Tamfum, J.J., Mpoudi Ngole, E. & Peeters, M. (2019). Extensive Serological Survey of Multiple African Nonhuman Primate Species Reveals Low Prevalence of Immunoglobulin G Antibodies to 4 Ebola Virus Species. *J. Infect. Dis.*, 220(10):1599-1608. <https://doi.org/10.1093/infdis/jiz006>.

- Barua S., Hoque M., Adekanmbi F., Kelly P., Jenkins-Moore M., Torchetti M.K., Chenoweth K., Wood T., Wang C.. (2021). Antibodies to SARS-CoV-2 in dogs and cats, USA. *Emerg Microbes Infect* , 10(1):1669-1674. <https://doi.org/10.1080/22221751.2021.1967101>.
- Cuellar, J., Dub, T., Sane, J. & Hytönen, J. (2020). Seroprevalence of Lyme borreliosis in Finland 50 years ago. *Clin. Microbiol. Infect* ., 26(5):632-636. . <https://doi.org/10.1016/j.cmi.2019.10.003>.
- Deng, J., Jin, Y., Liu, Y., Sun, J., Hao, L., Bai, J., Huang, T., Lin, D., Jin, Y. & Tian, K. (2020). Serological survey of SARS-CoV-2 for experimental, domestic, companion and wild animals excludes intermediate hosts of 35 different species of animals. *Transbound Emerg Dis* . 67(4):1745-1749.<https://doi.org/10.1111/tbed.13577>.
- Kumar, H.B.C., Dhanze, H., Bhilegaonkar, K.N., Chakurkar, E.B., Kumar, A. & Yathish,H.M. (2020). Serological evidence of Japanese encephalitis virus infection in pigs in a low human incidence state, Goa, India.*Prev. Vet. Med.*, 175:104882. <https://doi.org/10.1016/j.prevetmed.2020.104882>.
- Stranieri, A., Lauzi, S., Giordano, A., Galimberti, L., Ratti, G., Decaro, N., Brioschi, F., Lelli, D., Gabba, S., Amarachi, N. L., Lorusso, E., Moreno, A., Trogu, T., & Paltrinieri, S. (2021). Absence of SARS-CoV-2 RNA and anti-SARS-CoV-2 antibodies in stray cats.*Transbound. Emerg. Dis* , 1–7. <https://doi.org/10.1111/tbed.14200>
- Udom, K., Jairak, W., Chamsai, E., Charoenkul, K., Boonyapisitsopa, S., Bunpapong, N., Techakriengkrai, N., & Amonsin, A. (2021). Serological survey of antibodies against SARS-CoV-2 in dogs and cats, Thailand.*Transbound. Emerg. Dis* , 1–8. <https://doi.org/10.1111/tbed.14208>
- Van Aart, A. E., Velkers, F. C., Fischer, E. A. J., Broens, E. M., Egberink, H., Zhao, S., Engelsma, M., Hakze-van der Honing, R. W., Harders, F., de Rooij, M. M. T., Radstake, C., Meijer, P. A., Munnink, B. B. O., de Rond, J., Sikkema, R. S., van der Spek, A. N., Spiereburg, M., Wolters, W. J., Smit, L. A. M. (2021). SARS-CoV-2 infection in cats and dogs in infected mink farms. *Transbound. Emerg. Dis* , 1–7. <https://doi.org/10.1111/tbed.14173>
- Weidinger, P., Kolodziejek, J., Camp, J. V., Loney, T., Kannan, D. O., Ramaswamy, S., Tayoun, A. A., Corman, V. M., & Nowotny, N. (2021). MERS-CoV in sheep, goats, and cattle, United Arab Emirates, 2019: Virological and serological investigations reveal an accidental spillover from dromedaries. *Transbound. Emerg. Dis* , 1–7. <https://doi.org/10.1111/tbed.14306>
- Zhao Y, Yang Y, Gao J, et al. (2021). A serological survey of severe acute respiratory syndrome coronavirus 2 in dogs in Wuhan.*Transbound Emerg Dis*, 00:1–7. <https://doi.org/10.1111/tbed.14024>