TIGER IN NEW YORK ZOO

On April 5, the USDA National Veterinary Services Laboratories confirmed SARS-CoV-2 in one tiger in a zoo in New York. This is the first instance of a tiger being infected with COVID-19. Samples from the tiger were obtained and tested after several lions and tigers at the zoo showed clinical signs of respiratory illness. Public health officials believe the large cats became sick after exposure to an employee who was actively shedding virus. The zoo was closed in mid-March and the first tiger began showing clinical signs on March 27. All of the large cats are expected to recover and no other animals in the zoo are exhibiting clinical signs of disease. USDA and CDC are continuing to monitor the animals, and state animal and public health officials will determine whether other animals, at this zoo or in other areas, should be tested for SARS-CoV-2. The OIE will also be notified.

FROM THE LITERATURE

A preprint of a research article posted online on March 30 at bioRxiv has raised public concern that cats and ferrets might be able to be infected with SARS-CoV-2 and transmit the virus to other animals. A 2003 Brief Communication published in the journal *Nature* during the SARS outbreak similarly provided results of the experimental infection of cats and ferrets with the related virus, SARS-CoV. We emphasize caution in not overinterpreting the results described in these articles, and also not extrapolating them to the potential for SARS-CoV-2 to naturally infect or be transmitted by companion animals kept as pets. Our rationale is as follows:

- Papers published at bioRxiv are preliminary reports that have not been peer-reviewed. A disclaimer on the website notes papers posted there "should not be regarded as conclusive, guide clinical practice/health-related behavior, or be reported in news media as established information."
- Experimentally induced infection does not mirror naturally induced infection. Just because an animal can be experimentally infected with a virus does not mean that it will be naturally infected with that same virus.
- The numbers of animals used in these experiments were very small and the conclusions drawn are based on data points collected from these very few animals—in some cases, as few as two animals were included.
- Only two of six uninfected cats in the 2020 study became infected via transmission of SARS-CoV-2 from experimentally infected cats. Results from so few animals should not be used as conclusive evidence that infected cats can readily transmit COVID-19, particularly under natural conditions.

A second preprint, posted on April 3 at bioRxiv, described an investigation into the possibility that cats were exposed to SARS-CoV-2 and mounted an antibody response against the virus during the initial outbreak of COVID-19 in Wuhan, China. Again, a disclaimer on the bioRxiv website notes papers posted there "should not be regarded as conclusive, guide clinical practice/health-related behavior, or be reported in news media as established information."

- Blood was collected from 39 cats prior to the onset of the outbreak (March-May 2019) and 102 cats after the onset (January-March 2020) and sera stored before testing.
- Antibodies against SARS-CoV-2 were not detected in any samples collected prior to the outbreak, suggesting that virus was not circulating in Wuhan prior to the onset of the outbreak
- After the outbreak, SARS-CoV-2-specific antibodies were detected in 15 of 102 serum samples obtained from cats (14.7%). These 15 cats either lived with an owner who had COVID-19 (n=3), at a veterinary clinic (n=6), or on the street as strays until they were moved to an animal shelter after the onset of the outbreak (n=7).
- It was not reported how many of the 87 cats that were seronegative for SARS-CoV-2 lived with people who had COVID-19.
- Eleven of the ELISA-positive samples were also positive via a tissue culture-based virus neutralizing test (VNT). The highest titers of neutralizing antibodies (1:360 or 1:1080) were found in samples from the three cats that lived with owners who had COVID-19; four cats did not have detectable neutralizing antibodies, and all other titers were < 1:40.
- The results of serology from more than 100 cats in Wuhan during the peak of the outbreak provide initial evidence that cats can be exposed to the virus, likely by infected people, and mount an antibody response.
- However, the low seroconversion rate and low to non-existent titers of virus neutralizing antibodies in all but the three cats who lived with people diagnosed with COVID-19 suggests that cats may not be readily infected with SARS-CoV-2 under natural conditions.
- The significance of this low level of exposure resulting in seroconversion to development of virus-mediated disease in cats or transmission of the virus from cats to other animals, including people, is not known.

Nothing in these research articles provides conclusive evidence that cats, ferrets, or other domestic animals can be readily infected with SARS-CoV-2, nor do they demonstrate that cats, ferrets or other domestic animals transmit the virus under natural conditions.

Despite the number of global cases of COVID-19 surpassing the one million mark as of April 2, 2020, we have only seen examples of two dogs and one cat in Hong Kong, and a tiger in New York, that had positive results of tests for infection. None of the dogs or cats determined to be positive showed signs of illness consistent with COVID-19. The two dogs and one cat lived closely with one or more people with a confirmed diagnosis and clinical symptoms of COVID-19. No conclusions can responsibly be drawn regarding the cat in Belgium because of questions surrounding collection and analysis of samples for testing for SARS-CoV-2 and the absence of an evaluation of that cat for other, more common causes for its clinical signs. The tiger was said to be exposed via contact with a zoo employee who was actively shedding virus, and some other large cats at the zoo that were apparently housed in proximity did exhibit signs of respiratory disease, but are expected to recover. There have been no reports of pets or livestock becoming ill with COVID-19 in the United States. At this point in time, there is also no evidence that domestic animals, including pets and livestock, can spread COVID-19 to people.

Therefore, the AVMA maintains its recommendations regarding SARS-CoV-2 and companion animals. These recommendations, which are supported by guidance from the US Centers for Disease Control and Prevention (CDC) and World Organization for Animal Health (OIE), indicate that:

- Animal owners without symptoms of COVID-19 should continue to practice good hygiene during interactions with animals. This includes washing hands before and after such interactions or handling animal food, waste, or supplies.
- Out of an abundance of caution, and until more is known about the virus, those ill with COVID-19 should restrict contact with pets and other animals, just as you would restrict your contact with other people. Have another member of your household or business take care of feeding and otherwise caring for any animals, including pets. If you have a service animal or you must care for your animals, including pets, then wear a facemask; don't share food, kiss, or hug them, and wash your hands before and after any contact with them.
- There have been no reports of pets or livestock becoming ill with COVID-19 in the United States. At this point in time, there is also no evidence that domestic animals, including pets and livestock, can spread COVID-19 to people.

Companion animals should not be routinely tested for COVID-19 at this time. Animals that are ill or injured should receive veterinary care. The owner or animal caretaker should first consult with the veterinarian via phone to determine whether an in-clinic examination is needed. Where appropriate, testing for infectious diseases that commonly cause companion animal illness should be conducted. If a new, concerning illness is observed that cannot be otherwise explained, and the companion animal has had close and prolonged contact with a person with confirmed or suspected COVID-19 infection, the veterinarian should contact the state public health veterinarian or designated health official to discuss whether or not there is a need to test that animal for COVID-19.

While these are recommended as good practices, it is important to remember that there is currently little to no evidence that pets or other domestic animals that are naturally exposed to SARS-CoV-2 become sick with COVID-19 or spread the virus to other domestic animals, and no evidence that they can transmit SARS-CoV-2 to people. Accordingly, there is no reason to remove pets from homes even if COVID-19 has been identified in members of the household, unless there is risk that the pet itself is not able to be cared for appropriately. During this pandemic emergency, pets and people each need the support of the other and veterinarians are there to support the good health of both.

Testing companion animals

With the exception of the single report of illness in a cat in Belgium, which could not be confirmed, there have not been additional reports of pets or other domestic animals becoming ill subsequent to natural exposure to SARS-CoV-2, and there is no reason to think that domestic animals, including pets, in the United States might be a source of infection with the coronavirus

that causes COVID-19. To date, the CDC has not received any reports of pets or other animals becoming sick with COVID-19 in the United States. As such, routine testing of domestic animals for COVID-19 is not being recommended by the AVMA, CDC, USDA, or the American Association of Veterinary Laboratory Diagnosticians (AAVLD). Because the situation is ever-evolving, public and animal health officials may decide to test certain animals out of an abundance of caution. In the United States, the decision to test will made collaboratively between local, state, and federal animal and public health officials. Answers to questions frequently asked by state animal and public health officials and the public are available from USDA.

After the decision is made to test, state animal health officials will designate a state-appointed veterinarian, USDA-accredited veterinarian, or foreign animal disease diagnostician to collect the sample using appropriate personal protective equipment (PPE) and sample collection methods. If you have an animal in Georgia that you feel should be tested, please contact the State Veterinarian's office at the Georgia Department of Agriculture at 404-656-3671 or USDA APHIS, Veterinary Services at 770-761-5421.

Again, current expert understanding is that COVID-19 is primarily transmitted person-to-person. This supports a recommendation against testing of domestic animals for SARS-CoV-2, except by official order. If domestic animals, including dogs or cats, present with respiratory or gastrointestinal signs, veterinarians should test for more common pathogens and conditions.