

SARS-CoV-2 infection in dogs and cats

Can SARS-CoV-2 infect dogs, cats and other animals?

We don't really know. Preliminary evidence suggests that one dog in Hong Kong that lived with a person infected with the virus tested positive multiple times over multiple days. This suggests that the dog was in fact infected, rather than just contaminated with the virus. Subsequently, a second dog tested positive by RT-PCR. Neither dog showed clinical signs (the first dog died after quarantine from causes unrelated to the virus). In mid-March, 2020, the World Health Organization stated that there is no evidence at present that dogs and cats can be infected with SARS-CoV-2, develop the disease, or spread the disease. It is important to note that SARS-CoV-2 was not isolated from the first dog in Hong Kong – only RNA was identified via RT-PCR, although subsequent serological testing identified antibodies in the dog's blood confirming infection.

In late March 2020, a cat living with an infected person in Belgium tested positive for SARS-CoV-2 virus. The viral RNA was identified in the cat's feces. A second cat tested positive in Hong Kong via RTPCR on March 31 2020, with viral RNA identified from oral, nasal and rectal samples. The first cat showed vomiting, diarrhea and respiratory signs. The second cat showed no clinical signs.

Ferrets have been infected experimentally, and variably showed clinical signs of fever, decreased activity and some coughing.

SARS-CoV-2 utilizes two receptors in humans: It binds Angiotensin-Converting Enzyme 2 (ACE2) and then fuses with the cell membrane with help from a type-II transmembrane serine protease (TMPRSS2) (similar to the original SARS virus in the early 2000s). Sequence homology for ACE2 at the critical

binding sites suggests that SARS-CoV-2 might be able to bind to ACE2 receptors in cats and ferrets. Given the findings from the one dog in Hong Kong (see Worms-and-Germs Blog), we can reasonably suspect that dogs might also bind the virus. Rats and mice appear not to be able to bind the virus, because their ACE2 receptors are different enough from those of dogs or cats.

Infection, however, requires additional steps than just virus binding and membrane fusion. Viral replication, avoiding the host immune response etc. are also necessary components of infection and potential transmission.

Can infected dogs and cats transmit the disease to people?

This is changing. Although no transmission from animal to human has been documented, a new study found that ferrets and cats (but not dogs) could be infected, and infected cats could transmit virus to other cats (transmission between ferrets was not tested). Experimentally infected dogs developed antibodies and viral RNA (but not live virus) was detected in feces from the infected dogs. Uninfected dogs did not appear to become infected.

To date, all transmission has been human-to-human, after the initial jump from bats (most likely) to humans. It is worth noting that the original SARS virus could also bind to the dog and cat ACE2 receptor, but no reported cases of pet-to-human transmission of that virus were ever reported, although that outbreak was much smaller and investigation of domestic animals was limited.

Consequently, caution should be taken when handling pets of people who are known to be infected, especially cats or ferrets. Precautions should be also adopted when handling dogs of infected people, however, the risk with dogs transmitting infection to humans appears, for the moment, lower than it might be with cats or ferrets.

Can dogs and cats act as fomites and transmit the disease to people?

This question has been addressed by the AVMA. Here is the direct quotation:

“COVID-19 appears to be primarily transmitted by contact with an infected person’s bodily secretions, such as saliva or mucus droplets in a cough or sneeze. COVID-19 might be able to be transmitted by touching a contaminated surface or object (i.e., a fomite) and then touching the mouth, nose, or possibly eyes, but this appears to be a secondary route. Smooth (non-porous) surfaces (e.g., countertops, door-knobs) transmit viruses better than porous materials (e.g., paper money, pet fur), because porous, and especially fibrous, materials absorb and trap the pathogen (virus), making it harder to contract through simple touch.

Because most pet hair is porous and also fibrous, it is very unlikely that a person would contract COVID-19 by petting or playing with a pet. However, because animals can spread other diseases to people and people can also spread diseases to animals, it’s always a good idea to wash hands before and after interacting with animals; ensure the pet is kept well-groomed; and regularly clean the pet’s food and water bowls, bedding material, and toys.”

Could the SARS-CoV-2 virus cause clinical disease in dogs, cats or ferrets?

We don’t know. The two dogs that might be infected in Hong Kong showed no clinical signs. The closely related SARS virus did not cause disease in cats (but cats were able to transmit the virus to other cats). In contrast, disease did occur in experimentally infected ferrets. There is currently no evidence that domestic animals can develop disease from this virus or, if infected, transmit it to other animals or people. However, study of animals to date has been limited.

Should I (can I) test a pet for SARS-CoV-2?

Many animal diagnostic laboratories are not currently set up to test for this specific coronavirus. Some are, and might be able to test animals with known exposure. For example, if the

owner is infected (confirmed), it could be possible for them to ask for testing of their pet dog or cat (or ferret). However, given that the current data suggest that these pets are not infective to people, the rationale for doing this is questionable.

The dilemma about testing pets increases, given that any owner with a known infection (has tested positive) should be quarantined, and their pet should be considered, from a health-and-safety perspective to also be contaminated or infected. Consequently, you would be required to adopt precautions to prevent infection, by wearing PPE, a face mask, and face shield (to prevent contact from the pet's contaminated haircoat, or, if infected, saliva or droplets getting into your conjunctival mucosa) etc. Most clinicians are not set up to do this. If an infected owner contacts you, referral to the CDC is likely the most appropriate response –consider it “above your pay grade”.

What disinfectants can I use to decontaminate surfaces?

The CDC has provided information for the public about decontaminating and disinfecting surfaces.

A group of German investigators has identified several commonly available disinfectants that should inactivate SARS-CoV-2. These include:

- Isopropyl alcohol (70%) – commonly called “rubbing alcohol”.
- Bleach – this can be diluted by putting 20 mls of bleach into 1L of water
- 0.5% hydrogen peroxide
- 0.1% sodium hypochlorite

Source: <https://www.vin.com/covid/>