



Poultry Health Services

Some questions and answers about Coronavirus disease 2019 (COVID-19)

There is a great deal of information about coronavirus in the news and on social media. It can be hard to know what is factual and what you need to understand to make sense of the risks. The vets at Poultry Health Services would like to share some key concepts and definitions to help you navigate the information already circulating.

Are avian coronaviruses infecting humans?

No, avian coronaviruses are not infecting humans as they are a different class of coronavirus (gammacoronavirus).

Can humans be infected with the coronaviruses commonly found in birds (like Infectious Bronchitis Virus – [IBV])?

There is no evidence of humans becoming infected with coronaviruses commonly found in birds and we have been studying avian coronaviruses since 1930! We think this is because of major differences between the viruses and the avian receptor proteins.

Can humans give COVID-19 to chickens and turkeys?

This is highly unlikely, as COVID-19 is a betacoronavirus which usually only affect mammals. Even if a flock of chickens or turkeys were exposed to humans infected with COVID-19, they wouldn't become infected.

Are poultry products safe to eat?

Yes, poultry products are safe to eat.

Who cares that birds don't carry COVID-19 and that it is not a risk for them?

We do, because bird health, welfare and food safety is our passion at Poultry Health Services!

Still have more questions?

If you want to learn more, please read on. While you may not have heard of coronavirus until lately, these are very common viruses - in fact, so common that coronavirus infections are usually called "the common cold".

Coronaviruses are members of a large family of viruses named *Coronaviridae*. Within this family exists the subfamily Coronavirinae subdivided by four genera (i.e. alphacoronavirus, betacoronavirus, gammacoronavirus, deltacoronavirus).

Coronaviruses get their name from the Spanish word "corona", which means "crown" based on how the virus surface proteins look like the ridged edges of a crown. The surface proteins are also important because they determine which receptor proteins they can attach to on the host they infect. Alphacoronaviruses, many of which cause the common cold in humans, change over time and most populations are exposed every year and develop immunity to similar viruses.

The virus in the news right now (Covid-19) is a betacoronavirus which can infect humans and other mammals like pigs and dogs, and likely originated in bats. Betacoronaviruses occasionally adapt from other mammalian species (SARS from bats and civets and MERS from camelids) to be able to infect humans because our populations are not regularly exposed. Betacoronaviruses can cause more severe illness than the alphacoronaviruses we usually see.

So what is the story with COVID-19?

The story on COVID-19 is still being written and we have referenced some of the authors on recent papers if you are interested in reading more. On December 12, 2019, a group of 27 individuals with a severe and potentially lethal respiratory infection were reported to be infected by a novel coronavirus in Wuhan, the seventh most populous Chinese city with a population of ~12 million people (Biscayart et al., 2020; Zhou et al., 2020). The epidemic, which was linked to a Seafood Wholesale Market where wild and domesticated animals were sold illegally (Ahmad et al.,

2020), has grown to a total of 109,965 confirmed cases and 3,824 deaths across 108 countries (195 worldwide) as of March 8, 2020 at 6:53 p.m. (E. Dong, Du, & Gardner, 2020; E. Dong, Du, H., Gardner, L., 2020) The disease in humans has been named as Coronavirus disease 2019 (COVID-2019) and the novel coronavirus causing it is SARS-CoV-2. The virus genome has been published and is highly similar (96.2%) to one found in bats (RaTG13) (Zhou et al., 2020), suggesting bats as the most likely source of the virus as it was the case for the first SARS virus (Salata, Calistri, Parolin, & Palu, 2019).

1. What is a “coronavirus”?

A coronavirus refers to a member of a large family of viruses named *Coronaviridae*. Within this family, exists the subfamily Coronavirinae subdivided by four genera (i.e. alphacoronavirus, betacoronavirus, gammacoronavirus, deltacoronavirus). These viruses can cause disease in a variety of animal species. Some examples of important coronaviruses are: the Human Coronavirus, which causes the common cold; Porcine Epidemic Diarrhea Virus, which causes diarrhea and mortality in young piglets; Canine Coronavirus, causing mild to severe gastroenteritis in dogs; Avian Infectious Bronchitis Virus (IBV), causing respiratory infection in chickens, and Turkey Coronavirus (TCoV), causing enteritis in young turkeys (Malik et al., 2020; Swayne, 2020).

Coronaviruses important for humans are alphacoronaviruses (Common cold) and betacoronaviruses (COVID-19), which infect mammals (e.g. humans, pigs, dogs, bats). Evidence suggests that SARS-CoV-2 was originally a virus from bats that now infects humans. No evidence exists of any avian coronavirus causing disease or infection in humans (Swayne, 2020),

2. Are there other coronaviruses that were transmitted to humans from animals (zoonosis)? Where is this virus (SARS-CoV-2) coming from?

Two other instances are known in which other animal coronaviruses affected humans. The first appeared in China in the year 2002 and caused a disease called “Severe Acute Respiratory Syndrome” (SARS), which was caused by SARS-CoV a virus originated from bats and passaged in masked palm civets before infecting humans (Cui, Li, & Shi, 2019). The second virus appeared in 2012 and caused the lethal Middle East Respiratory Syndrome (MERS), and it was caused by MERS-CoV a virus from camelids that evolved from a bat virus ancestor approximately 30 years ago (Muller et al., 2014).

This SARS-CoV-2 virus is clustered in the same genus as the original SARS virus. It came from bats and it presumably had an intermediate host, although it has not yet been identified (Li et al., 2020; Salata et al., 2019).

3. Can IBV infect humans? How different is the virus from other zoonotic viruses?

All these zoonotic viruses (SARS-CoV, SARS-CoV-2, and MERS) naturally infect bats, have been passaged in a mammalian intermediate host for some time ranging between years/weeks, and are classified within the *Betacoronavirus* genus. Furthermore, humans and bats share some similarities in the receptor proteins (ACE2 for SARS-CoV and SARS-CoV-2; and DPP4 for MERS) (Salata et al., 2019). On the other hand, IBV and TCoV, are classified in a different genus *gammacoronavirus*, which is known for including viruses infecting mostly birds. To date, there is no evidence of any of these gammacoronaviruses affecting humans (Swayne, 2020). This lack of evidence, considering human closeness to chickens, and IBV, discovered in 1930 without any reported zoonotic event, are suggestive of deep virus-host differences between birds and humans that render it difficult for an avian virus to break the species barrier and become zoonotic.

We hope this was informative. If you have questions or want to learn more about how we help keep birds healthy and help our clients produce the best poultry products, contact us at phsinfo@poultryhealth.ca or visit our website: www.poultryhealth.ca.



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