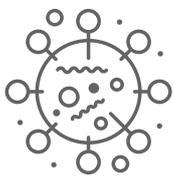




COVID-19 Q&A

With UWA novel viruses expert
Associate Professor Allison Imrie.

What is a novel virus and how often does one occur?



Novel viruses are viruses we did not know about until they were identified – by investigating an outbreak of a new

disease, by looking for novel viruses, or accidentally while investigating something different. We can easily find thousands, even millions, of new viruses if we look, but we are mostly interested in those viruses that cause human disease. The technologies we have developed, and which we can access quite easily now, allow us to identify new viruses very quickly.

How does a virus jump from animals to humans?

Animal viruses that are able to infect humans are those that can attach to and enter human cells; most animal viruses cannot do this. Those animal viruses that can cross the ‘species barrier’ and infect humans do so when we expose ourselves to animals and environments where these animal viruses normally circulate. The way we live now is very different to how we lived for centuries before, and as we continue to alter the environment around us, so we bring ourselves into greater contact with animal viruses that we would not have encountered before.

Are there certain at-risk animals in which this is more likely to occur?

Bats are recognised as ‘reservoir hosts’ of zoonotic viruses; those viruses that infect animals. There are more than 500 bat species and many viruses have been described that infect bats, sometimes establishing chronic infections, and these viruses infect other animals and also humans. Humans can either contract viral infections directly from bats or from animals infected with viruses from bats. These other animals act as ‘amplifying hosts’ and produce high levels of virus. When humans come in contact with these animals, they can then be infected.



What behaviours around the globe and locally in WA increase the risk of a virus jumping from animals to humans?

Wet markets bring humans into close contact with animals which may have been infected with bat viruses. Trapped animals are stressed and, in that condition, may be excreting high concentrations of virus in faeces and in blood. Humans who come in contact with these body fluids are susceptible to infection by exposure to blood and/or respiratory droplets.

Exposure to animal viruses can also occur via direct contact with saliva and via bites, for example by rabid dogs, or by handling animals hunted as game. The rabies virus enters the human body most commonly via bites but can also enter after contact with mucous membranes (eyes, nose, respiratory tract) or through cuts in the skin.

Influenza viruses (IV) are viruses of birds, and novel IV may be variant viruses that enter humans for the first time; for example, H1N1 in 2009, and the three influenza pandemics of the 20th century caused by new strains of the viruses that humans had not encountered before.

For WA residents, it is very unlikely you will contract COVID-19 or any other exotic, virulent virus from your pet, but it’s probably wise not to kiss your dog or let them lick your dinner plate in any case!

What is it about a virus that makes it easy to pass on?



This can be because of the virus itself – it is able to infect human cells and tissues that in turn allow more efficient transmission

– for example, a virus that infects the respiratory tract is more transmissible between people than a virus that infects nerves. Also, some human hosts may be more infectious than others. ‘Superspreaders’ are people who have been reported to infect many more people than they might otherwise be expected to.



How did recent pandemic viruses emerge?

SARS-CoV (SARS) emerged in China in November 2002 and first infected humans in the Guangdong province of

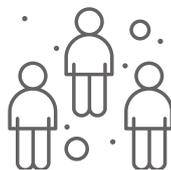
southern China. Transmission was brought under control by July 2003, about eight months after emergence.

Case numbers: The epidemic that occurred from 2002-2003 resulted in more than 8,000 cases, with 774 deaths (~10% mortality) in 26 countries, originally in Southeast Asia: southern China, Hong Kong, Singapore, Vietnam and Taiwan, and then spreading to other countries, including Canada.

What was the crucial turning point that led to getting it under control? Transmission was contained by intensive public health measures, by interruption of human-to-human transmission, via syndromic surveillance, prompt isolation of patients, strict enforcement of quarantine of all contacts, and community quarantine in some areas.

SARS-CoV-2 (COVID-19 virus) was first identified in December 2019 in people who presented with pneumonia of unknown cause. A novel coronavirus was identified in all patients, most of whom had visited a seafood market in Wuhan, China. Subsequent analysis showed that this new virus was most closely related to SARS-like bat coronaviruses identified in southern China in 2013, and to SARS-CoV. It is possible that this new virus had been circulating elsewhere in China before December 2019 but was not identified.

How easy is the COVID-19 virus (SARS-CoV-2) to pass on in comparison to other viruses?



It is highly infectious. Within two months of the beginning of the outbreak in February 2020, more than 80,000 cases with more than 2,800 deaths had been reported, mostly in China. These numbers continue to increase rapidly. The R0 number for this virus is about 2.2, meaning each infected person can infect 2.2 other people. This number indicates efficient transmission; however, other viruses are more infectious, with measles being the most infectious virus (R0 12-18) as well as chicken pox (R0 10-12) and mumps (R0 10-12). Seasonal influenza is generally less transmissible (R0 1.5) but this changes significantly during pandemic periods.

How exactly does it enter via the nose and mouth, and where does it go from there?

SARS-CoV-2 (the COVID-19 virus) has been shown to infect the upper respiratory tract – the throat – and also further down into the lungs. Different populations of viruses have been shown to be replicating in the throat versus the lungs. Although the virus can be identified in stool samples, this virus has not been shown to be infectious and transmitted this way, and the virus is not present in blood or urine.



How does a virus spread so quickly, from a single market to across the globe, in a few short months?

People travel more now than ever before in human history, and they arrive at their destinations very quickly. This means that a person can be infected in one country or area and take their infection with them to their new destination, and infect others. When you combine this pattern with a highly infectious respiratory virus that is transmitted by droplets and perhaps aerosols, you have the situation we see now with COVID-19.

Has the COVID-19 virus spread been quicker in comparison to other pandemics?

It certainly seems to have spread very quickly from China to most countries in the world in a few short months – and faster than seasonal, and perhaps pandemic, influenza.

If you recover from COVID-19, are you then immune from the virus and can't be infected again?



We don't yet know the answer to this question. When people are tested for COVID-19 infection, the test looks for virus genetic material (RNA) in samples mostly taken from the upper airways, with long swabs inserted into the nose and throat. When people recover from the infection – when their immune response has successfully controlled replication of the virus and the infectious virus has been cleared from their body – antibodies produced against the virus are detected by antibody tests performed on blood samples. We don't yet know if these antibodies are protective, that is, whether a person who has recovered from COVID-19 and tests antibody positive, is protected from a second infection. We also don't know how long our immune memory of the infection lasts.