Source: *The Straits Times,* pB7
Date: 18 April 2020

A woman and her son at Hankou railway station in Wuhan, the Chinese city where the coronavirus first emerged late last year. Infectious diseases expert Wang Linfa says the coronavirus responsible for Covid-19 is one of several viruses that likely originated in bats and were transmitted to humans via intermediate animal hosts. PHOTO: AGENCE FRANCE-PRESSE

Coronavirus pandemic

Blame Covid-19 on human activity, not bats: Expert

Infectious diseases specialists discuss origin, clinical features of disease in webinar series

Rei Kurohi

Bats have "peacefully co-existed" with viruses for a long time and should not be blamed for the Covid-19 pandemic, said infectious diseases expert Wang Linfa.

Instead, it was human activities such as wildlife trading and farming that likely caused the outbreak, added Professor Wang, who is director of the emerging infectious diseases programme at Duke-NUS Medical School.

He warned that more bat-borne viruses could make the jump to human hosts in the future if such activities are not stopped.

The professor was speaking on Thursday in the second episode of a webinar series organised by the National University of Singapore (NUS), National University Health System and the World Health Organisation's Global Outbreak Alert and Response Network.

He said the coronavirus responsible for Covid-19 is one of several viruses that likely originated in bats and were transmitted to humans via intermediate animal hosts.

The Hendra virus, the Nipah virus and the Sars (severe acute respiratory syndrome) virus were passed to humans through horses, pigs and civets respectively, he said.

The identity of the animal in between bats and humans in the case of Covid-19 is not yet certain.

Identifying the origin and early transmission of the coronavirus is not a purely academic exercise, Prof Wang noted. "If you don't know the origin and the intermediate host, it's very hard to prevent future outbreaks."

Animal viruses rarely make the jump to human hosts and scientists have been working to learn how such viruses switch hosts and what factors influence such events.

Pangolins have been identified as a possible candidate in the transmission of the coronavirus to humans.

Prof Wang said the coronavirus – officially known as Sars-CoV-2 – is 80 per cent genetically similar to Sars and 96 per cent similar to a known bat coronavirus.

But another coronavirus found in pangolins has a structure called the receptor-binding domain that is even more similar to the Covid-19 virus than the bat coronavirus.

Identifying intermediate hosts can take a long time. It took scientists 10 years to confirm that civets were the intermediate host that transmitted Sars to humans, Prof Wang said, adding that more conclusive evidence is still needed to establish if pangolins played a similar role in the case of Covid-19.

Prof Wang said the field of serology – the study of antibodies in blood serum – is at the forefront of research on intermediate hosts.

Serology also plays a role in other aspects such as diagnosis and epidemiology, he added.

Singapore was a world leader in using serology for contact tracing, he said, referring to the way serology was used to link three clusters of patients here by identifying patients who had already recovered from Covid-19.

Another major question that researchers are exploring is why Covid-19 causes mild or no symptoms in younger patients.

Prof Wang also said Singapore is among several countries working together to investigate this question on a large scale.

Asymptomatic or pre-symptomatic transmission is one reason Covid-19 poses such a formidable challenge for healthcare systems around the world, said infectious diseases specialist Paul Tambyah.

In the first episode of the webinar series on April 9, Prof Tambyah, of the NUS Yong Loo Lin School of Medicine, said the virus can also cause a range of different, non-specific symptoms or no symptoms at all. "It's really hard to tell who has Covid-19 based on the symptoms."

He said a Covid-19 patient he attended to had seen a general practitioner after experiencing mild shortness of breath.

But by the time she was tested for the coronavirus, she was "completely asymptomatic".

Prof Tambyah added that despite not experiencing breathlessness, coughing, sore throat or any other symptoms, the patient continued to test positive and was hospitalised for eight days until she tested negative twice in a row and was discharged.

Addressing reports that loss of one's sense of smell is a tell-tale sign of coronavirus infection, he said a small study done among National University Hospital (NUH) patients found more than half had lost their sense of smell.

One possible biological explanation is that the virus could be entering patients' systems through the respiratory epithelium and olfactory epithelium, which are tissues lining the respiratory tract and nose.

These tissues have cells that feature the ACE-2 receptor, which has been found to be an entry point for the virus, said Prof Tambyah.

"The virus has to get into the cell, otherwise we will just sneeze it out or it'll just go right through us," he added. "It happens that the cells in the olfactory epithelium do have this receptor. So it is possible that's how the virus gets in and damages the sense of smell early."

Another feature of the virus is that, unlike the Sars virus, the viral load does not correlate with the severity of the illness.

Patients with Covid-19 have the highest amount of the virus in their bodies at the onset of the disease when they may not feel sick. In Sars, the viral load tended to peak when patients were at their most ill, Prof Tambyah said.

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ABOUT THE SERIES

Covid-19: Updates from Singapore is a 12-episode weekly webinar series organised by the National University of Singapore (NUS), National University Health System and the World Health Organisation's Global Outbreak Alert and Response Network (GOARN).

CO-HOSTS

- Professor Dale Fisher, professor of medicine, NUS Yong Loo Lin School of Medicine, and chair of GOARN
- Dr David Allen, visiting senior fellow, Courage Fund Visiting Professorship, NUS Yong Loo Lin School of Medicine

EPISODE 1 GUEST: Professor Paul Tambyah, professor of medicine, NUS Yong Loo Lin School of Medicine

EPISODE 2 GUEST: Professor Wang Linfa, director of emerging infectious diseases programme, Duke-NUS Medical School

Q&A

Using serology to indicate virus immunity

Q *Why are bat-borne diseases so common? Is this an effect of human encroachment on bat habitats or a change in bat behaviour?*

Prof Wang Linfa Bats have been around for 60 million to 80 million years. They are more ancient than humans and they have been peacefully co-existing with viruses.

Bats carry many more viruses than any other mammal, but bat viruses usually do not jump species until a susceptible intermediate host, such as a civet, pangolin or pig, comes along.

Definitely, in the last few decades, intensive farming, wildlife farming and also climate change have all contributed to bats now making contact with more animals, raising the chances of them transmitting viruses to intermediate hosts.

Once the virus gets amplified, like with Nipah in pigs, it gets transmitted to humans.

Q *Do you believe serology can indicate effective immunity to Covid-19? When can we use serology to know if it is safe for healthcare workers to work in the front line?*

Prof Wang To use serology to indicate correlation with protection (against the virus), you have to know two things.

First, you are measuring the population of neutralising antibodies.

When you get infected, your body launches antibodies and there are two types.

One just looks for the virus, but the virus can still get into your cells.

The other is neutralising antibodies which prevent the virus from getting into cells. Such antibodies most likely correlate with protection.

I have developed an assay (test) and we are going to measure neutralising antibodies, so the first part of the equation is solved.

But the second part of it is much more difficult: Does the level of neutralising antibodies correlate with protection in vivo (in a live subject, as opposed to in vitro, or in a cell culture)?

This is a much more difficult question to answer. We need more recovered and recovering patients, and we need to monitor them for much longer than the two months we have had.

We're working very hard but, to answer the second part of that question, we need more time and more samples.

Q *There have been theories that Sars-CoV-2 was synthesised in a laboratory and not naturally occurring. Is there evidence to support or debunk this?*

Prof Wang This is a very politically sensitive topic but there are many papers on it.

All the leading scientists say there is zero chance that happened.

Q *There are many comments on replicating the Singapore approach in countries like the United States. How realistic is this? For example, can contact tracing as it is done in Singapore be scaled to a country like the US?*

Prof Dale Fisher Yes and no.

The concept of all those interventions – such as early detection, isolation, contact tracing and quarantining – has to stay true.

But how are you going to do it in a different setting and how will it get adapted?

What is the community's tolerance for privacy intrusions or loss of freedom by quarantining and isolation?

These are things the world is getting a bit more comfortable with now that they can see the consequences of not containing the virus.

I won't say what's happening in Singapore can be replicated in other countries necessarily, but the principles can be.

Q *What are the best strategies for combating Covid-19 in developing countries with limited resources?*

Prof Paul Tambyah The key is still clinical diagnosis.

Even though a lot of low- and middle-income countries have limited resources, this is an opportunity for the world to step in. Nobody is safe until everybody is safe.

We've seen this with The Global Fund to Fight Aids, Tuberculosis (TB) and Malaria.

A TB polymerase chain reaction (PCR) test has been rolled out across the world. We've got desktop PCR kits which are being used.

This outbreak has highlighted the need for usable point-of-care diagnostics like the PCR kits.

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