

Issue 19

Characteristics of the novel coronavirus (COVID-19)

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Hello.

This is Kohno Shigeru from Nagasaki University.

Below are my notes from a discussion with the Dean of Institute of Tropical Medicine, Prof. Morita Kouichi.

Coronavirus is an RNA virus with a genome of about 30,000 bases, which is comparatively large. There are prominent projections (spikes) on the surface of the virus that can be seen with an electron microscope, which look like a crown (in Latin, corona), hence the name coronavirus. While there are four types of well-known coronavirus that cause the common cold, recently two highly pathogenic human coronavirus species have emerged: SARS (Severe acute respiratory syndrome) virus in 2002 and MERS (Middle East respiratory syndrome) virus in 2012. Outbreaks of each virus occurred in 2003 and 2013 respectively. These viruses can travel from animals (probably bats) to humans and cause a severe respiratory infection, which is a serious problem as an international infectious disease. This novel coronavirus is the third appearance of that kind and was given the name COVID-19.

The novel coronavirus (technically: SARS-CoV-2) infects by attaching to ACE2 (angiotensin converting enzyme 2) on the surface of human cells. The trouble is that the virus not only causes severe pneumonia by growing inside the lower respiratory tract, but also infects the upper respiratory tract (pharynx and larynx) and can be transmitted to others even before symptoms appear and in mild cases of infection.

The SARS and MERS viruses infected the lower respiratory tract and caused severe pneumonia and it was relatively easy to control the situation by finding and isolating these severely ill people. Thus, the epidemic ended in seven to eight months in the case of SARS.

However, this time the novel coronavirus grows in the upper respiratory tract and can be transmitted from the early and mild stage of infection, in addition to the lower respiratory tract where it causes severe pneumonia. This trait of the COVID-19 is exactly what is making the countermeasures very difficult.

Furthermore, people who do not have any symptoms of cough or phlegm can be diagnosed with pneumonia only by a CT scan along with a throat swab and positive virus test. This means that those people can be the source of further infection, thus making the countermeasures harder. Especially young people, where the symptoms are mild and mortality is low, tend to transmit the virus to others.

This is exactly why the speed of infection spread is faster compared to SARS and MERS and it's difficult to see when this outbreak will end.

It is thought that the most likely source of the novel coronavirus is a wild animal, probably a bat. In southeast Asian countries and China, there still is a food culture that includes eating wildlife. I think that for a long time these viruses have repeatedly moved from wild animals to humans and have caused local epidemics like this one.

Because of population growth, urbanization, and an increase of land and air transportation, these infections can grow and spread quite rapidly throughout the world.

Indeed, I think that the coronavirus infection should be considered a typical emerging infectious disease. And therefore, research on emerging infectious diseases, which our university is promoting, is an extremely important area when responding to the current situation promptly and gaining findings for preventive measures.