

Our immune system and challenges to the COVID-19



<https://youtu.be/jRjHwu-XWAQ>

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Transcript:

COVID-19 virus contains RNA (Ribonucleic Acid)-genetic material packed inside a protein shell.

The only way to prevent people from catching COVID-19 is with a vaccine. It is a new virus, but the quest for a vaccine is not coming from a standing start

When you are inflicted with an infection, your body develops antibodies and specialized immune cells that learn to fight that illness-causing pathogen.

This virus was only identified a few months ago, and while researchers have been rapidly finding out about the virus and the disease it causes, there is still so much about it we do not understand.

Rapid vaccine development technologies mean that the time it takes to develop a vaccine, which used to be in the order of two to five years, could be condensed down to the 12 –18 month

University of Queensland researchers are one of the groups worldwide working on a potential vaccine for COVID-19

One problem, that is envisaged with the COVID-19 your body may not cause a strong immune response, and the very purpose of producing a specific vaccine may not serve the purpose.

This is a great fear, and the chances of mutant virus that will develop in due course may further becomes a problem to eradicate the viral infection from the humans.

So, the immune system we have in our body is like a security system and how efficiently this innate system will work when our body is challenged by a virulent deadly virus, entering our body through the portals of our eyes, nose and mouth, is something that we need to discuss and find answers.

The flu pandemic of last year, did not gravely affect the people in the tropical countries, but in the US. killed more people than the First World War.

That flu caused by influenza types A & B viruses, peaked in US. about December through February until May last year.

Getting a flu vaccine shot is the single answer that you can do each flu season to protect from severe illness.

Those flu vaccines triggered enough antibodies in our body to prevent a severe attack if one contracts the flu.

So far, all viruses were detected long before the epidemics, and there was enough time period to manufacture the vaccine to be given during the seasonal flus.

There was no doubt the attenuated virus when inoculated to humans, enough protective antibodies were created to fight in case the flu hits you.

So far, no vaccine has been manufactured for the present COVID-19. Obviously, the virus came as a shock suddenly, through the exposure of people from bats transferred onto humans, in Wuhan. This is questioned by the Chinese authorities, from where the virus came from?

In the UK, a potential coronavirus vaccine being developed at the University of Oxford will begin human trials immediately, Matt Hancock, the Health Secretary, has said.

Meanwhile the Wuhan Institute of virology is working on an inactivated vaccine for COVID-19.

Wuhan Institute of Virology provided the World Health Organization with the whole genome sequence of the virus in the early period of the epidemic, thereby laying a good foundation for the rest of the world to form their testing methods and vaccine design, said Yuan Zhiming, a researcher at the Institute.

Fear of deadlier Mutation-evolution of the virus from one form to another

In mutation of the virus, we have two forms.

Every virus with time mutates, it is part of a viral life. The corona virus is an RNA virus: collection of genetic material packed inside a protein shell.

RNA viruses, like the flu and measles, are more prone to changes and mutations compared with DNA viruses, such as herpes, smallpox, and human papillomavirus (HPV).

It is believed that corona virus being a deadly virus will mutate to something deadlier and become an even scarier threat to humanity.

COVID-19 being an RNA virus, when meets human cells it starts to make new copies of itself than can go on to infect other cells. This sort of multiplication is referred to as replication.

This virus has already started mutating, and the vaccine that is being manufactured may not be able to combat with the mutant virus: what this means is that by the time vaccine is ready in the market, the virus would have mutated and the antibodies produced in the body may not be able to kill the mutant virus.

The virus that is being spreading in Italy and New York is the mutant strain after replication of the original RNA virus.

It is observed that the mutant virus seems to be any more infectious or fatal than the original nonmutant strain that appeared in Wuhan, China in late December 2019.

It is also observed that the mutations likely will not interfere with the effectiveness of the COVID-19 vaccine that is being produced and available early January.

Viral mutation seems to be a terribly slow process, and the mild nature of the mutation is good news for the vaccine that will be ready early next year.

Mutation of this virus has two forms-L and S form.

The implications are that these mutants may be more vivid and transmittable, and that is what we are concerned about.

2 main major lineage or strains L and S types. Ancestral type is called S form of virus. S form is now all over the world.

This is reproduced into a mutation called L form and is more infectious than the S type.

S type which is the older is mild, less infectious

Mutated later to L type spread quickly, about 70 per cent of current cases.

L type was more prevalent in the early stages of the outbreak in Wuhan.

L type causes a severe disease

Presently the S form is causing the pandemic

How come that the S type is more prevalent now when the L type was more prevalent in the early stages of the outbreak in Wuhan?

Frequency of the L type decreased after early January 2020, probably due to human intervention and lockdown control in China, closing opportunities for the L type to spread.

So, the pandemic seems to be S type presently. S type is less transmittable, and less virulent.

Those spikes seen on the surface of the virus are -Protein spikes.

These spikes are important, as they make it transmittable.

So, the virus spikes get into the protein receptors (ACE-2) on the surface of the cell say in lung tissue.

ACE is like the doorknob of the keyhole of your house door.

COVID-19 acts as the robber

Once the S protein grabs it, the virus can enter the house.

These protein spikes move and fit into the receptors.

This make the virus infectious, and the virus gets into the cell.

The virus reproduces inside the cell.

The change in the molecular conformation within the spike of the virus can fit into the cell more efficiently and increases the binding and making the virus more transmittable.

L form seems to be fitting more efficiently.

Chinese halted the L type.

Implications of this.

We are infected with both S and L types. It is the S type causing the pandemic.

Individuals in the US tested and both strains are around.

The L form will be more prevalent, and we will not be able to curb the L type like the Chinese, making the pandemic more serious.

Vaccine may not work on the L mutated strain

Good news is that the same vaccine will work for both strains, hopefully.

So, when we get the vaccine, we can immunize against both S and L types.

Meanwhile in our body the antibodies formed for the S and L types may be different.

When we get the vaccine in 2021, we can immunize people against both types.

It is possible that the antibodies in your body may be working for the S type.
L type may have different antibodies.
The antibodies can cross. Antibodies for the L type may cross onto the S type.
This could lead to waves of infection.
Vaccine for both s and L type will make you sicker.

That is the present situation

Summarizing

Issues

As described, there are two types or strains of COVID-19.
The ancestral form is the "S" type and the subsequent mutant strain is the "L" type.
We are now afflicted with the S type which is a mild infection while the L type yet to come is a more deadly virulent type that spreads faster.
Presently a vaccine is being made in many laboratories to fight against "S" type of virus.
WE are not sure whether the antibodies formed for the S type will also defend the more virulent L type of the virus, yet to come
We still have to wait and see.
The situation is vary scary.
Hope this presentation of the COVID virus and the vaccine challenges helped you to understand the present and future situations.
Thank you for sharing and take care.
Special thanks to Dr. Tom de Silva for inspiring me to do this presentation.