

Probiotic formula to target imbalance in gut microbiota in COVID-19

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Have you ever thought about why some people are more vulnerable to catching a virus? And why some get more severe infection than others? Gut microbiota, which is a fine balance between good and bad bacteria,

regulates the immune system. Imbalance in gut microbiota (dysbiosis) will make us susceptible to infections.

Before the role of [gut microbiota](#) in COVID-19 was identified, the National Health Commission of the People's Republic of China had already included the use of probiotics for treatment of COVID-19 in January 2020. However, currently available probiotic products have many limitations. For example, many probiotic bacteria are susceptible to gastric acid, high temperature and humidity. The shelf-life of many probiotic products is short. On top of that, not all kinds of probiotics can help enhance immunity. To date, there is an urgent unmet need to define the role of gut microbiota in COVID-19.

The Faculty of Medicine of The Chinese University of Hong Kong (CU Medicine) is the first to discover a series of good bacteria missing in the gut of COVID-19 patients. The research team confirmed this discovery with a large number of healthy subjects and COVID-19 patients. Using [big data analysis](#) and [machine learning](#), the research team has successfully developed a probiotic formula that aims to target gut dysbiosis, thereby offering hope of boosting immunity against COVID-19 and other emerging viral infections. They anticipate that the formula will soon be turned into a probiotic supplement to the daily diet to improve immune defense against infection.

Professor Francis KL CHAN, Dean of CU Medicine and Director of the Centre for Gut Microbiota Research at CUHK, remarked, "Gut health rules over the immune system of our bodies. We must identify the composition of intestinal bacteria that helps maintain our defense. From there on, we can modulate the gut microbiota to boost our immunity against viral and bacterial infections. This will be a novel approach in the combat of COVID-19."

What is the gut microbiota?

The gut microbiota is the microbe population living in the intestine. The gut microbiota contains tens of trillions of microorganisms, including at least 1,000 different species of known bacteria with more than 3 million genes (150 times more than human genes). The gut microbiota is as significant to human health as an organ, and plays an important role in immunity. Gut dysbiosis will make us susceptible to infections.

In the latest research published in the international medical journal *Gastroenterology*, CU Medicine investigated the alteration of gut [microbiota](#) in local COVID-19 patients. From February to March this year, stool specimens were collected from 15 COVID-19 patients whose conditions ranged from mild to critically ill from the time of hospitalization until discharge. The research team studied the microorganisms present in the patients' guts and compared them with those from healthy individuals.



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Professor Paul Kay Sheung Chan, Chairman of the Department of Microbiology at CU Medicine and Associate Director of the Centre for Gut Microbiota Research at CUHK, said, "This is the first study in the world to realize that severe gut dysbiosis exists in COVID-19 patients. Some commensal symbionts, generally good bacteria, were missing while other pathogens were increasing in the patients' guts. The condition prevailed even after patients had been discharged."

The research team further expanded the research scope and collected data on gut microbiome of 150 COVID-19 patients and 1,500 healthy individuals. With the use of big data analysis, the team managed to come up with a probiotic formula which targets at gut dysbiosis derived from COVID-19 infections. The CU Medicine team carefully calculated the proportion of good bacteria and came up with a processing protocol which helps enhance the stability and quantity of live bacteria.

Professor Siew Chien NG, Associate Director of the Centre for Gut Microbiota Research at CUHK, explained, "The composition of microorganisms in our gut can be altered by diet or lifestyle. What appears to be useful in the West may not be as beneficial among Asian populations. This study provides a whole new perspective in the fight

against COVID-19. Our probiotic formula is derived from data from the Chinese population. We are studying good [bacteria](#) that are closely linked to our immune system and looking for solutions to limit the threat of the novel [coronavirus](#) to our health."

CU Medicine has applied for patents for the probiotic innovation in China and the U.S. and is now collaborating with innovation and technology companies and food companies to turn the formula into a [probiotic](#) supplement that can be added into the daily diet. The team is hopeful that the innovation can soon reach the public to enhance gut health. They are now working on large-scale clinical trials to provide further scientific evidence on the importance of gut health in preventing any novel infectious diseases.

More information: Tao Zuo et al. Alterations in Gut Microbiota of Patients With COVID-19 During Time of Hospitalization, *Gastroenterology* (2020). [DOI: 10.1053/j.gastro.2020.05.048](https://doi.org/10.1053/j.gastro.2020.05.048)

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