

# Hi-tech lab taps advanced technology to boost Singapore's future pandemic response

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Nanyang Technological University, Singapore (NTU Singapore) and Pathnova Laboratories, a medical diagnostic company backed by Temasek Life Sciences Accelerator and headquartered in Temasek Life Sciences Laboratory, is contributing to Singapore's COVID-19 diagnostic capability through its partnership in a new clinical diagnostic laboratory.

Amid the ongoing global COVID-19 situation, the lab plans to tap advanced technology like Artificial Intelligence (AI) and data analytics to innovate, boosting the country's future pandemic response.

Situated at NTU Singapore's Lee Kong Chian School of Medicine (LKCMedicine) Novena Campus, the NTU Clinical Diagnostic Laboratory was set up in April 2020 by a team of academic researchers, in support of the national effort to increase diagnostic testing capacity and commenced Covid-19 polymerase chain reaction (PCR) testing on 1 July 2020.

The partnership between NTU and Pathnova commenced on 1 March 2021, with Pathnova running the operations and NTU continuing to support and host the lab. Since then, the lab now known as Pathnova Laboratories @ LKCMedicine, has scaled up its operations and been engaged by the Singapore Ministry of Health in testing swabs from over 120,000 individuals, including routine rostered testing for residents of foreign worker dormitories.

With a testing capacity of 2,000 tests per day, the lab has been preparing for large-scale testing and faster turnaround times with automation and increasing the types of SARS-CoV-2 assays available.

Given its focus on serology, Pathnova has also extended its capabilities into COVID-19 serology testing at the diagnostic lab. Such tests are intended for detecting past infections or assessing an individual's antibody response post vaccination.

## **Preparing for future pandemics**

As the lab inevitably transitions out of COVID-19, the vision is to use the lessons learnt from pandemic testing to reimagine a new genre of lab which is flexible and scalable through open-source robotics and software automation.

Such a lab will be scalable yet adaptable, for instance in using smart digital processes to ensure quality and productivity of daily testing, while allowing scientific experts to make innovations and improvements on lab workflows.

Mr Peter Chia, Chief Executive Officer, Temasek Life Sciences Accelerator, said, "We are pleased to work with a world-renowned health institution like LKC Medicine. It is our belief that such collaborative partnerships stem from quality science and passionate people working together, capitalising on the momentum from the international scientific community's response to this crisis, to bring innovative solutions for public good.

I would like to congratulate LKC Medicine and Pathnova for this partnership. We look forward to seeing more innovative solutions from them to benefit communities in Singapore and the region."

NTU Senior Vice President (Research) Professor Lam Khin Yong, said: "NTU's collaboration with Pathnova Laboratories will allow our scientists to leverage their expertise in Artificial Intelligence technologies to tackle future pandemic challenges. We look forward to how this synergy between academia and industry will bring about meaningful results that contribute to the greater national effort in safeguarding population health."

## Exploring accelerated detection and diagnosis of SARS-CoV-2

Supported by experts in the fields of genomics, computer science and bioengineering, the Pathnova Laboratories @ LKCMedicine lab will explore ways to simplify and shorten complex protocols. Creating a new kind of molecular laboratory, it will run on open-source hardware and software, be fully integrated, reconfigurable, and resistant to supply chain bottlenecks.

For example, the lab will look at using advanced technology to accelerate innovation through data analytics and AI automation, activating robotics and mathematical algorithms to raise efficiency and lower operational costs.

NTU Senior Vice President (Health and Life Sciences) and Dean NTU Lee Kong Chian School of Medicine (LKCMedicine), Distinguished University Professor Joseph Sung said, "As we have seen and experienced with coronavirus, viruses mutate and diseases evolve but fortunately, technology also evolves - often in our favour. By leveraging technology in molecular virology and partnering with the industry, we can work together towards strengthening Singapore's future pandemic preparedness."

Being the only diagnostic service lab set up by an Institute of Higher Learning as a rapid response to the national exigency, the lab brings together two excellent experts in the field.

It is co-led by Associate Professor Eric Yap from LKCMedicine, who is the Medical Director of the new lab, and Dr Ian Cheong, Chief Scientific Officer, and co-founder of Pathnova Laboratories.

*NTU and Pathnova share a similar spirit. We build things leanly and from first principles, with a view to scalable and consistent performance when used in the real world. Our partnership was catalysed in the crucible of COVID-19. We are glad for the meaningful opportunity to contribute to Singapore's safe reopening together."*

*Dr Ian Cheong, Chief Scientific Officer and Co-Founder, Pathnova Laboratories*

Assoc Prof Yap, who worked as a medical doctor and defence scientist, studies the patterns and effects of genetic variation in human, bacterial and viral genomes, exploiting these differences for more accurate and rapid disease diagnosis.

In April 2020, Assoc Prof Yap and his team of researchers devised a way to speed up the COVID-19 PCR test, yielding results in just 36 minutes with limited equipment and capabilities. Their direct PCR test is used to look for COVID-19 genetic sequences in crude samples without the need for lengthy and manual RNA purification steps, which are needed in current PCR tests.

Dr Ian Cheong, who is trained as both a lawyer and scientist, has a background in experimental therapeutics and diagnostics for cancer. In 2017, with support from Temasek Life Sciences Accelerator (TLA), he co-founded Pathnova Laboratories with Emeritus Professor Chan Soh Ha and Mr. Jason Foo to develop scalable detection of nasopharyngeal cancer and autoimmune diseases through serological detection, accelerated with machine learning.

<https://www.news-medical.net/news/20210702/Hi-tech-lab-taps-advanced-technology-to-boost-Singapores-future-pandemic-response.aspx>