

NUS Researchers in the Fight Against COVID-19

We are all especially proud of how NUS researchers have stepped up to be at the forefront, contributing to the national and international fight against COVID-19. In March 2020, NUS launched a **COVID-19 Research Seed Grant Call**, of up to \$100,000 per award, to encourage interdisciplinary, innovative approaches to the detection, treatment and prevention of COVID-19. Ten projects spanning the areas of detection testing, behavioural studies, specially designed protective wear, environmental recommendations for buildings and intelligent data modelling, were awarded funding approval in April 2020.

I am pleased to share a number of notable COVID-19 research achievements, some of which were supported by the COVID-19 Research Seed Grant Call:

[cPass](#), a kit that detects whether a person has antibodies which neutralise the coronavirus, has become the first of its kind to receive authorisation from the United States' Food and Drug Administration. cPass was invented by a team led by the emerging infectious diseases programme at Duke-NUS Medical School, and co-developed with biotech company Genscript Biotech Corporation and the A*STAR Diagnostics Development Hub.



Epidax : COVID-19 micro-PCR diagnostic system
NUS Institute for Health Innovation & Technology (iHealthtech)

Other rapid diagnostics projects are currently underway. The Institute for Health Innovation & Technology (iHealthtech) developed a fast and portable microfluidic-based micro-PCR point-of-care diagnostic system '[Epidax](#)', that enables on-site screening for COVID-19 to be completed within one hour. Another project is a point-of-care testing platform known as '[enVision](#)' (enzyme-assisted nanocomplexes for visual identification of nucleic acids) developed by iHealthtech and Yong Loo Lin School of Medicine. enVision is highly sensitive, has the ability to operate at room temperature, and is able to generate signals that are readily quantified by smartphones and other existing modalities.

Breathonix Pte Ltd, a spin-off company from NUS, has developed an easy-to-use breath test to detect COVID-19 within a minute. This game-changing technology, believed to be the first in Asia, achieved more than 90 per cent accuracy in a Singapore-based pilot clinical trial that involved 180 patients. Breathonix was founded by two NUS graduates, Dr Jia Zhunan

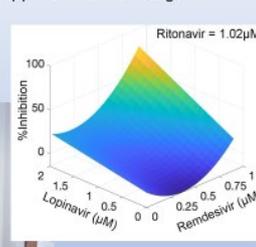
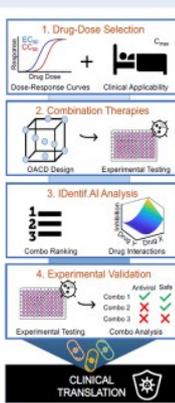
and Mr Du Fang, and is supported by the NUS Graduate Research Innovation Programme, a scheme that encourages the University’s talented graduate students and research staff to establish and run high potential start-ups based on deep technologies.



Left: Founders of Breathonix, Dr Jia Zhunan and Mr Du Fang, with Prof Freddy Boey
 Right: Minister Ong Ye Kung testing out the Breathonix prototype, Oct 2020

In the quest to develop effective therapeutic treatments, scientists from DSO National Laboratories and the Yong Loo Lin School of Medicine have developed [five human monoclonal antibodies](#) with potent neutralising activity for SARS-CoV-2 virus. These represent powerful new therapeutic or prophylactic candidate medicines to combat COVID-19. Researchers at the NUS N.1 Institute for Health have also developed a ground-breaking artificial intelligence platform known as [‘IDentif.AI’](#) (Optimising Infectious Disease Combination Therapy with Artificial Intelligence) which can identify optimal drug combination therapies at unprecedented speeds.

Identifying Infectious Disease Combination Therapy with Artificial Intelligence ‘IDentif.AI’
 The N.1 Institute for Health

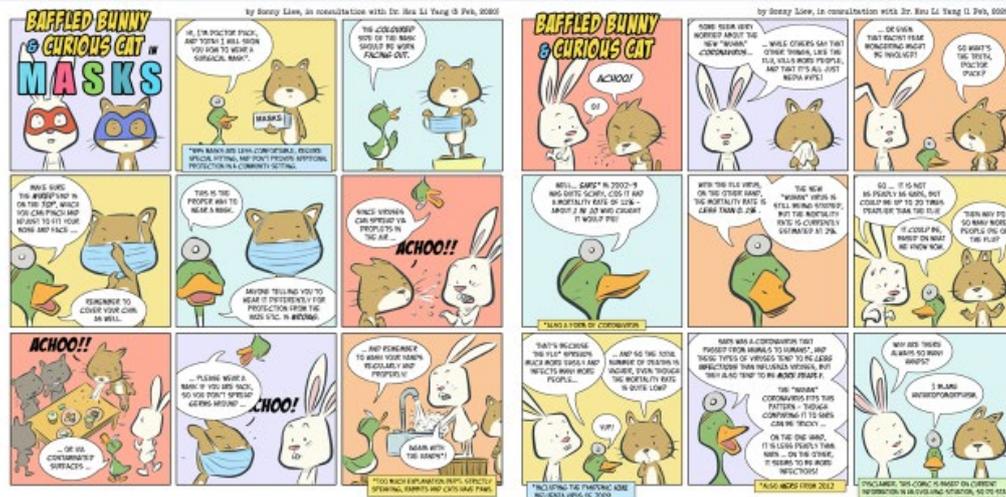

Prof Dean Ho, A/Prof Edward Chow and Dr. Agata Blasiak

Prof Freddy Boey showing the swabs, and (from left) Dr Alfred Chia, A/Prof David Allen, and A/Prof Yen Ching-Chiu are part of two NUS teams that developed three nasopharyngeal swab designs for Covid-19 testing.



Beyond vaccines, therapeutics and diagnostics, other contributions by NUS researchers include designing and mass producing [nasopharyngeal swabs using 3D printing and injection moulding techniques](#) by various teams across NUS, [epidemiological modelling and weekly science reports](#) by the Saw Swee Hock School of Public Health, and combatting misinformation by the [new Centre for Trusted Internet and Community](#). NUS experts also

contribute regular commentaries in the media to help the public better understand the situation.

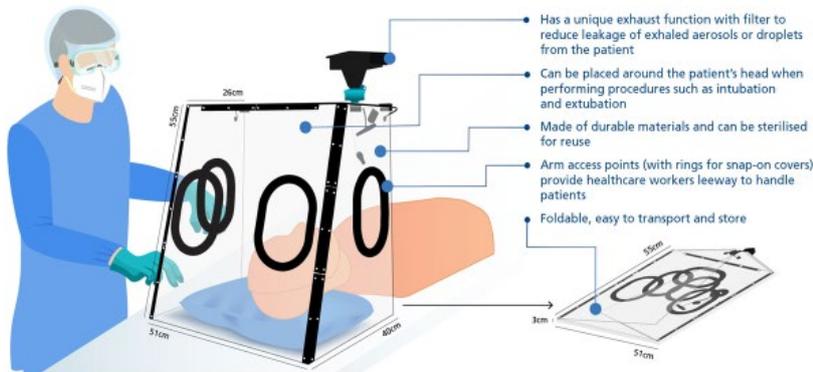


Comic Series : Baffled Bunny & Curious Cat
Public Education on COVID-19, by the Saw Swee Hock School of Public Health, and artist Sonny Liew

Most notably, COVID-19 has brought about unprecedented collaboration among researchers. NUS researchers have gone beyond their Departments and Schools, to leverage expertise across disciplines, institutions, industry and government agencies, to find solutions. One striking example is the multidisciplinary team of NUS researchers working with doctors from the National University Hospital to develop a 'shield' known as the **Droplet and Aerosol Reducing Tent (DART)**. DART is a portable, tent-like structure that can be placed around the patient’s head when healthcare workers perform procedures like intubation or extubation. It can lessen the infection risk of such droplet and aerosol generating procedures by providing an extra layer of protection between the healthcare workers and the patient. DART is now being tested and used across hospitals in Singapore. This invention was recently adapted into a version known as Dental DART, which can be used to protect dentists, nurses and patients from potential infectious agents present in aerosols that are generated during dental procedures.

Droplet and Aerosol Reducing Tent (DART)

A team from the National University of Singapore and the National University Hospital developed a new solution to provide additional protection for healthcare workers caring for COVID-19 patients.



The multidisciplinary team from NUS and NUH developed the Droplet and Aerosol Reducing Tent (DART). The NUS team was led by Prof Freddy Boey, Deputy President (Innovation & Enterprise), and A/Prof Yen Ching-Chuan, Co-Director of the [Keio-NUS CUTE Center](#).

Beyond COVID-19, NUS research must evolve and adapt to a post COVID world, where governments and industry are seeking innovative solutions that enable self-reliance, improve public health, and ensure resilience. Academic researchers are in a unique position to bring about research insights. It is an opportune time for researchers to identify new avenues for high impact, innovative research that will emerge from the pandemic.

NUS has thus launched “**Reimagine Research**”, a seed-funding scheme for research in emerging areas post COVID-19, to help our researchers capture opportunities in the post COVID era. Seven projects are being supported. These include a study to understand the impact, perceptions and experiences of Singaporean families and residents to COVID-19, considering variables like class, gender, nationality, age and ethnicity. Another project works towards a self-reliant society, where researchers from the Faculty of Engineering and the Faculty of Science are teaming up to develop a universal, transgene-free delivery technique for plant engineering based on the use of biodegradable nano-needles.