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NUS invents new way to produce Covid-19 swab, 40 million to be produced in coming months

The three nasopharyngeal swab designs can be made using 3D-printing and a manufacturing process known as injection moulding. PHOTO: NATIONAL UNIVERSITY OF SINGAPORE

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SINGAPORE - National University of Singapore (NUS) researchers have developed a new method of producing nasopharyngeal Covid-19 testing swabs and are preparing to produce 40 million of them in the coming months.

NUS deputy president of innovation and enterprise Freddy Boey said on Monday (July 13) that Singapore has been relying on suppliers from the United States, Italy and other parts of Europe for its swabs.

But the surge in coronavirus cases around the world has led to a global shortage as countries turn to mass testing to reopen their economies.

That prompted two NUS research teams to link up with Temasek Foundation and develop three different nasopharyngeal swab designs that can be made using 3D-printing and a manufacturing process known as injection moulding.

This has given Singapore the capability and know-how to produce its own swabs.

Professor Boey said he believes this makes Singapore the first country in Asia to use 3D-printing to produce swabs and the first in the world to use injection moulding.

Nasopharyngeal swabs are small, flexible sticks that are inserted through the nose to the back of the nasal cavity to collect fluid samples.

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They need a specially designed tip to capture and retain the fluid in order for the test to be accurate.

A team led by NUS senior vice-president of health innovation and translation John Eu-Li Wong; Associate Professor Yen Ching-Chiuan, the co-director of the Keio-NUS Connective Ubiquitous Technology for Embodiments Centre; and Professor Jerry Fuh, director of the NUS Centre for Additive Manufacturing developed a 3D-printed swab named Python.

The team worked with Associate Professor David Allen and Professor Wang De Yun from the NUS Yong Loo Lin School of Medicine, researchers from the NUS School of Design and Environment and NUS Faculty of Engineering, and National University Hospital (NUH) clinicians on the swab's design, pre-clinical testing and clinical validation.

Their swab uses a double helix structure for the tip as trials revealed that this design has excellent fluid adsorption and causes minimal discomfort to the patient.

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NUS said that Python was tested against an industry standard swab on patients with Covid-19 and demonstrated comparable accuracy and performance with no significant difference against the standard swab.

A patent has been filed for the swab, which is being mass-produced by two local companies, Structo and Eye-2-Eye Communications. The swab's design is free for use in Singapore.

NUS' work did not stop there. Another team led by Prof Boey came up with two swab designs, known as IM2 and IM3, that can be produced through injection moulding.

Prof Boey said the process is faster than 3D printing, allowing several hundred swabs to be produced in a matter of minutes.

"The use of injection moulding ensures a secure source to supply high volumes of swabs at a low cost, to meet the needs of our community and beyond. This is crucial in our continued fight against the pandemic," he added.

Patents have been filed for the two designs, which are undergoing clinical trials at NUH and Singapore General Hospital.

Prof Boey and his team are now working with four companies - TNC Optics & Technologies, Meiban Group, Inzign, and Forefront Medical - to mass manufacture and sterilise the injection-moulded swabs.

Each manufacturer is estimated to be able to produce 100,000 to 150,000 swabs a day - more than enough for the 40,000 daily tests health officials have said they want to carry out.

In the meantime, the Python swabs will serve to "hold the fort" until IM2 and IM3 are ready for mass production.

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"Now we're confident to say that Singapore will not lack," said Prof Boey.

NUS president Tan Eng Chye said: "We are proud that our researchers have stepped forward at this time of need. They have worked very hard, under great time pressure... so that these swabs can be mass manufactured locally and affordably to meet Singapore's needs."

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