

Booster jab targeting Sars virus may neutralise Covid-19 variants

Cheryl Tan

Scientists here have found that people who have recovered from Sars (severe acute respiratory syndrome) in 2003 and who received the Pfizer-BioNTech vaccine are able to produce antibodies to neutralise all known Covid-19 variants of concern.

The antibodies can also tackle other potential animal coronaviruses.

The findings could pave the way for the development of a booster jab, which may involve targeting the Sars-CoV-1 virus responsible for the Sars epidemic in 2003.

The study, conducted by scientists from the Duke-NUS Medical School and the National Centre for Infectious Diseases (NCID), was published in *The New England Journal of Medicine* today.

Among the coronavirus family, one viral subgroup relies on the ACE2 molecule – a protein found on the surface of many cell types – to enter human cells.

Neutralising antibodies are able to prevent the viral spike protein from binding with the ACE2 molecules in human cells.

Both Sars-CoV-1 and the Sars-Cov-2 virus, which causes Covid-19, belong to this group, as well as a number of coronaviruses circulating among animals such as bats, pangolins and civets, said Professor Wang Linfa from the Duke-NUS Emerging Infectious Diseases (EID) programme. He is the senior corresponding author of the study.

Collectively, this group of viruses is known as the sarbecovirus, which has the potential to jump from animals to humans and could start the next pandemic, although the exact route of transmission still remains unknown, he added.

Dr Chee Wah Tan, a senior research fellow with Duke-NUS' EID programme and co-first author of the study, said the team explored the possibility of inducing pan-sarbecovirus neutralising antibodies that can block the human ACE2-viral interaction, thus protecting against all known and unknown Covid-19 variants, and future sarbecoviruses.

The Sars-CoV-1, Sars-CoV-2 viruses, and the sarbecoviruses have similar antibody-binding sites, which can be targeted by a pan-sarbecovirus neutralising antibody to prevent infection.

To test their hypothesis, the researchers recruited eight people who recovered from Sars-CoV-1, 10 healthy people and 10 people who recovered from Covid-19. The team compared the immune response of the three groups before and after they were vaccinated with the Covid-19 vaccine.

Investigations were conducted using an improved version of Duke-NUS' surrogate virus neutralisation test (sVNT). The test, whose trade name is cPass test, was granted Emergency Use Authorisation by the US Food and Drug Administration to determine the presence of Sars-CoV-2-specific neutralising antibodies after infection or vaccination.

For the study, the sVNT platform was improved so that it could measure the relative level or strength of neutralising antibodies against the different viruses in a single test.

Dr Wannii Chia, a research fellow at the Duke-NUS EID programme and co-first author of the study, said that prior to getting vaccinated, those who recovered from Sars had detectable neutralising antibodies against the Sars-CoV-1 virus, but had little to no antibodies against the Sars-CoV-2 virus.

However, after receiving two doses of the Pfizer vaccine, all had displayed high levels of neutralising antibodies against both viruses, and a broad spectrum of antibodies against 10 sarbecoviruses that were examined, she said.

Prof Wang said with this newfound knowledge, the team is looking at creating a vaccine booster to increase one's breadth of protection for the Covid-19 variants, and potential Sars-CoV-3 or Sars-CoV-4 disease.

The vaccine candidate may target the Sars-CoV-1 viral spike protein, or it may be an optimised "consensus" spike protein which better represents the range of sarbecoviruses within the same clade, or from a common ancestry, he added.

The team is also looking at developing a Covid-19 treatment using the antibodies from recovered Sars patients who had been vaccinated against Covid-19.

For further studies, it is hoping to recruit more recovered Sars patients, including those who have yet to receive their Covid-19 jab, to investigate the amount of protection that a single jab could offer.

This will include those who have been jabbed with other vaccines, such as the Moderna and Sinovac vaccines, to understand the level of protection these could confer, said Prof Wang. "We believe similar results will be obtained even when different vaccines are used. But scientifically, we need to have real-world data to prove that," he added.

Associate Professor David Lye, director of the Infectious Disease Research and Training Office at NCID and joint corresponding author of the study, said: "As emerging variants of concern have already demonstrated some degree of immune evasion against the first-generation vaccines, this discovery has the potential to address that problem as the world continues Covid-19 vaccination to exit the pandemic. In addition, this can potentially act as a highly promising preventive vaccine against future coronavirus pandemics."

Agreeing, Professor Gavin Smith, interim director of Duke-NUS' EID programme, said: "There are major efforts under way globally to produce vaccines that protect against a broad range of coronaviruses. The study by Prof Wang and colleagues shows the feasibility of this approach and is a major step towards protecting against future pandemics."

tansuwen@sph.com.sg