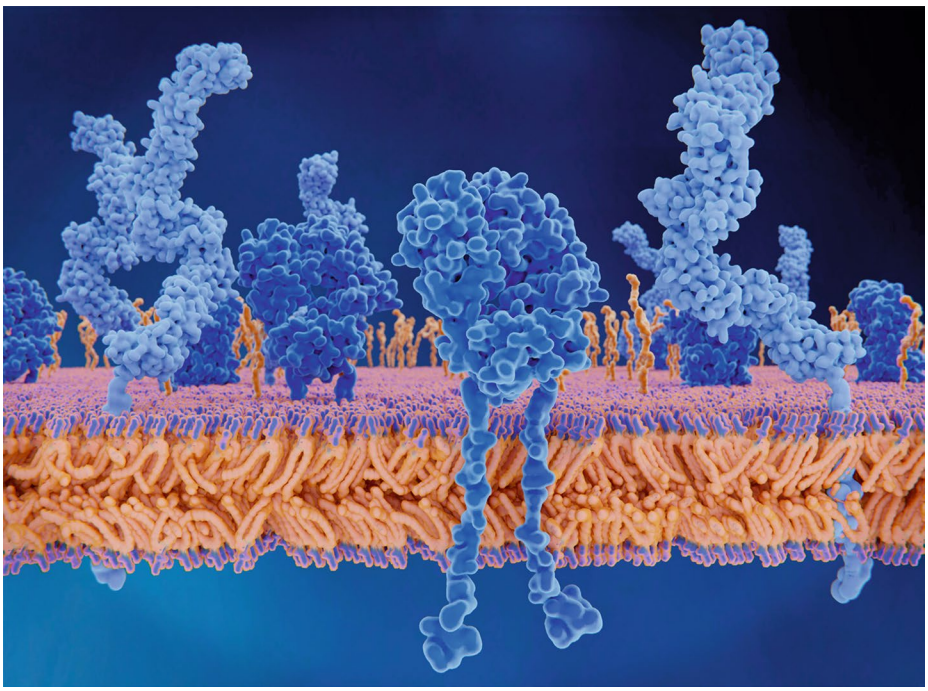
COVID-19 testing turns to T cells

A diagnostic test based on sequencing long-lived SARS-CoV-2–specific memory T cells provides a complement to antibody testing for determining previous exposure to SARS-CoV-2.

Following last month's US Food and Drug Administration (FDA) Emergency Use Authorization for Adaptive Biotechnologies' T-Detect COVID-19 test, routine T-cell testing has entered a new era. The Adaptive test involves laboratory-based next-generation sequencing to identify T cells that recognize SARS-CoV-2 antigens. The test is not intended for the diagnosis of active infection but is a complement to antibody tests used to confirm recent or previous infections. The lab-based procedure, which has a seven- to ten-day turnaround time, is now authorized for use on samples taken from individuals at least 15 days after the onset of symptoms.

Increasing interest is focused on the role of T-cell immunity in fighting SARS-CoV-2 infection and in providing resistance to re-infection. A new analysis of T cells from people who recovered from COVID-19 has confirmed that they remain active against three of the new SARS-CoV-2 variants of concern: B1.1.7, B.351 and B.1.1.248. The study, conducted by a team from the US National Institute of Allergy and Infectious Diseases (NIAID), Johns Hopkins University School of Medicine, Johns Hopkins Bloomberg School of Public Health and Singapore-based biotech company ImmunoScape, will further boost confidence that the efficacy of vaccines developed against the original pandemic strain will not be overly compromised as these new variants—and others—spread more widely.

Until now, researchers have mostly relied on the use of lateral flow assay or enzyme-linked immunosorbent assay (ELISA) tests for SARS-CoV-2 antibodies to determine whether a person has been exposed to the virus. Understanding the neutralizing antibody response has been considered central to establishing protection against the virus. "It's easy to test," says Andrew Redd of NIAID, who led the recent study. Although critical, antibodies are part of a larger and incompletely understood set of humoral and cellular immune responses, which has received little attention. These include additional antibody functions, such



A T-cell test for COVID-19 sequences the DNA of a person's TCRs (dark blue) to reveal whether they have been infected . Credit: Juan Gaertner/Science Photo Library

What two US counties will tell us about COVID-19

A rapid-testing program will be rolled out across two communities to ask whether widespread at-home tests are effective at curbing community spread. The 'Say Yes! COVID Test' initiative will enroll up to 160,000 volunteers in Tennessee and North Carolina, who will self-administer three rapid, at-home tests a week. The testing program, launched by the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH), aims to understand whether frequent tests can reduce viral transmission during this and future pandemics. NIH Director Francis S. Collins says "this is the first initiative of this scale to make free, rapid, self-administered tests available community-wide" to determine such tests' effectiveness. The test is the QuickVue test from Quidel, an at-home diagnostic that detects SARS-CoV-2 antigen and provides a result in ten minutes from a nasal swab. The test received Emergency Use Authorization on 1 March 2021 and is supplied through Rapid Acceleration of Diagnostics (RADx), an NIH program set up to fund innovative COVID-19 testing technologies. Antigen tests such as QuickVue are less sensitive than PCR, which is the gold standard for diagnosing COVID-19. If used frequently, however, such at-home tests could rapidly identify people who are asymptomatic but still infectious, encouraging them to self-isolate. Such scaled-up testing could potentially stop viral spread, but data to show this is the case has not been forthcoming. "All the mathematical models predict that. But this is a real-world, real-life example," said Bruce Tromberg, director of the National Institute of Biomedical Imaging and Bioengineering, in *The New York Times*. Tromberg is leader of the RADx Tech program.

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