T Cells Recognize Recent SARS-CoV-2 Variants

Research suggests protective effect of natural infection or vaccination is likely to be persistent.

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When variants of SARS-CoV-2 (the virus that causes COVID-19) emerged in late 2020, concern arose that they might elude protective immune responses generated by prior infection or vaccination, potentially making re-infection more likely or vaccination less effective.

To investigate this possibility, researchers from the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, and colleagues analyzed blood cell samples from 30 people who had contracted and recovered from COVID-19 prior to the emergence of virus variants. They found that one key player in the immune response to SARS-CoV-2—the CD8+ T cell—remained active against the virus.

The research team was led by NIAID's Andrew Redd, Ph.D., and included scientists from Johns Hopkins University School of Medicine, Johns Hopkins Bloomberg School of Public Health and the immunomics-focused company, ImmunoScape. [The study was published in Open Forum Infectious Diseases.]

The investigators asked whether CD8+ T cells in the blood of recovered COVID-19 patients, infected with the initial virus, could still recognize three SARS-CoV-2 variants: B.1.1.7, which was first detected in the United Kingdom; B.1.351, originally found in the Republic of South Africa; and B.1.1.248, first seen in Brazil. Each variant has mutations throughout the virus, and, in particular, in the region of the virus' spike protein that it uses to attach to and enter cells. Mutations in this spike protein region could make it less recognizable to T cells and neutralizing antibodies, which are made by the immune system's B cells following infection or vaccination.

Although details about the exact levels and composition of antibody and T-cell responses needed to achieve immunity to SARS-CoV-2 are still unknown, scientists assume that strong and broad responses from both antibodies and T cells are required to mount an effective immune response. CD8+ T cells limit infection by recognizing parts of the virus protein presented on the surface of infected cells and killing those cells.

In their study of recovered COVID-19 patients, the researchers determined that SARS-CoV-2-specific CD8+ T-cell responses remained largely intact and could recognize virtually all mutations

in the variants studied. While larger studies are needed, the researchers note that their findings suggest that the T cell response in convalescent individuals, and most likely in vaccinees, are largely not affected by the mutations found in these three variants, and should offer protection against emerging variants.

Optimal immunity to SARS-Cov-2 likely requires strong multivalent T-cell responses in addition to neutralizing antibodies and other responses to protect against current SARS-CoV-2 strains and emerging variants, the authors indicate. They stress the importance of monitoring the breadth, magnitude and durability of the anti-SARS-CoV-2 T-cell responses in recovered and vaccinated individuals as part of any assessment to determine if booster vaccinations are needed.

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