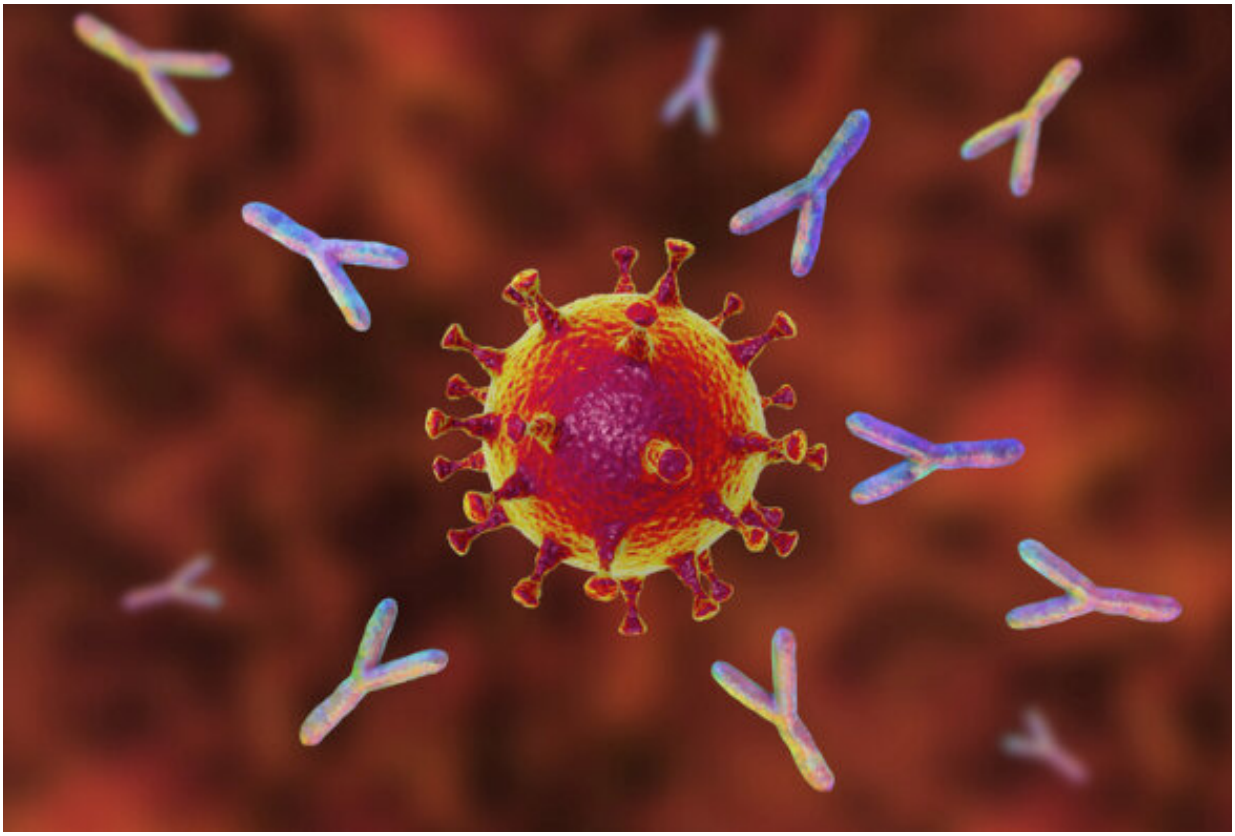
MedicalXpress

# Latest data on immune response to COVID-19 reinforces need for vaccination

June 18 2021



Credit: University of Liverpool

New research has found that previous infection, whether it was symptomatic or asymptomatic, does not necessarily protect you long-term from COVID-19, particularly against new Variants of Concern.

The preprint study was led by University of Oxford, in collaboration with the Universities of Liverpool, Sheffield, Newcastle and Birmingham with support from the UK Coronavirus Immunology Consortium.

The "Protective Immunity from T cells to COVID-19 in Health workers" (PITCH) study examined how the immune system responds to COVID-19 in 78 healthcare workers who had experienced either symptomatic or asymptomatic disease (66 vs 12). An additional 8 patients who experienced severe disease were included for comparison.

Blood samples were taken monthly from 1–6 months post infection to examine different elements of the immune response. This included different types of antibodies—such as Spike-specific and Nucleocapsid-specific antibodies which are produced to target different parts of the virus, alongside B cells, which manufacture antibodies and keep the body's memory of the disease, and several types of T cell.

The preprint report details a highly complex and variable immune response following COVID-19 infection. The University of Liverpool's Dr. Lance Turtle is a co-author on the study, which has been posted on Research Square.

The researchers used a new machine learning approach—nicknamed SIMON—to identify detailed patterns in the data and to see if initial disease severity and the early immune response could predict longer-term immunity.

They found an early immune signature, detectable one month post infection and linked to both cellular and antibody immunity, which predicted the strength of immune response measured at 6 months post infection. This is the first time that such a signature has been found and improves understanding of the development of lasting immunity. When

serum samples (containing antibodies) obtained at 1 and 6 months post infection were tested, the majority of samples from people who produced a weak immune response signature failed to show any neutralizing antibodies against the Alpha variant, with none mounting a neutralizing antibody response against the Beta variant. This raises the possibility that the immune memory of these individuals does not provide sufficient protection to prevent reinfection by these variants.

While the majority of people who had symptomatic disease did have measurable immune responses at six months post infection, a significant minority (17/66; 26%) did not. The vast majority of people who experienced asymptomatic disease (11/12; 92%) did not exhibit a measurable immune response at six months post infection. This implies that people who have previously been infected with COVID-19 should not assume they are automatically protected against reinfection and highlights the importance of everyone getting their COVID vaccination when they are offered it.

Health Minister Lord Bethell said: "This powerful study addresses the mysteries of immunity and the lessons are crystal clear. You need two jabs to protect yourself and the ones you love. I call on anyone invited to get vaccinated to step forward and finish the job so we can all get out of this."

Key findings from the PITCH study:

- Immune memory following COVID infection is measurable at 6 months but is highly variable between people.
- Previous infection does not necessarily protect you long term from SARS-CoV-2, particularly variants of concern Alpha and Beta. Individuals who show little or no evidence of immune memory to COVID at 6 months post infection are not able to neutralize the variants of concerns.

- We can use the immune response characteristics at one month post COVID infection to predict which people will have durable immune responses at six months.
- People with COVID symptoms have variable immune responses that may decline over time and are not necessarily protected from SARS-CoV-2 variants.
- People who experienced asymptomatic infection tend to have lower immune responses across the many immune parameters we have measured.

Understanding the strength and durability of the immune response to natural COVID infection remains highly relevant as it will help us reduce reinfections, better understand immune responses to vaccination and tackle new variants of concern. Further research will continue to deepen our understanding of the immune responses over the longer term and what it means for protection against COVID-19 in the real world.

This study reinforces how important it is that everyone gets their COVID vaccination when offered. COVID-19 vaccines generate higher immune responses than natural infection, underlining the need for everyone to get vaccinated for maximum protection against this disease and in particular against Variants of Concern.

**More information:** Adriana Tomic* et al, Divergent trajectories of antiviral memory after SARS-Cov-2 infection, *medRxiv* (2021). DOI: 10.21203/rs.3.rs-612205/v1

Provided by University of Liverpool