

# COVID-19 immunity could be higher than tests have shown

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Research from Karolinska Institutet and Karolinska University Hospital shows that many people with mild or asymptomatic COVID-19 demonstrate T-cell-mediated immunity to the new coronavirus, even if they have not tested positively for antibodies.

According to the researchers, this means that public immunity is probably higher than antibody tests suggest.

***“Roughly twice as many people have developed T-cell immunity compared with those who we can detect antibodies in.”***

“T cells are a type of white blood cells that are specialized in recognizing virus-infected cells, and are an essential part of the immune system,” says Marcus Buggert, assistant professor at the Center for Infectious Medicine, Karolinska Institutet, and one of the paper’s main authors. “Advanced analyses have now enabled us to map in detail the T-cell response during and after a COVID-19 infection. Our results indicate that roughly twice as many people have developed T-cell immunity compared with those who we can detect antibodies in.”

### **It wasn’t just individuals with verified COVID-19 who showed T-cell immunity**

In the present study, the researchers performed immunological analyses of samples from over 200 people, many of whom had mild or no symptoms of COVID-19. The study included inpatients at Karolinska University Hospital and other patients and their exposed asymptomatic family members who returned to Stockholm after holidaying in the Alps in March. Healthy blood donors who gave blood during 2020 and 2019 (control group) were also included.

Consultant Soo Aleman and her colleagues at Karolinska University Hospital’s infection clinic have monitored and tested patients and their families since the disease period. “One interesting observation was that it wasn’t just individuals with verified COVID-19 who showed T-cell immunity but also many of their exposed asymptomatic family members,” says Soo Aleman. “Moreover, roughly 30 per cent of the blood donors who’d given blood in May 2020 had COVID-19-specific T cells, a figure that’s much higher than previous antibody tests have shown.”

***“Patients with severe COVID-19 often developed a strong T-cell response and an antibody response; in those with milder symptoms it was not always possible to detect an antibody response, but despite this many still showed a marked T-cell response.”***

The T-cell response was consistent with measurements taken after vaccination with approved vaccines for other viruses. Patients with severe COVID-19 often developed a strong T-cell response and an antibody response; in those with milder symptoms it was not always possible to detect an antibody response, but despite this many still showed a marked T-cell response.

“Our results indicate that public immunity to COVID-19 is probably significantly higher than antibody tests have suggested,” says Professor Hans-Gustaf Ljunggren at the Center for Infectious Medicine, Karolinska Institutet, and co-senior author. “If this is the case, it is of course very good news from a public health perspective.”

## **Larger and more longitudinal studies**

T-cell analyses are more complicated to perform than antibody tests and at present are therefore only done in specialized laboratories, such as that at the Center for Infectious Medicine at Karolinska Institutet.

“Larger and more longitudinal studies must now be done on both T cells and antibodies to understand how long-lasting the immunity is and how these different components of COVID-19 immunity are related,” says Marcus Buggert.

## **Not yet undergone peer review**

The results are so new that they have not yet undergone peer review ahead of publication in a scientific journal. Pending such review, the article has been published on a preprint server, bioRxiv.

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## **Publication**

“Robust T cell immunity in convalescent individuals with asymptomatic or mild COVID-19”

Takuya Sekine, André Perez-Potti, Olga Rivera-Ballesteros, Jean-Baptiste Gorin, Annika Olsson, Habiba Kamal, Sian Llewellyn-Lacey, David Wulliman, Tobias Kamann, Gordana Bogdanovic, Sandra Muschiol, Elin Folkesson, Olav Rooyackers, Lars I. Eriksson, Anders Sönnnerborg, Tobias

Allander, Jan Albert, Morten Nielsen, Kristoffer Strålin, Sara Gredmark-Russ, Niklas K. Björkström, Johan K. Sandberg, David A. Price, Hans-Gustaf Ljunggren, Soo Aleman, Marcus Buggert, Karolinska COVID-19 Study Group.

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*Photo of Professor Hans-Gustaf Ljunggren at the Center for Infectious Medicine, Karolinska Institutet, and co-senior author of the study. Photographer: Ulf Sirborn*

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