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SARS-COV-2-SPECIFIC T CELL IMMUNITY PREVENTS RECURRENT SEVERE COVID-19 DISEASE

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

Immune cells: SARS-CoV-2-specific T cells are only now being characterised from COVID-19 patients. | Photo Credit: enot-poloskun

Natural exposure or infection with the novel coronavirus may “prevent recurrent episodes of severe COVID-19”, a paper published in *Cell* says. This is because, once infected with SARS-CoV-2, the immune system elicits “robust, broad and highly functional memory T cell responses”.

The study published by a team led by Marcus Bugger from Karolinska Institutet, Stockholm, Sweden, found SARS-CoV-2-specific T cells even in family members who have been exposed to the virus but have tested negative on antibody blood tests. SARS-CoV-2-specific T cells were also seen in convalescent individuals with a history of asymptomatic infection and mild COVID-19 disease.

All categories of people — recovered from moderate or severe COVID-19 disease, or in the convalescent phase after mild or severe disease or exposed family members or healthy people — exhibited “robust memory T cell responses months after infection, even in the absence of detectable circulating antibodies specific for SARS-CoV-2”, they write.

They were able to detect similar memory T cell responses directed against the internal and surface proteins (membrane and/or spike) of the virus in some people in whom SARS-CoV-2-specific antibodies could not be detected.

This indicates a “previously unanticipated degree of population-level immunity against COVID-19”, they note. This implies that seroprevalence as an indicator may underestimate the extent of immunity in the population, they note.

“The dissociation of antibody (its absence) and a robust T cell response is noteworthy. It reinforces how much we miss by focusing on antibodies out of convenience, since T cells response is only assessed in research labs,” Eric Topol, Scripps Research Director and Founder, Scripps Research Translational Institute, says in a tweet.

The phenotype of the memory T cells during the acute phase of infection was different from the convalescent phase SARS-CoV-2-specific T cells, which were “polyfunctional and displayed a stem-like memory”.

Studies undertaken in rhesus macaques had found that once infected, the animals were fully protected from reinfection. Till date, no documented case of reinfection has been found in people anywhere in the world, whether they had recovered from mild or severe COVID-19 disease or even been asymptomatically infected.

While many have been focusing on induction of neutralising antibodies, antibodies may not be detectable in those who have had mild or asymptomatic infection. At the same time, while SARS-CoV-2-specific T cells have been identified in humans, the kind of T cell immune response connected with clinical course of the diseases and serostatus was not known.

To address this lacuna, Dr Bugger's team characterised different T cells in 206 people in Sweden with known clinical outcomes and serostatus.

They found a "clear segregation" between memory T cells from patients who have recovered from moderate or severe disease, and convalescent individuals and healthy blood donors.

The SARS-CoV-2-specific T cells also acquired an early differentiated memory phenotype in the convalescent phase, which gives the T cells stem-like properties characterised by extensive proliferation and polyfunctionality.

The study has some limitations, though. Since it is a small study with limited clinical follow-up, it is not known if robust memory T cell responses, when circulating antibodies can be detected, can indeed lead to protection against severe COVID-19 disease. However, both 2002 SARS and MERS have been able to induce potent memory T cell responses that persist even when antibody responses wane.

Even as antibodies wane with time, robust T cell memory formed after SARS-CoV-2 infection suggests that "potent adaptive immunity is maintained to provide protection against severe re-infection".

Like the team from La Jolla Institute for Immunology, La Jolla, California, Dr. Bugger's team too found pre-existing cross-reactive memory T cell against spike or membrane proteins in 28% of the unexposed healthy blood donors. The pre-existing cross-reactive memory T cells are from previous exposures to common cold coronaviruses, and the biological relevance remains unclear. "But it is tempting to speculate that such responses may provide at least partial protection against SARS-CoV-2, and different disease severity," they write.

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