Early functional SARS-CoV-2-specific T cell response may prevent severe infection

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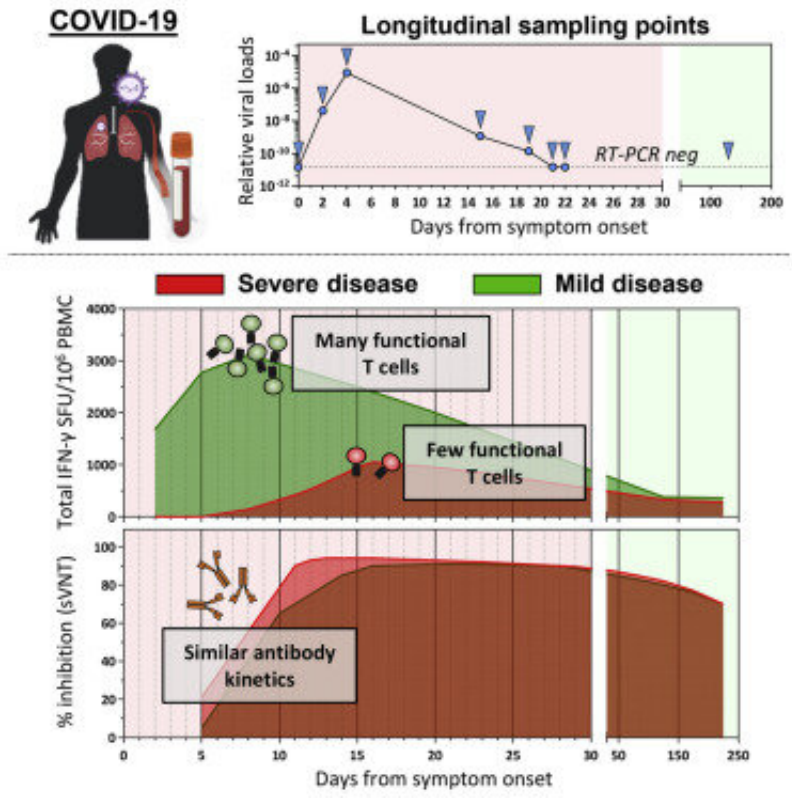

Graphical Abstract. *Cell Reports* (2021). DOI: 10.1016/j.celrep.2021.108728

Antibodies and T cells are components of the human immune system that directly act against viral infections and eliminate infected cells. A new study by scientists from Duke-NUS Medical School, provides evidence that an early presence of SARS-CoV-2-specific T cells in COVID-19 is likely to prevent severe disease. The study, published in

Cell Reports, has important implications for the clinical management of COVID-19 patients.

Humoral and cellular adaptive immunity are two immune mechanisms that act against pathogens. Humoral immunity is mediated by antibodies, while cellular immunity does not involve antibodies and is instead facilitated by T cells. Studying how these immune mechanisms mediate SARS-CoV-2 infections could be beneficial in controlling the progression of the disease. However, their roles in viral control or disease pathogenesis is not fully understood and only a few studies have thoroughly monitored COVID-19 patients longitudinally, especially during the acute phase of infection.

To fill this knowledge gap, the team of researchers at Duke-NUS investigated the changes in virological and immunological parameters in 12 patients with symptomatic acute SARS-CoV-2 infection from onset of the disease to recovery or death.

"We found that patients who control SARS-Cov-2 infection with only mild symptoms are characterized by an early induction of IFN-γ secreting SARS-CoV-2-specific T cells. The amount of humoral response, however, does not predict the level of COVID-19 disease severity," said Dr. Anthony Tanoto Tan, Senior Research Fellow at the Duke-NUS' Emerging Infectious Diseases (EID) program and the co-author of this study.

"Our data supports the idea that SARS-CoV-2-specific T cells play an important role in the rapid control of viral infection and eventual clearance of the disease," added Dr. Martin Linster, Senior Research Fellow with Duke-NUS' EID program and the co-author of this study.

This work is a continuation of the team's previous publication in *Nature*, where they analyzed SARS-CoV-2-specific T cell response in

COVID-19 patients at convalescence. In this study, they have expanded the analysis to the full timeline of SARS-CoV-2 infection from onset to outcome.

"It is time that T cell monitoring should be considered in providing a comprehensive understanding of the immune response against SARS-CoV-2. This would also mean that a vaccine will likely be more effective if a holistic induction of both antibodies and T cells occurs," said Professor Antonio Bertoletti, from Duke-NUS' EID program, who is the corresponding author of this study.

"This important study furthers our understanding of the immune response against SARS-CoV-2. It has far-reaching implications including on COVID-19 vaccine design and the subsequent monitoring of vaccine response," said Professor Patrick Casey, senior vice-dean for research at Duke-NUS.

The team is now studying more symptomatic COVID-19 patients with varying disease severity to further validate their findings.

More information: Anthony T. Tan et al. Early induction of functional SARS-CoV-2-specific T cells associates with rapid viral clearance and mild disease in COVID-19 patients, *Cell Reports* (2021). DOI: 10.1016/j.celrep.2021.108728

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