SARS-CoV-2-specific T cell immunity prevents recurrent severe COVID-19 disease

Context

- **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”.

Study:

- The study 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.

Robust responses

- 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 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”.

No reinfection

- 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.

**Clear segregation**

- 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.

**Limitations of the Study**

- 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.

**Adaptive immunity**

- 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”.
- The pre-existing cross-reactive memory T cells are from previous exposures to common cold coronaviruses, and the biological relevance remains unclear.