Rapid, simplified whole blood-based multiparameter assay to quantify and phenotype SARS-CoV-2-specific T-cells

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Shareable abstract (@ERSpublications)
This proof-of-concept study shows that SARS-CoV-2 T-cell responses are easily detectable using a rapid whole blood assay requiring minimal blood volume. Such assay represents a suitable tool to monitor adaptive immunity in vaccine trials. https://bit.ly/3yZHtcL

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Abstract

Background Rapid tests to evaluate severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-specific T-cell responses are urgently needed to decipher protective immunity and aid monitoring vaccine-induced immunity.

Methods Using a rapid whole blood assay requiring a minimal amount of blood, we measured qualitatively and quantitatively SARS-CoV-2-specific CD4 T-cell responses in 31 healthcare workers using flow cytometry.

Results 100% of COVID-19 convalescent participants displayed a detectable SARS-CoV-2-specific CD4 T-cell response. SARS-CoV-2-responding cells were also detected in 40.9% of participants with no COVID-19-associated symptoms or who tested PCR-negative. Phenotypic assessment indicated that, in COVID-19 convalescent participants, SARS-CoV-2 CD4 responses displayed an early differentiated memory phenotype with limited capacity to produce interferon (IFN)-γ. Conversely, in participants with no reported symptoms, SARS-CoV-2 CD4 responses were enriched in late differentiated cells, coexpressing IFN-γ and tumour necrosis factor-α and also Granzyme B.

Conclusions This proof-of-concept study presents a scalable alternative to peripheral blood mononuclear cell-based assays to enumerate and phenotype SARS-CoV-2-responding T-cells, thus representing a practical tool to monitor adaptive immunity due to natural infection or vaccine trials.

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