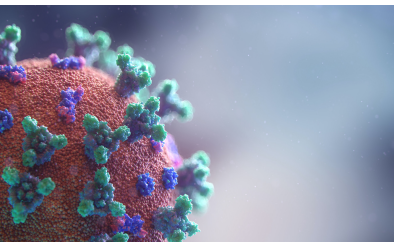


A Biomarker for Post-COVID Syndrome

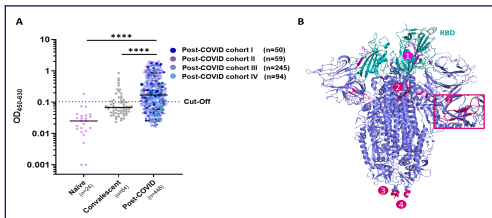
Post-COVID Syndrome (PCS), also known as „Long-COVID“, refers to various symptoms that persist for at least three months after SARS-CoV-2 infection. Approximately 65 million people worldwide suffer from PCS. Patients with PCS experience fatigue, cognitive impairment, dyspnea and other persistent symptoms. Although the list of possible mechanisms underlying PCS is growing, there is still no biomarker or validated test to diagnose PCS.



Identification of PCS-specific SARS-CoV-2 S-protein epitopes

Currently, no validated laboratory tests exist for diagnosing PCS. Instead, the diagnosis relies on evaluating multiple clinical tests that monitor persistent symptoms of SARS-CoV-2 infection. In contrast, this invention reveals a number of PCS-specific epitopes within the SARS-CoV-2 spike protein, which enable differentiation at the molecular level. These epitopes are located in conserved regions of the spike protein. The identified PCS-specific epitopes can be used as

- 01 PCS-specific epitopes can serve as biomarkers to support diagnosis of PCS
- 02 Large cohorts were screened to identify and validate PCS-specific epitope sequences
- 03 Feasibility of high-throughput screening demonstrated by ELISA
- 04 71.1% of patients were correctly classified using the PCS-ELISA



Reactivity of naïve controls, convalescent controls and PCS patients in the PCS-ELISA for one epitope. The size of the tested Post-COVID cohorts is shown in the inset and symbolized by different colors of the data points. Asterisks indicate significance levels of $p < 0.0001$, medians are given as horizontal lines, the cut-off of the assay is given as dashed line.

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CHALLENGE

The exact causes of PCS are unknown. It is thought that in addition to viral persistence, there may be autoantibodies, hypercoagulability, reactivation of other viruses such as EBV, and immunological dysfunction of pathophysiological relevance. Moreover, PCS affects many processes in the body, and is thought to be a multi-symptom complex disease, making it difficult to accurately diagnose PCS. An effective diagnostic test would be a crucial step to fight PCS.

INNOVATION

Precise epitope mapping revealed specific antibody binding patterns in PCS patients compared to matched convalescent, naïve and vaccinated controls. Although, numerous variants of concern (VOC) occurred, epitope recognition is not impaired. The identified PCS-specific epitopes are expected to function individually or in combination as biomarkers for PCS and could thus be used as part of a test system for the molecular biological diagnosis of PCS. In addition, these PCS-specific peptides offer the potential to be used in a therapeutic approach.

01 Basic principles observed · 02 Technology concept formulated · 03 Experimental proof of concept · 04 Technology validated in lab · 05 Technology validated in relevant environment · 06 Technology demonstrated in relevant environment · 07 System prototype demonstrated in operational environment · 08 System complete and qualified

TRL 08

TRL 07

TRL 06

TRL 05

TRL 04

TRL 03

TRL 02

TRL 01

Technology Readiness Level (TRL)



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