Nationales Referenzzentrum für postvirale Syndrome

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Transfer of IgG from Long COVID patients into a mouse model

SARS-CoV-2 infections can lead to post-infectious syndromes, which are referred to as Long COVID[1] in this publication. (Auto)antibodies are thought to play a pathogenic role in this condition. This study tests this hypothesis by transferring total immunoglobulin G (IgG) from Long COVID patients to mice.

The study included samples from 34 long COVID patients and 15 healthy controls who had been infected with SARS-CoV-2 but did not experience persistent symptoms, all of whom were treated at the Amsterdam UMC outpatient post-COVID clinic. All patients in the cohort had only experienced mild initial illness. Patients were stratified into three subgroups based on their plasma levels of glial fibrillary acidic protein (GFAP), neurofilament light chain (NFL), and interferon-β. Subgroup-specific pathways were identified using plasma proteomics.

The effects varied across these patient subgroups, with subgroup-specific autoantibody signatures observed. The results show that the IgG transferred to the mice induced sensory hypersensitivity and affected their locomotor activity. IgG collected from the same patients, even two years after their initial infection, produced similar symptoms in mice, indicating that the underlying immune dysfunction may be long-lasting. These findings support the hypothesis that long-term effects of SARS-CoV-2 infection may involve an autoimmune component in long COVID subgroups, whereby the immune system mistakenly attacks the body, leading to pain-related symptoms.

Key findings of the study include the transfer of pooled total IgG from long COVID patients inducing pronounced and persistent mechanical hypersensitivity in mice and IgG collected two years later from patients who remained symptomatic reproducing mechanical allodynia in mice.

These findings suggest a causal role for autoantibodies in long-term effects of the virus and could establish a murine model for therapeutic development. The study also highlights the importance of longitudinal immunophenotyping. The study may inform further research into treatment options focusing on antibodies.

However, the study is limited by its relatively small sample size and reliance on a mouse model, which may not fully capture the complexity of the human disease.

[1] Post-acute infection syndromes following SARS-CoV-2 are usually referred to as post-COVID syndrome, but in some publications also as ‘true’ Long COVID (Peluso et al. 2024), in which case the word ‘true’ is omitted. In publications, the methods section must be carefully checked to determine which definition is being used, in order to avoid misinterpretations.