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ABSTRACTS

Persistent gut microbiome dysbiosis and elevated fecal biomarkers in children post-SARS CoV-2 infection experiencing prolonged gastrointestinal and neuropsychiatric symptoms

Grantee:

Suchitra Hourigan, National Institute of Allergy and Infectious Diseases, National Institute of Health, USA

Speaker:

Mickayla Bacorn, University of Maryland School of Medicine

The gut microbiome may influence long-term post-COVID symptoms in children, though its role remains unclear. We hypothesized that persistent dysbiosis contributes to adverse inflammatory outcomes. Stool samples from uninfected (n=52) and post-infection (n=232) children in the Pediatric COVID Outcomes Study revealed reduced diversity and altered microbiome composition post-infection. Among older children, those with three or more persistent GI symptoms showed distinct microbiome profiles and elevated fecal calprotectin, indicating intestinal inflammation. Similarly, children with six or more neuropsychiatric symptoms had reduced diversity, altered composition, and increased fecal zonulin, a marker of intestinal permeability. These findings suggest post-infection dysbiosis may underlie prolonged GI and neuropsychiatric symptoms.

https://www.nature.com/articles/d42473-024-00090-7

Investigating the immunomodulatory and clinical effects of using dietary fibre intervention to target the gut microbiota in patients with Long COVID

Grantee:

Jane Varney, Department of Immunology, Monash University, Australia

Speaker:

Paul Gill, Department of Immunology, Monash University

Long COVID has emerged as a global health issue with long-term social and economic impacts. Patients experience symptoms across multiple organ systems, including cognitive impairment, fatigue, immune dysfunction and dysbiosis of the gut microbiota. Pre-clinical data shows that targeting the gut microbiota using dietary fibre can ameliorate gut dysbiosis, which may also help to treat the severity of long COVID symptoms via a gut-immune-brain axis. We have previously shown that supplementation of fermentable dietary fibres resistant starch and inulin modulates the gut microbiota and immune system in healthy people. Our team has adapted this approach to conduct a placebo-controlled dietary intervention study to investigate if dietary fibre supplementation may improve symptoms in long COVID patients. The study aims to assess if dietary fibre improves Long COVID symptoms, and to characterise changes to gut microbiota and the immune system that are associated with symptom severity.

https://www.nature.com/articles/d42473-024-00091-6

Potential biomarkers for long COVID by screening for antibodies against hundreds of thousands of structures on gut microbes.

Grantee:

Thomas Vogl, Medical University of Vienna, Austria

Only a subset of patients infected with SARS-CoV-2 develop long-COVID, but the exact factors affecting disease onset are incompletely understood. While it has been appreciated that the gut microbiota may be immunomodulatory towards susceptibility to developing long-COVID, the exact mechanisms have remained unclear. Studying associations between adaptive immunity against specific bacteria and long-COVID is challenging, as the gut microbiota represent a vast space of potential antigens: Thousands of strains exist in the human population, with each strain encoding thousands of genes representing potential antigens. Hence, to identify immunomodulating associations of long-COVID and microbiota, it would be necessary to screen a space of 100,000s of potential antigens – a feat unachievable with the throughput of conventional ELISAs or peptide arrays. Here, we have profiled antibody responses against 357,000 microbiota and viral antigens in COVID/long-COVID patients shedding light on microbiota-immune interactions predisposing long-COVID onset.

https://www.nature.com/articles/d42473-024-00092-5