

## PRESS RELEASE

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### **Dietary fibre powers the multivitamin factory in your gut**

#### **Luxembourg Institute of Health reveals critical link between fibre intake, gut bacteria, B vitamins and immune health**

*An impressive study led by the Luxembourg Institute of Health has uncovered how dietary fibres can enhance the availability of gut microbiome-produced B vitamins to the host to impact immune health.*

Dietary B vitamins, which have numerous health-promoting functions, including immune regulation, are absorbed in the small intestine, therefore levels of these compounds in the colon depend entirely on microbial biosynthesis. A new study by the Luxembourg Institute of Health shows how eating more fibre can help your gut bacteria to utilize less B vitamins for themselves, thereby boosting the availability of B vitamins to the host. This study, led by Prof Mahesh Desai, Group Leader, Nutrition, Microbiome and Immunity of the Department of Infection and Immunity, provides new insights into the intricate relationship between diet, gut health, and the immune system.

The research team employed various rodent diets with differing fibre contents to explore how these variations affect gut bacteria and, subsequently, host immunity. Their comprehensive analyses revealed that fibre deprivation led to a marked decrease in microbiota-produced B vitamins, a group of vitamins that play a crucial role in many bodily functions, including keeping your immune system strong. In contrast, supplementation with either complex cereal fibres or the prebiotic inulin, a specific type of fibre, restored the production of these vitamins and re-established immune balance. This happened because the fibre helped the good gut bacteria thrive, while a lack of fibre caused some bacteria to use up the B vitamins for themselves, leaving less for the host.

Prof Mahesh Desai explained, *“Our findings underscore the significant role of dietary fibres in modulating the gut bacteria’s metabolic output, particularly in enhancing the availability of B vitamins. This, in turn, has a profound effect on the host’s immune landscape. Since deficiency of B vitamins is associated with a plethora of diseases, our study highlights the potential for dietary interventions to boost B vitamins in the large intestine in order to support immune health.”*

The study’s results are particularly intriguing given the increasing prevalence of immune disorders and inflammatory diseases. By establishing a clear link between fibre intake, gut bacteria metabolism, and immune function, this research opens up new avenues for developing dietary strategies to promote health and prevent disease.

*“Dietary fibre is a catch-all term for a very diverse class of carbohydrates,” co-first author Dr Erica Grant noted. “Our research shows that specific types of fibres, like inulin, are more effective in supporting growth of beneficial bacteria that produce B vitamins; whereas the absence of these fibres creates an environment that drives specific bacteria to use the B vitamins for themselves.”*

*“Regarding translational applications in humans”, adds Dr Amy Parrish, joint first author of the publication, “this could have significant implications for personalized nutrition and the development of targeted dietary interventions to support colonic immune health.”*

The study highlights the potential of defined fibre types to boost the production of bacteria-derived B vitamins and regulate local immune populations. These findings pave the way for innovative approaches in using diet to modulate the microbiome and improve immune health.

The research was published in Springer Nature Journal, Microbiome, one of the top journals in the field, under the full title: *“Dietary fibres boost gut microbiota-produced B vitamin pool and alter host immune landscape”* (<https://microbiomejournal.biomedcentral.com/articles/10.1186/s40168-024-01898-7>).

### **Funding and collaborations**

The study was performed by two former PhD students in Prof Desai’s team, Dr Erica Grant and Dr Amy Parrish. Other researchers who participated in the study from the Department of Infection and Immunity of LIH included Dr Marie Boudaud, Mr. Oliver Hunewald and Prof Markus Ollert. The study involved collaborations of Department of Infection and Immunity of LIH with the group of Dr Shinji Fukuda, Keio University, Japan. This work was supported by the Luxembourg National Research Fund (FNR) and the Fondation du Pélican de Mie et Pierre Hippert-Faber, under the aegis of the Fondation de Luxembourg, as well as the European Commission Horizon 2020 Marie Skłodowska-Curie Actions individual fellowship.

### **About the Luxembourg Institute of Health (LIH)**

*The Luxembourg Institute of Health (LIH) is a public biomedical research organisation focused on precision health and invested in becoming a leading reference in Europe for the translation of scientific excellence into meaningful benefits for patients.*

*The LIH places the patient at the heart of all its activities, driven by a collective obligation towards society to use knowledge and technology arising from research on patient derived data to have a direct impact on people’s health. Its dedicated teams of multidisciplinary researchers strive for excellence, generating relevant knowledge linked to immune related diseases and cancer.*

*The institute embraces collaborations, disruptive technology and process innovation as unique opportunities to improve the application of diagnostics and therapeutics with the long-term goal of preventing disease.*

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