

Training the gut's immune system to combat detrimental effects of emulsifiers in processed food

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Researchers investigate how the intestinal microbiota can be an efficient way to prevent various chronic inflammatory conditions. Credit: Gaël Kazaz, Institut Cochin 2021 (CC-BY 4.0, creativecommons.org/licenses/by/4.0/)

In a new study, mice whose immune systems were trained against the microbial protein flagellin did not experience the usual detrimental effects of ingesting food additive emulsifiers, pointing to a potential new way to combat various chronic inflammatory diseases. Melissa Kordahi and Benoit Chassaing, Inserm researchers from the Institut Cochin and Université Paris Cité, France, and colleagues present these findings in the open access journal *PLOS Biology*.

Dietary [emulsifiers](#) are substances added to processed [food products](#) to prevent mixed ingredients from separating. Prior research has suggested that eating certain emulsifiers may alter the [gut microbiome](#)—microbes that naturally live in the gut—in such a way that enhances some microbes' ability to invade the protective mucosal lining of the gut, and may lead to chronic intestinal inflammation. Flagellin, a protein expressed by many bacteria that makes up their whip-like flagellae, enabling them to swim and hence conferring motility, may play a key role in promoting such inflammation.

Building on that earlier research, Kordahi and colleagues hypothesized that training the gut's immune system to target flagellin—immunizing it against flagellin—may help protect against the detrimental downstream consequences of dietary emulsifiers consumption. To test this idea, they immunized mice to flagellin for several weeks and then fed them food containing two common dietary emulsifiers, carboxymethylcellulose (E466) and polysorbate 80 (E433).

They observed that the immunized mice did not experience invasion of [microbes](#) into their mucosal lining after ingesting emulsifiers. Moreover, immunization also appeared to protect against chronic intestinal inflammation and metabolic dysregulations normally observed after emulsifier ingestion.

The researchers also note that, after eating food with emulsifiers, the

flagellin-immunized [mice](#) still experienced changes in the proportions of various microbe species that make up their gut microbiomes. This suggests that the protective effects of flagellin immunization may be related to its effects on microbe function and movement rather than solely an effect on microbiota composition.

More research will be needed to deepen the understanding of the potential use of flagellin immunization and how well these findings might translate to humans in the future. Nonetheless, this study suggests that flagellin immunization could be a potential new strategy to protect against inflammatory conditions that may be promoted by alterations in the host-microbiota interaction, such as [inflammatory bowel disease](#), obesity, and type 2 diabetes.

Chassaing adds, "This study suggests that targeted modulation of the intestinal microbiota can be an efficient way to prevent various chronic inflammatory conditions, such as metabolic deregulations occurring during the consumption of commonly used food additives."

More information: Kordahi MC, Delaroque C, Bredèche M-F, Gewirtz AT, Chassaing B (2023) Vaccination against microbiota motility protects mice from the detrimental impact of dietary emulsifier consumption. *PLoS Biology* (2023). [DOI: 10.1371/journal.pbio.3002289](https://doi.org/10.1371/journal.pbio.3002289). [journals.plos.org/plosbiology/ ... journal.pbio.3002289](https://journals.plos.org/plosbiology/.../journal.pbio.3002289)

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