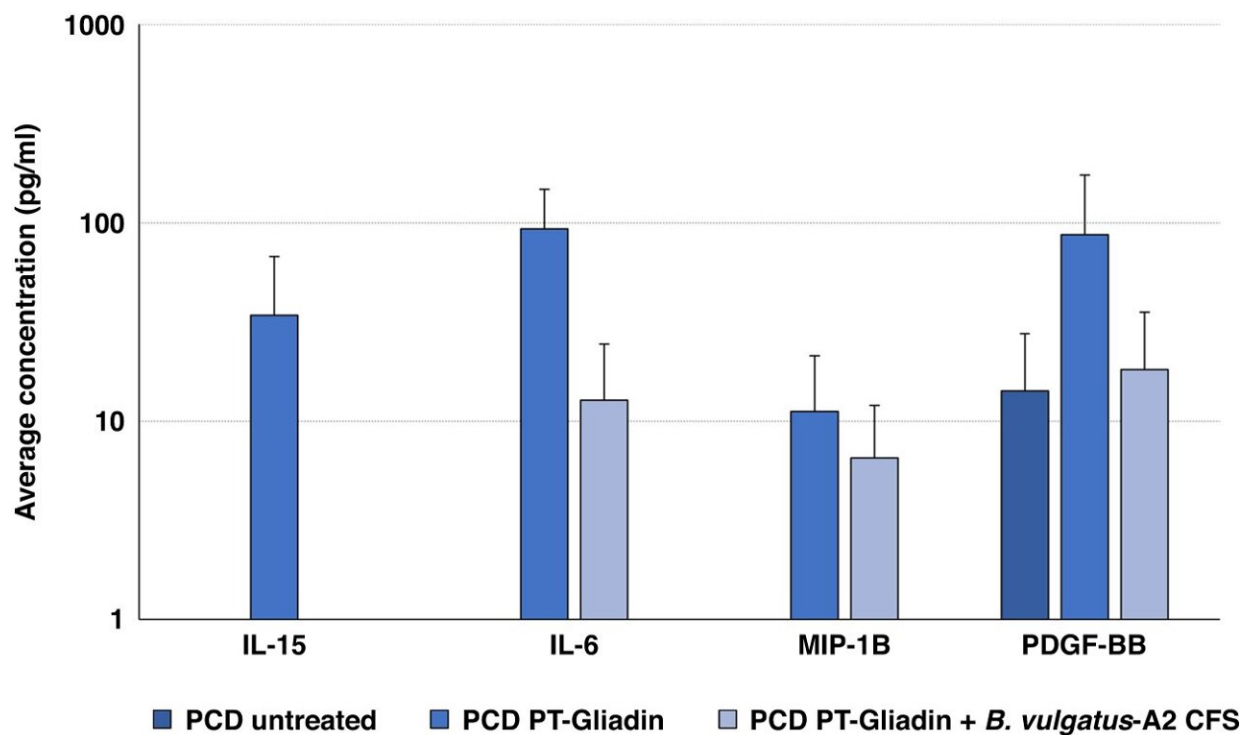


Researchers identify bacterial strain that demonstrates a potentially protective role in celiac disease

January 8 2024, by Susie Flaherty



Cytokine release analysis (N = 2 per treatment) with average bars in pg/ml from two bio replicates, each with technical duplicates. Credit: *Pediatric Research* (2024). DOI: 10.1038/s41390-023-02960-0

Researchers from Mass General for Children (MGfC) and 13 other institutions have identified a strain of *Bacteroides vulgatus* that may

protect the gut intestinal barrier against the break in tolerance that occurs when gluten is introduced into the diet of genetically at-risk children.

In collaboration with researchers from Ohio, Italy and Spain, members of the Mucosal Immunology and Biology Research Center (MIBRC) at MGfC [published](#) the proof-of-concept study on January 4 in *Pediatric Research*.

The study represents the most recent findings from a 10-year longitudinal, prospective study called the Celiac Disease Genomic, Environmental, Microbiome and Metabolomic Study (CDGEMM), which contains voluminous environmental and [genomic data](#) and [biological samples](#) from approximately 600 infants and children in the U.S., Italy and Spain.

CDGEMM researchers have completed several deep genomic analyses of the epigenetic profiling of several bacterial species in the small intestine of infants and children at risk of [celiac disease](#). Now they have added functional studies to their research portfolio to test the effects of gluten on the [gut microbiome](#).

Using [tissue samples](#) from children genetically predisposed to develop celiac disease and healthy controls, the researchers employed a human gut organoid model developed by Stefania Senger, Ph.D., at the Intestinal Organoid Program at MIBRC.

Researchers identified five microbial strains that appeared to play a protective role against the development of celiac disease, an autoimmune condition that occurs in roughly 1% of the U.S. population.

In genetically predisposed individuals, eating products that contain wheat, rye or barley can initiate a cascade of events that results in a loosening of the barrier between [intestinal epithelial cells](#) and the

passage of the gluten peptide.

The outcome is a blunting of the villi in the small intestine, which can lead to nutritional deficiencies and symptoms that can affect various body systems.

When gluten was introduced to the gut samples grown from tissue taken during endoscopies from the [small intestine](#), it resulted in intestinal permeability, an increase in inflammatory cytokines and cell death.

The introduction of *B. Vulgatus* into the affected organoids resulted in improvement in these three factors through epigenetic reprogramming of the inflammatory pathways that control antigen trafficking.

"Although it is only a small sample of four organoids, our findings are significant in identifying the mechanisms that precede the development of the autoimmune condition of celiac disease," says Alessio Fasano, senior author of the study.

In the article, the researchers state that "gut dysbiosis precedes the onset of celiac disease in genetically at-risk infants. This dysbiosis is characterized by the loss of protective bacterial strains in those children who will go on to develop celiac disease."

Fasano notes that the ultimate goal of this comprehensive research program is to prevent celiac disease from occurring by manipulating the microbial makeup of the infant gut microbiome in the early march from [genetic predisposition](#) to full-blown celiac disease.

"Our data offer possible preliminary evidence that could lead to potential targets to interrupt the progression of celiac disease in people at risk with an unbalanced gut microbiome," says Fasano. "Using celiac [disease](#) as a model, this line of research also holds promise for other autoimmune

conditions."

More information: Tina Tran et al, Novel *Bacteroides Vulgatus* strain protects against gluten-induced break of human celiac gut epithelial homeostasis: a pre-clinical proof-of-concept study, *Pediatric Research* (2024). [DOI: 10.1038/s41390-023-02960-0](https://doi.org/10.1038/s41390-023-02960-0)

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