

Mechanism of probiotic health promotion revealed

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In several clinical trials, the probiotic bacterium *Lactobacillus paracasei* DG has been shown to promote health, but until now, the mechanism has remained a black box. New research now suggests that the health benefits arise from communication between the probiotic bacteria and the human host. That communication involves bacterial secretion of a novel polysaccharide that tells the immune system to release certain immunity-stimulating chemicals. The research is published December 2 in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

In the study, the investigators isolated the polysaccharide, which are large polymers of sugar molecules. They form coverings over the surfaces of many [bacterial cells](#), and the bacteria sometimes secrete them, as well.

The researchers then used [nuclear magnetic resonance](#) imaging and chemical methods to determine the polysaccharide's structure and composition. "We showed that a significant proportion of the polysaccharide is made from the sugar, rhamnose," said coauthor Andrew P. Laws, PhD, Professor of Chemical Biology, University of Huddersfield, UK. "This sugar predominates in a number of polysaccharides that are secreted by [probiotic bacteria](#)."

Laws' coauthor, Simone Guglielmetti, PhD, Professor of Microbiology, the University of Milan, Italy, then exposed certain [human immune cells](#) to different doses of the [polysaccharide](#), and monitored the cells' release

of immune-stimulating chemicals. Notably, they secreted pro-inflammatory cytokines and chemokines.

The release of such pro-inflammatory compounds might suggest that *L. paracasei* would aggravate conditions such as ulcerative colitis, or ulcers caused by *Helicobacter pylori*, instead of mitigating them, as it has been found to do in [clinical trials](#). But "we have evidence that our polysaccharides bind to and mildly activate the receptors which release pro-inflammatory messengers," said Laws. "We believe that this generates a lesser inflammatory response than what would occur if the same receptors were activated by pathogenic bacteria."

L. paracasei DG is included in Enterolactis, one of the most popular probiotic supplements in Italy, which has been on the market for more than 20 years, said Guglielmetti.

The motivation for the research was the dearth of information as to how the polysaccharides on the bacterial cells interact with the cells of the gastrointestinal tract, said Laws.

Provided by American Society for Microbiology

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