

Pre- and probiotics keep intestinal barriers strong

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Credit: Alicia Harper, Pexels

We hear a lot about how probiotics are key to gut health, and therefore an important component of overall health. The same goes for prebiotics, another weapon in the arsenal of gut-helping molecules. But how do pre- and probiotics work, exactly, and are they all created equal?

"There are a lot of studies out there that talk about pre- and probiotics,

but I wanted specifics," says Elizabeth Rose, DVM and current Ph.D. student at NC State's College of Veterinary Medicine. "I wanted to break it down and figure out how these things work to inform future formulations so that we don't end up wasting money and time."

So Rose set out to look at the evidence. She recently published her review of the current medical literature on how these treatments work in the *International Journal of Molecular Sciences*. Her main takeaway? That the efficacy of pre- and probiotics can go beyond just promoting gut health through the presence of "good" bacteria, or, in the case of prebiotics, the correct sugars.

In fact, some of these molecules have a direct effect on the integrity of the gut itself, by keeping the intestinal barrier strong.

But let's back up. What is the difference between a pre- and a [probiotic](#)?

Probiotics are microorganisms that can be introduced to your GI tract through ingestion. Prebiotics are non-living types of sugars, such as oligosaccharides, that can also be ingested. The colostrum that newborn babies get from their mother's milk, for example, is full of prebiotics. The key is that the prebiotics are not digested by the infant, but instead provide food for the bacteria resident in the gut.

So what do they do when they get into your gut? Most people are familiar with the idea that the "good" bacteria in probiotics are involved in keeping the microbiome balanced, "outcompeting" harmful bacteria and protecting us against disease. But Rose's review found that they are also involved in repairing damage to the mucosa, the layer of [epithelial cells](#) that protects your intestinal lining from the contents of your intestines.

These epithelial cells are aligned vertically, and are bound together by

proteins called tight junctions. Tight junctions are produced by the epithelial cells and function like locking mechanisms, holding the cells in place and preventing leaks.

Pre- and probiotics actually bind to the epithelial receptors and cause genetic and physiochemical differences that both stimulate the epithelial [cells](#) to make more proteins and create signals that cause tight junction proteins to move to weak areas in the mucosal barrier, reinforcing them.

Rose hopes that knowing how these therapies work can help researchers design more effective pre- and probiotic formulations.

"Mechanistic understanding leads to formulations that are better suited for the job," Rose says. "Prebiotics and probiotics definitely influence the intestinal barrier. Now that we know how they affect the barrier, we can supplement drug therapies with these bioactive compounds—utilizing them in addition to, or even instead of, drugs."

More information: Elizabeth C. Rose et al, Probiotics, Prebiotics and Epithelial Tight Junctions: A Promising Approach to Modulate Intestinal Barrier Function, *International Journal of Molecular Sciences* (2021).
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