

Probiotics for the Immune System

By Mindy Hermann, MBA, RDN

While probiotics are unproven remedies, they are actively being studied for the benefits they may have on the immune system and for relief from intestinal problems.



The dairy case, particularly the yogurt section, is the epicenter of an exciting and growing area of interest: probiotics. The promises for probiotics are wide-reaching and include benefits for the immune system. But, as with any such trend, it is important to separate the helpful from the hype.

Probiotics = For Life

The word *probiotics* means “for life,” a name that refers to the ability of probiotics to boost populations of microorganisms such as bacteria that live in the human body. The official definition of probiotics was developed by the Food and Agriculture Organization of the United Nations in 2001. It states that probiotics are live microorganisms that when administered in adequate amounts confer a health benefit on the host. This definition was carefully crafted, and each part of the definition describes an important feature of probiotics:

- Probiotics are microorganisms, typically certain types of bacteria but also other forms of microscopic life. It's important to note that not all bacteria, or even all bacteria in yogurt and other dairy products, are probiotics. The only bacteria that can be called probiotics are those strains that have a scientifically proven connection to health.

- Only live organisms can be characterized as probiotics. Bacteria and other organisms that no longer are alive cannot aid other organisms in the body and, as such, are not probiotics. Foods that contain probiotics may be marked “live and active” on the label, meaning that the bacteria cultures are guaranteed by the manufacturer to be alive.

- Probiotics must be consumed in adequate amounts. This ensures that enough of them make it alive through the digestive process (stomach acid and various digestive enzymes destroy bacteria and other microorganisms) and remain alive until they reach the large intestine. This requires starting with a lot of cultures. Yogurt and other fermented foods are rich in microorganisms, including probiotics. One teaspoon of yogurt with live and active cultures has approximately half a billion¹ bacteria cultures!

- Not all bacteria improve the health of microorganisms in the body. The probiotic classification pertains only to those with health benefits that can include positive effects on the immune system.

- While microorganisms that break down lactose offer a benefit to people who are lactose-intolerant, these microorganisms are not considered probiotics because they act on milk and dairy products rather than directly on the body.

All probiotics have three-part Latin names. The first part is their genus, the second is their species and the third refers to their strain. For example, one three-part Latin name is *Lactobacillus* (genus) *rhamnosus* (species) GG (strain). Different strains have different characteristics, just like the difference between dogs (*Canis lupus familiaris*) and common wolves (*Canis lupus lupus*).

Probiotics and the Body's Natural Microorganisms

The human body is filled with microorganisms, including bacteria, viruses and other microscopic life. Trillions of microorganisms live on the skin, and trillions more live in the digestive tract, which starts at the mouth and ends at the anus. So many microorganisms — approximately 100 trillion² — live in the average intestine that their total weight adds up to about 2.5 pounds.³ Collectively, the body's microorganisms are called its microbiota. The specific composition of each person's microbiota is different and is determined by genetics, exposure to microorganisms in early life, diet, health and medications.

Only live organisms can be characterized as probiotics.

A healthy microbiota has numerous important roles in the body. It helps support the development of a strong immune system. It forms a protective layer or barrier in the intestine that blocks pathogens and harmful substances from entering the bloodstream through the intestinal wall. It also helps maintain a balance in the intestine between beneficial and harmful microorganisms. When the microbiota does not function properly, as in certain immune deficiency disorders, pathogenic microorganisms can take hold, causing discomfort and illnesses such as inflammatory bowel disease and Crohn's disease.⁴

Certain probiotics, namely the types of bifidobacteria and lactobacilli that commonly are added to yogurt and probiotics supplements, work by boosting the overall health of the microbiota and gut barrier. They accomplish this in several ways: boosting mucus production on the surface of the intestine; preventing harmful bacteria from proliferating, sticking to⁵ or traveling through the intestinal wall; and stimulating the production of immunoglobulin A (IgA), the primary antibody associated with mucosal immunity.⁶

The relationship between probiotics and relief from intestinal problems is actively being studied. Some findings show that probiotics help relieve infectious diarrhea, but more research is needed to determine which strains are the most effective.⁷ Research results also suggest that probiotics, by restoring a healthy balance of organisms in the microbiota, may help alleviate the symptoms of inflammatory bowel disease, Crohn's disease, ulcerative colitis and other disorders^{5,8} — some of which are more common in people who are immune-compromised.

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How Probiotics May Boost the Immune System

Approximately 70 percent of the body's immune system is located in the intestinal tract. Known as GALT (gut-associated lymphoid tissue),⁵ its primary immune responses in the intestine target dietary proteins that could be potential allergens, as well as pathogenic bacteria, viruses and parasites.² An unhealthy or unbalanced microbiota may lead to inadequate immune responses and is thought to contribute to the development of autoimmune diseases, diabetes and other illnesses.⁵ Conversely, a healthy balance of microorganisms in the intestine aids the immune system by interacting with intestinal innate and adaptive immune development and functions.⁹

Researchers, encouraged by the tremendous potential and limited downside of probiotics, are actively trying to figure out how they work to enhance the intestinal immune response. Several possible mechanisms have been put forth:

- Improve communication. By helping balance intestinal microorganisms, probiotics enhance the ability of the microbiota to communicate, or "cross-talk," with the immune cells located in the intestinal mucosa. Failures in this communication are thought to contribute to the development of autoimmune and auto-inflammatory diseases.⁹
- Boost T cells. Probiotics appear to have a beneficial effect on T cells, lymphocytes (white blood cells) that are involved in cell-mediated immunity.¹⁰ It has been shown that

a variety of strains of lactobacillus, a probiotic bacteria, improve the health of T cells and increase the ability of these blood cells to destroy harmful bacteria.¹¹

- Activate cells that stimulate immune responses. Dendritic cells are cells in the immune system that intercept and deliver antigens to T cells and B cells, where the adaptive immune response takes place. They help regulate both innate and adaptive immunity by producing anti-inflammatory cytokines and chemokines (both are compounds that signal the immune system). Certain probiotic strains help activate dendritic cells while also suppressing the inflammation process caused by pathogens. Probiotics also stimulate immune cells to better tell the difference between harmful and beneficial bacteria.⁵

- Stimulate IgA production. The positive influence of probiotics on IgA in the intestinal mucosal lining may improve immune function.⁵

The relationship between probiotics and reduced inflammation has been shown in short-term studies to aid symptoms of irritable bowel syndrome (IBS)¹² and certain types of colitis,⁵ which are not immune diseases. But, results of longer-term IBS studies vary.¹³ However, to date, probiotics have not definitively been shown to be effective in inflammatory bowel disease, Crohn's disease or several other conditions.¹³ Additionally, despite probiotics' promising effects on the intestinal immune system, studies have not yet demonstrated that they benefit disorders involving the immune system. Long-term studies on large groups of people are needed to determine whether different combinations of probiotics, given at specific stages in the disease process, might lead to beneficial results. Thus, for now, probiotics are not part of mainstream therapy for inflammatory bowel disease and other immune-related intestinal disorders.¹⁴

Adding Probiotics to the Diet

Although probiotics are considered to be unproven remedies and the U.S. Food and Drug Administration has not approved any health claims for probiotics,¹⁵ many people add them to their diet with the thought that they can't hurt and possibly can help. The most common products with probiotics are yogurts that contain probiotic cultures in addition to their traditional yogurt cultures, a variety of dairy and non-dairy beverages, and probiotic supplements. When deciding on a probiotic food or supplement, it must continue to be taken on a regular basis in order to get any potential benefit; once stopped, the microbiota is likely to go back to the way it was before beginning probiotics.⁵

Always look for package information on the strains of probiotics that are supplied in the products being considered. Different strains have different potential effects on particular conditions in the body,¹⁶ research on one strain is not applicable to others, different people do not have the same response to a specific probiotic, and results from animal studies do not necessarily apply to humans.^{2,15} Furthermore, no strains or combinations of strains have yet been proven to improve immune disorders.

Exact dosages can't be found on most products, but foods and supplements will list the species and strain. Some will state that the cultures are live and active, and supplements will list the approximate number of cultures.

In 2011, the Agency for Healthcare Research and Quality looked at the safety of probiotics and concluded that they have few negative side effects. However, long-term safety has not yet been studied extensively in healthy populations or in people who have chronic illnesses or immune deficiency diseases and who consistently take daily doses.¹⁵ That is why it is important to consult with a doctor or other health professionals before starting a probiotics regimen. Additionally, probiotics should not take the place of scientifically proven medications or treatments.¹⁵

Because probiotics are live microorganisms, they need to be handled properly to ensure that they stay alive. A package statement that lists the number of live cultures in a product pertains to the product when it leaves the manufacturing facility. Improper handling during shipping and storage can kill the bacteria, and, unfortunately, there is no way of knowing that a product might have been mishandled. However, if a product package calls for refrigeration and it is being sold from a room-temperature shelf, it shouldn't be purchased. For freshness, products with the latest expiration date should be chosen, and package instructions for storage at home should be followed.

The field of probiotics is rapidly changing, with new research findings continuing to be published and new products hitting the store shelves. Patients should rely on reputable sources for information on scientifically proven relationships between probiotics and immune system disorders. And, when choosing among brands, reviews from reputable third parties and other users should be taken into account, and a product and dosage schedule that makes the most sense for the patient should be considered.

MINDY HERMANN, MBA, RDN, is a food and nutrition writer and communications consultant in metropolitan New York. She gets her probiotics from yogurt, which she tries to eat daily.

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