

Nutrition and Health Info Sheet: Prebiotics and Probiotics

For Health Professionals

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What are prebiotics and probiotics?

Probiotics are living microorganisms that may have a health benefit to humans when consumed in the correct amounts.¹ A prebiotic are the compounds that fuel beneficial bacteria in humans' gastrointestinal systems.² These compounds include cofactors, vitamins, minerals, and enzymes. There are different types of beneficial bacteria that reside in the gut and all around the entire body. Some are present to create an antagonistic environment to ward off harmful bacteria. Others are there to aid in the break-down of larger molecules that would not be digested otherwise.^{1,2}

To really understand prebiotics and probiotics, it is important to know where all of this bacterial activity occurs. Every human has an entire community of bacterial strains that reside within their own gut. Research on the microbiome is still in its early stages, but current literature defines a microbiome as all of the microbes that live within and on the host. Scientists use this term to reference all of the genes and bacteria within each individual.³

Table: Prebiotic and Probiotics¹

Prebiotics	Probiotics
Non-living, non digestible compounds such as certain carbohydrates	Live microorganisms
Serve as food for beneficial bacteria within the gut	Bacteria or Yeast
Available as food supplements and naturally occurring in certain foods, which include many fruits and vegetables.	Available as supplements and in certain foods containing live cultures (yogurt, cheese, kefir, miso)
Prebiotics aid digestion and may support the treatment of several chronic digestive disorders.	Probiotics may support the treatment of several chronic GI disorders, such as Irritable bowel syndrome, lactose intolerance, etc.

What are the benefits of prebiotics and probiotics?

In order for our gut microbiome to function properly, humans need a healthy combination of many bacterial strains (pro) and compounds (pre) to fuel them.¹ While the research is limited, a healthy microbiome is believed to have a wide range of benefits including improved immune function and gastrointestinal health. In cases that disrupt the microbiome (e.g. overexposure to antibiotics), symptoms such as diarrhea and abdominal discomfort may present.⁴ Probiotics, in adequate and safe amounts, are often included in treatment regimens for patients with various gastrointestinal conditions including irritable bowel syndrome (IBS), lactose intolerance, stomach ulcers, infectious diarrhea, among others.¹ The use of prebiotics and probiotics to maintain a healthy microbiome is critical to human health and there is more research underway to establish more empirical evidence.⁵

What are the effects of prebiotics and probiotics on human physiology?

There are still many questions that surround the microbiome and how administering bacterial cultures plays a role in changing that environment, however clinical studies have provided suggestive evidence that lead researchers to believe that the microbiome is sensitive to small changes and may result in abnormal responses to digesting food, fighting off pathogens, and may result in vitamin deficiencies.^{3,4}

In the gut there is a continuous fluctuation of beneficial and harmful bacteria which is called bacterial antagonism. Probiotics also contribute to:

- Competition for nutrients¹
 - » Probiotics will compete for nutrients (or in some cases prebiotics) with pathogenic bacteria.
- Immune defense^{1,6}
- Digestion¹

What are some sources of prebiotics and probiotics?

Once bacteria are grown to large colonies, purified, and deemed safe for commercial use they may be added as probiotics in the following ways: as a culture concentrate added to food, inoculated into dairy products and allowed to grow, or as a concentrated dietary supplement in the form of powders, tablets, or capsules at different dosages. Dairy products have long been a popular vehicle to deliver probiotics. However, there is still more research needed regarding the efficacy of delivering probiotics from dairy to human gut flora.⁷ Furthermore, vegetarians tend to consume higher amounts of prebiotics by eating foods like bananas and asparagus, which results in more fuel for probiotics.⁸

Who should consume prebiotics and probiotics?

While more research is needed, recent data suggest that people with digestive issues, such as IBS, lactose intolerance, and stomach ulcers may benefit from taking both prebiotics and probiotics.² Probiotics can be a relatively inexpensive method of remedying certain gastrointestinal ailments. They can be purchased at grocery stores or specialty stores. Details on culture size are indicated on every bottle sold (usually ranging from 1 billion cultures to ~ 10 billion cultures).

Is there a risk of overconsumption?

Overdosing on probiotics can lead to side effects like diarrhea, bloating, and nausea.⁵ There are several available strains of bacteria sold as probiotics. In healthy individuals, side effects of overconsumption of probiotics will be minor, if at all, however in those with compromised immune systems, there can be resultant infection and other complications.⁹ It is best to consult with a medical professional when deciding whether or not to supplement the diet with probiotics.

Can probiotics prevent infectious diarrheas?

Probiotic organisms play a role in preventing and treating infectious diarrheas like the rotavirus, a common cause of infant diarrhea and infant mortality.¹⁰ The virus is found in the stool of the infected individual and hands, diapers, and other vectors can spread the virus. Studies have shown that probiotics such as *L. rhamnosus* GG, *L. reuteri*, *L. casei* Shirota, and *B. animalis* Bb12 can decrease the duration of acute rotavirus diarrhea. Probiotic organisms can inhibit the effects of enteropathogens and benefit the gut.⁴

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