Prebiotics, Probiotics, & Postbiotics

A Healthy Gut Microbiome is Essential for Overall Health

What is the Gut Microbiome?

Trillions of microbes colonize our body including mucosal, skin and gastrointestinal, or gut, environments. These are as abundant as our own human cells and contribute nearly 2,000,000 genes (100X) more than our 20,000 human genes.[1] Maximum numbers of these microbes reside in our gut and constitute the gut microbiota, which is quite diverse. Different people harbor different consortia, or sets, of microbes. Diet and lifestyle have a profound impact on gut microbiota.

What are Prebiotics?

Prebiotics are substrates that are selectively used by host microorganisms that, in turn, confer a health benefit.[2] The term "selectively used" refers to prebiotics being utilized by specific gut microbial communities, including certain strains of Lactobacilli and Bifidobacteria, both of which are commonly used as probiotics. We cannot digest prebiotics, therefore undigested prebiotics reach the colon where they are efficiently utilized/metabolized by resident microbiota generating various beneficial compounds, such as short chain fatty acids in the process.[3-4]

Prebiotics are naturally present in a variety of plants in the form of polysaccharides (including certain fibers such as chicory root, vegetables, fruits, and whole grains), and polyphenols*. These may be added to some foods such as yogurt, cereals, breads, or drinks. Prebiotic supplements, such as those found in the form of powders, may help increase daily intake. Different prebiotics provide different benefits; therefore, one should consume a variety of whole foods.

Prebiotics Have the Potential To:

- Feed good gut bacteria
- Support digestive function (bowel health and regularity)
- Help improve mineral absorption
- Help regulate certain body functions such as energy balance and healthy glucose metabolism
- Help support body's immune system

Prebiotics & Fiber

Fiber can be classified as soluble or insoluble and is naturally present in many healthy foods such as vegetables, fruits and whole grains.[2] Many prebiotics today are also classified as soluble fiber; however, not all soluble fibers are prebiotics. Prebiotics are not digested by humans, and our gut microbes act upon them. They are also naturally found in plant-based foods and are typically extracted from plants or synthesized from sugars.

Recommended Intakes of Prebiotics

No Adequate Intake (AI) level or Daily Value (DV) exists for prebiotics. However, it is suggested to get at least 5 grams of prebiotics in your daily diet.[2] The DV for fiber is 28 grams per day based on a 2,000 calorie diet. Like prebiotics, fiber is also not digestible in humans; however, gut microbes do utilize some fibers.

What are Probiotics?

Probiotics, defined internationally by the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) are "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host".[5] The Food and Drug Administration (FDA) classifies probiotics for human consumption as "live biotherapeutics".[3-4] In 2014, the International Scientific Association for Probiotics and Prebiotics (ISAPP) reinforced the FAO/WHO definition and provided guidance on the appropriate use and scope of the term "probiotic."[6] The human body hosts trillions of microorganisms and many are beneficial; however, some are opportunistic pathogens and may be harmful.[4] To qualify as a probiotic, the organism must be non-pathogenic, demonstrate ability to survive the stomach acidic environment, resist effect of bile salts, and have the ability to compete successfully against "resident" gut organisms for an appreciable length of time.[2-6]

Why Do We Need Probiotics?

There is a healthy balance between various microbial communities in our digestive tract. This balance may be disrupted under certain circumstances such as physical stress, poor nutrition, medications such as antibiotics, aging, traveling, etc. Probiotics being beneficial microbes offer health benefits, such as support for overall digestive health.† This includes supporting regularity of bowel movements and consistency of stool, as well as supporting digestive balance.† The production and absorption of certain nutrients in the colon may be better achieved by using probiotics.[6-8]†

How Do We Know Probiotics Are Good For Us?

Clinical research has long shown the benefits and safe use of probiotics for digestive health, and more recent research has demonstrated the connection between immune, heart and brain health. According to the CRN 2020 Consumer Survey, 57% of people take probiotics for digestive health or general health, while 51% of people take probiotics for immune support. This is important because 70% of the immune system is found in the gut. Studies around the globe routinely report the role probiotics can play in keeping us healthy.

Identifying Probiotics

Probiotics can be identified by their genus, species and strain for the microorganism(s) they contain. Health benefits provided by a probiotic are strain specific and human relevant dose is determined by human clinical trials. Most commercially available probiotics belong to Bifidobacterium and Lactobacillus genus. Various probiotic strains may exert varying effects on the body (e.g. digestive, immune, etc.) and different strains from the same species may confer different benefits. For example, Bifidobacterium animalis subsp lactis HN019 has shown to help support digestive health, while Bifidobacterium animalis subsp lactis BI-04 has been studied for effects on immune health.[7] Bifidobacterium animalis lactis BB-12 has both gut health and immune health benefits. Bifidobacteria are among the dominant bacterial populations in the gastrointestinal tract (GIT) of humans.

Lactobacilli metabolize carbohydrates to produce lactic acid making them the largest genus within the lactic acid bacteria (LAB) group. The main uses for Lactobacilli are in the manufacturing process of fermented dairy, meat, or vegetable foods and sourdough breads, and they are also widely used as probiotics.[8] Lactobacillus rhamnosus GG (LGG) was the first strain belonging to the genus Lactobacillus to be patented in 1989.[9] It is a very well studied probiotic in several human clinical trials and is best known for its digestive health benefit. There are several other Lactobacilli probiotics with distinct health benefits. A combination of Lactobacillus rhamnosus GR-1 and Lactobacillus reuteri RC-14 has been shown to provide vaginal health benefits,[10-13] whereas another combination of Lactobacillus plantarum HEAL 9 and Lactobacillus paracasei 8500:2 provides immune health support.[14]

Another category of probiotics is spore forming probiotics, which are resistant to harsh conditions unlike Lactobacilli and Bifidobacteria. They have high stability to the surrounding atmospheric conditions such as heat, gastric conditions, and moisture. Bacillus strains are widespread in nature and are found in soil, air, fermented foods, and the human gut.[15] Some of the strains such as Bacillus coagulans IS2 and Bacillus coagulans SNZ 1969 have been shown to support gut health.[16-21]

Probiotic Mechanism of Action

Different probiotics act via different mechanisms depending on their genes and metabolic capacity. Some of the suggested mechanisms of action for probiotics include the following:

- Adhesion to mucosal lining and occupying the sites resulting in crowding-out of pathogens and preventing them from persisting in gut†
- Production of molecules (bacteriocins) that are capable of destroying pathogenic organisms
- Production of short chain fatty acids (SCFAs) as metabolites from the fermentation dietary fiber or resistant starch. These SCFAs can lower intestinal lumen pH to levels harmful to other organisms. SCFA butyrate is also important for colonic health.

How to Select the Right Probiotics

To select the probiotic that is the best for each individual, there are a few tips to keep in mind:

- Purchase your probiotic from a well-known brand that you know and trust. A trusted brand will disclose the genus, species, and strain used in the probiotic product formulation, as well as providing a website and toll-free number on the label to address consumer questions.
- Read product label to assure it is describing the health benefit you are seeking. Also, a probiotic label should provide:
  - Amount/Quantity: a probiotic should include the amount of live organisms, which is also referred to as Colony Forming Units (CFUs). It should include the number of CFUs, not just the weight.
  - Identity: a probiotic should list for each live organism and the benefits. The brand or manufacturer should be able to confirm that the CFUs in the product for purchase are supported by clinical research.
  - Viability: a probiotic should guarantee the CFUs through shelf life or expiration date, rather than at time of manufacture. Follow suggested use and storage on the label. It's important to take the product per the suggested use. For example, it may be important to take the product with a cool or room temperature beverage and a meal.

What are Postbiotics?

In 2021, a consensus panel of experts assembled by ISAPP, defined postbiotics as "a preparation of inanimate microorganisms and/or their components that confers a health benefit on the host".[22-23] An important characteristic of postbiotics is the presence of inanimate microbes, along with other active cellular components such as metabolites, enzymes or cell wall fragments, that also significantly contribute to the functionality of a postbiotic - for example, heat inactivated probiotics or whole microbial fermentates. Research on postbiotics is an emerging area and has been promising as it has demonstrated how they can modify the composition or functions of the host microbiota. More research is needed as there is limited evidence for use of postbiotics in healthy populations.[22-23] One of the commercially available postbiotics is Epicor®. It is whole yeast fermentate and has shown support for immune health in multiple clinical trials.[24-26]

Should I Take a Prebiotic/Probiotic Supplement?

It's important for patients to communicate with their healthcare professionals about any changes to their daily regimen including dietary supplements. Work together to understand personal nutrition needs as well as current dietary patterns to identify nutrient gaps, as well as dietary fiber. For those who are still unable to meet their nutrient and/or fiber needs from diet alone, it's important to discuss the need to fill any potential gaps with dietary supplements, as a safe and effective way to ensure adequate intake of all essential nutrients/dietary fiber.

About Nature Made

For more than 50 years, Nature Made has been a trusted leader in the wellness industry. They have helped pioneer quality standards for vitamin, mineral and herbal supplements, and remain dedicated to formulating products backed by science. Committed to Good Manufacturing Practices (GMPs), Nature Made's quality extends to every aspect of our production, from purchasing high-quality raw materials to routine testing for purity and potency. In fact, they were the first national supplement brand to have a product verified by United States Pharmacopeia (USP), and it is the national supplement brand with the most products carrying the USP Verified Mark, verification that products meet stringent quality criteria for purity and potency. Nature Made is also the #1 Pharmacist Recommended Supplement Brand in 8 Categories**

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‡These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure or prevent any disease.
*Polyphenols are a group of compounds found in plants, with over 6000 types identified to date. They can be divided into two main categories, flavonoids and non-flavonoids.
**Based on Pharmacy Times Survey, 2023

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