Good Health Starts in the Gut

Probiotics & You

Written by Jen Allbritton, CN

Our bodies house trillions of microorganisms, with a majority of them residing in the digestive tract. Although some are harmful, most of the species of microorganisms are essential for optimal health, not to mention survival. Our body has a symbiotic relationship with these friendly bacteria, also referred to as intestinal microflora, gut flora, symbiotics or probiotics. The word probiotic actually means "for life". These inconspicuous, life-enhancing bacteria support a strong immune system, improve digestion, and synthesize various nutrients. In fact, supporting the health of your bacterial ecosystem is your first line of defense against illness and disease. Unfortunately, poor lifestyle and dietary habits can negatively affect these pro-life microorganisms and allow harmful bacteria to dominate, which ultimately diminishes overall health. Luckily, there are several ways to encourage a healthy microflora ecosystem.

Health Enhancing Properties of Probiotics

Probiotics….

- Inhibit the growth of harmful microorganisms (e.g., *Candida albicans*) by manufacturing organic compounds (e.g., lactic acid) that increase the acidity of the intestine and prohibit their reproduction. Harmful strains are constantly prowling the gut to proliferate at the first sign of probiotic weakness. Therefore, probiotic strength and maintenance is key.[1,2,3,4]
- Produce short chain fatty acids (SCFAs) as they feed off of prebiotic substances in foods and supplements. SCFAs feed the colon cells and improve intestinal motility. They support healthy immune development, modulate inflammation, and, like lactic acid, make the colon more acidic which inhibits the growth of harmful microorganisms. They also appear to support insulin sensitivity, energy expenditure and appetite control.[5]
- Promote digestion by secreting needed enzymes, encouraging peristalsis (the wave-like contractions of the intestine), and assisting nutrient breakdown by fermentation, which enhances food digestibility.[1,2,3,4]
- Boost immune function by preventing disease-causing invaders from permeating the intestinal wall and entering the bloodstream. By preventing harmful microorganisms from getting through the intestinal wall, the gut-lining probiotics lighten the load of the immune system. This allows the immune system to expend more energy protecting the body elsewhere.[3]
- Prevent and help remedy diarrhea in adults and children.[6] This includes antibiotic-associated diarrhea and "traveler's diarrhea," which is often caused by pathogenic bacteria in drinking water or undercooked foods.[2,3,7]
- Manufacture some of the B-vitamins, including niacin, pyridoxine, folic acid and biotin and small amounts of vitamin K2.[1,2,3,48]
- Increase resistance to local or systemic infection by producing substances called *bateriocins* that have a natural antibiotic action that kills unwanted microorganisms. It has been found that individuals with flourishing beneficial microflora are better able to fight the growth of disease-causing bacteria.[2]
- Help prevent vaginal yeast infections. *Lactobacillus* species are the most common species in the vaginal flora. These microorganisms prevent the overgrowth of unfriendly bacteria and yeasts in part by producing lactic acid, which acts like a natural antibiotic.[2] Some probiotics are available in a suppository form to be delivered vaginally, but oral probiotics appear to be equally effective in the long run. Probiotics taken orally not only positively alter the vaginal terrain, but also appear to directly make their way into the vagina after passing through the intestinal tract.[9]

- Recolonize the intestine during and after antibiotic use. Although antibiotics can be useful, they cause considerable damage to the intestinal microflora. Just as the name "antibiotic" implies, they kill bacteria, and they do it nonselectively. That is, they kill beneficial ones as well as harmful ones. Once probiotic organisms have been destroyed and stripped off the walls of the intestines, potentially pathogenic organisms have more of an opportunity to proliferate (e.g., *Candida albicans* and staphylococci). Studies demonstrate that probiotic supplements can prevent up to 50% of infections occurring after antibiotic use.[2] Although antibiotics and probiotics should be taken concurrently, they should not be taken together. Probiotics should be taken at least two hours *after* each dose of antibiotics to provide optimal effectiveness.[3]

The Key Probiotic Players

There have been about 1000 different species of bacteria found in the human gut and each person has a unique combination of between 250-500 of these, with the majority of them inhabiting the large intestine.[10,11]. Many of the strains used as probiotics are either of the Lactobacillus or the Bifidobacterium varieties. Lactobacilli are the predominant strains found in the small intestine and also in the vagina. They promote digestion, help to prevent the overgrowth of harmful bacteria and support healthy immune function. Bifidobacteria on the other hand, are the predominant strains in the large intestine (colon). They are capable of fermenting carbohydrates and making many B-vitamins. They also support the healthy development and function of the immune system as well as healthy elimination.[12,13.14] We need a variety of bacteria from both groups for optimal health. While different species and strains from each group will have similar benefits, each will have slightly different actions. The following is a short list of some commonly used strains.

Lactobacillus acidophilus is a main inhabitant of your small intestine. These bacteria manufacture lactase, to digest milk sugars, and lactic acid, which suppresses undesirable bacteria and yeasts. *Bifidobacterium bifidum* and *Bifidobacterium longum* are inhabitants of your large intestine. These bacteria produce numerous specialized acids that prevent harmful bacteria, yeasts and viruses from colonizing. They also prevent potential toxicity from detrimental compounds, manufacture B-vitamins, and help the body detoxify.

Lactobacillus bulgaricus is a transient type of probiotic that stays in the digestive tract for only a few weeks. Together with *Streptococcus thermophilus*, these bacteria are used for culturing. Some strains of these microflora produce natural antibiotics within the body that kill off harmful bacteria. They also manufacture lactic acid, which encourages a healthy environment for the more permanent residents of the colon.

Bifidobacterium infantis is a common inhabitant of an infant's intestine. It functions similarly to other bifidobacteria. An infant obtains these beneficial microflora as he or she passes through the birth canal and is inoculated from the mother's vagina. Later, breastfeeding provides more bacterial and immunogenic substances. It has been found that babies who do not receive adequate microflora early in life are more prone to allergies, infections, food sensitivities and malabsorption problems.[3,4] In recent years *B. infantis* has received attention for use in adults as well. In studies, *B. infantis* has improved IBS (irritable bowel syndrome) symptoms and appears to modulate inflammation in the intestines.[15,16]

Lactobacillus reuteri is a species of beneficial bacteria that is naturally found in your intestinal tract (both small and large). It is the only lactobacillus species that produces and secretes reuterin, a broad-spectrum antimicrobial agent that inhibits the growth and colonization of harmful bacteria in the colon, such as *E.coli, Salmonella, and Listeria*. Reuteri has been proven to stimulate the development of the lining of the intestine, which improves nutrient absorption, enhances physical growth and promotes better overall health. Additionally, these bacteria reduce illness from diarrhea and gastrointestinal infection.[17]

Lactobacillus GG is the probably the best researched strain of probiotic in the world, with over 400 published research studies on its benefits. This strain is able to survive the harsh environment of the upper GI tract and is very sticky, meaning it adheres well to the gut lining. In studies *Lactobacillus GG* has been shown to inhibit a number of 'bad' bacteria without interfering with the 'good' bacteria. It helps to support and balance a healthy immune response and to modulate inflammation. The combined actions of *Lactobacillus GG* appear to protect the integrity of the intestinal cells by preventing, and possibly even healing, intestinal hyper-permeability (a.k.a. "leaky gut"), especially in those with Celiac Disease.[18,19]

Bacillus coagulans is unique in that it contains a spore-like covering that allows it to survive the harsh environment of the upper GI tract and then to germinate quickly in the intestines. This transient bacteria produces lactic acid and peptides that help to make the intestines inhospitable to detrimental bacteria yet supports the growth of beneficial bacteria. They also produce short-chain fatty acids that feed the cells of the large intestine. In human studies *B. coagulans* improves bowel movement frequency, gas, bloating and pain in those with diarrhea predominant IBS. Like other probiotics, it also supports a healthy immune response. Because of its unique natural coating B. coagulans does not require refrigeration and is shelf stable. The doses used in research range from 100 million to 5 billion CFUs daily.[20]

Encouraging Probiotic Proliferation

There are several ways to increase probiotic proliferation with our dietary choices. First, consume cultured and fermented food products, including "live culture" yogurt, cottage cheese, kefir, tempeh, and unpasteurized fermented vegetables such as sauerkraut. These foods contain beneficial bacteria and encourage their colonization. Use caution when selecting a cultured food product. Many commercial yogurt manufacturers look for the "easy and cheap" production method. Some manufacturers pasteurize their products after the culturing process is complete, which destroys the bacteria in the initial product.[3] Be sure to look for the term "active" or "live" cultures on the label. Second, aim to get a variety of foods rich in prebiotics. Prebiotics are a category of compounds that the human body is unable to break down but that beneficial bacteria can break down and use as food. This process also produces short chain fatty acids (SCFAs), which feed the cells of the large intestine and help to modulate inflammation.[21] Prebiotics are found in many healthy foods, including honey, asparagus, bananas, dandelion greens, radicchio, endive, burdock root, eggplant, garlic and onions, green tea, Jerusalem artichokes, kefir, yogurt and many fruits.[22] Often probiotic supplements will contain concentrated sources of prebiotics such as fructo-oligosaccharides (FOS), mannan-oligosaccharides (MOS) and inulin. No matter the source, some people with compromised digestion may not tolerate prebiotics well at first, and gradual introduction may be necessary.

Factors that Hinder Probiotics' Life-Giving Properties

Intestinal flora is easily damaged. Many factors, such as poor diet, aging, medications, illness, stress, environmental pollution or infection can upset their delicate balance.[23] Several factors, including healthy digestion, are vital to ensure an optimal bacterial presence in the body. Peristalsis, the rate at which the intestines move food through your intestinal tract, affects your microflora. If it moves too fast, as in diarrhea, the efficiency and number of the flora is reduced. If it is too slow, as in constipation, overgrowth of harmful bacteria can occur. Digestive dysfunction can result from the overuse of laxatives. When the body becomes dependent on an artificial stimulus, the intestines "forget" their peristaltic responsibility. As a result, the rhythmical contraction that keeps harmful bacteria at bay is diminished. A good goal is to have 2 to 3 natural, effortless bowel movements each day.

It should come as no surprise that our food choices directly influence our internal bacteria. Simply put, the diet that is good for you is also good for your gut flora and vice versa. Foods that are not probiotic-friendly include sugars and refined foods. Alcohol also prevents implantation of health-

promoting bacteria. Chemicals found in our food and water supply, such as pesticides and chlorine, can have a negative impact on our resident microflora as well.[1,3]

Lastly, two factors that lead to probiotic destruction are stress and the common treatment for stress-related symptoms: antacids. Stress has been shown to reduce the number of *Lactobacilli* in the intestines[24] and frequent use of antacids shifts the environment of the gut to alkaline, which is favorable for harmful bacteria.[3] Just another reason practicing stress management is so important!

Supplemental Probiotics

Considering how easily our gut bacteria can be compromised in our modern lives, it may behoove you to take a high quality probiotic supplement. Here are some tips on how to find and use a probiotic supplement.

What strain? Unfortunately there is no one-size-fits-all probiotic. Different varieties can be beneficial for different ages and different concerns. A good starting place is to colonize with *Lactobacillus acidophilus* and *Bifidobacterium bifidum.* From here, many other species can be added to complement this base.

Mixed or Separated? There is much controversy over whether or not mixed species or single species products are better. One school of thought is that "cocktails" of the more important friendly bacteria should not be used since they are destined to inhabit different regions of the digestive tract and will compete with each other for nutrients and growing room. On the other hand, several studies in both humans and animals have found that properly selected multi-strain formulas are superior to single-strain products for a variety of conditions.[25] It is best to try both kinds for yourself and see which works best for your body.

Dairy or dairy-free? Probiotics are made similarly to traditional yogurt. These friendly bacteria are grown in what is called a "culture medium". As the bacteria grow, the culturing medium is transformed into a different substance called the *supernatant*, which is filled with beneficial metabolic byproducts. The supernatant also helps to preserve the bacteria while on the shelf and once ingested.[26] Milk is the preferred culturing agent, but other culturing mediums such as carrots, chickpeas, and soy can also be used for those who are highly sensitive to dairy. Because friendly bacteria produce lactase, dairy-based probiotics can sometimes be used by lactose intolerant individuals, but not always.[3]

Processing methods? Because bacteria are easily damaged by heat, oxygen, acid, etc, there are two main challenges in the production and use of probiotic supplements. First they must be grown, harvested, packaged and delivered to the consumer all while preserving the integrity of the bacteria. Second, they must survive the acidic environment of the stomach to reach their desired destination, the intestines. Probiotic processing methods have come a long way in the last several years. Whereas it used to be difficult to maintain the viability of the bacteria with any method other than the expensive freeze-drying method, today's processes are both more efficient and cost-effective, yet still deliver viable bacteria. There are many different methods currently in use and new ones are being explored every day. As we have learned more about probiotics, manufacturers have also devised additional ways to maintain their viability, including the cultivation of more hardy strains, using different culturing mediums, coating the probiotics and/or the capsule they are delivered in, and adding prebiotics.[27,28] There is even some research to suggest that many of the benefits offered by probiotics can be obtained from dead bacteria.[29,30]

How much? Recommended dosages for healthy maintenance of intestinal microflora are *at least* 100 million colony-forming units (CFUs) per day.[2] For therapeutic purposes one billion CFUs 1-3 times a day or more is recommended.[31] Keep in mind, no side effects have been reported, even with large doses of probiotic bacteria, although some individuals might experience bloating, diarrhea and gas when first introducing probiotics. This is not necessarily a bad sign and is temporary. It usually

signifies the killing off of pathogenic bacteria and fungi. To minimize this ‘die-off’ reaction, begin with very small amounts and build up your dose slowly.

When? Many probiotic experts feel the best time to take a probiotic supplement is in the morning on an empty stomach (when stomach acid is at its lowest) or just after meals, when the food can buffer the acid.[1]

Storage? Light, moisture and heat destroy bacterial potency. The most potent products are usually refrigerated and in dark glass bottles so moisture cannot penetrate the container. Even though unrefrigerated products may be less potent, they can be beneficial, especially in certain situations, such as travel.

Shelf Life? Look for a product that lists potency through expiration date, not just the potency at the time of manufacture and be sure to store the product according to the manufacturer’s recommendation to maximize survivability.

Capsule, tablet, liquid or powder? The form used to deliver probiotics is largely dependent on your individual needs. Some professionals believe the powdered form may have more potency than the capsules, tablets, or liquids. Powdered forms also get into the gut faster than when taken in capsules. However, capsules may protect the bacteria from contamination and are convenient. In addition, enteric-coating keeps the capsule intact (and the bacteria preserved) until it has passed the stomach and is into the intestines. In general, choose a product that meets your other criteria and that you are most likely to take regularly.

When choosing your supplement, do not hesitate to ask questions of the manufacturers. They should be able to provide you with research and hard facts about their products.

To achieve optimal functioning of your internal ecosystem, place emphasis on lifestyle habits and choices that encourage its growth and remove any and factors that cause its destruction. Although most people can use a “probiotic boost,” people who use antibiotics, have a poor diet, are under chronic stress or suffer from digestive issues seem to be most deficient in friendly bacteria. No matter what your health and wellness situation or practices, encouraging the health of your internal probiotic friends can literally bring “life” to your overall health.

References Available Upon Request