

Probiotics: How and why to take probiotics

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Antibiotics are often life-saving medications that eradicate bacterial infections. However, the same life-saving medication causes collateral damage to the beneficial (healthy) bacteria that inhabit one's gastrointestinal (GI) tract. Up to one-third of antibiotic users will experience antibiotic-associated diarrhea (AAD), resulting in impaired bacterial functioning. In some cases, eradication of too much of the beneficial bacteria in the GI tract can enable *Clostridium difficile* ("C.diff") to gain a foothold in the intestines and cause a severe—sometimes life-threatening—diarrheal infection. Even in cases where antibiotics do not cause noticeable GI symptoms, the ecological changes caused in the GI tract can have adverse effects on longer-term health.

For these reasons, a probiotic supplement can be helpful to attenuate the side effects associated with antibiotics. Probiotics are live microorganisms that when supplemented in adequate amounts confer a health benefit to the host (the person taking the supplement). Probiotics have shown benefit for human health both during and following treatment with an antibiotic medication. In some cases, doing so can prevent and or lessen the severity of AAD. Supplemental probiotics can also keep the bacterial pH level of the GI tract more hospitable to the beneficial bacteria than harmful bacteria; to help repopulate the GI tract with beneficial bacteria that have been killed off by the antibiotic medication.

Probiotics not only assist in reversing the GI damage from antibiotics, it is also beneficial to treat and or manage many other conditions and diseases. Research continues to provide insight on the benefits associated with probiotics.

To name a few conditions (or diseases) that benefit from probiotic supplementation, some include: type 2 diabetes (delay in onset and management after onset), gestational diabetes prevention and management, irritable bowel syndrome (IBS--both constipation and diarrhea management), abdominal pain, intestinal permeability, vaginal candidiasis, lactose intolerance, GI tract infections, non-alcoholic fatty liver disease, depression, anxiety, endometriosis, high cholesterol, gastroesophageal reflux disease (GERD), low immunity, prevention of urinary tract infections and kidney stones, prevention of postpartum obesity, prevention and treatment of atopic eczema, celiac disease, bacterial infections and overgrowth (dysbiosis), chemotherapy-induced diarrhea and leukopenia, radiation-induced diarrhea, prevention of attention-deficit hyperactivity disorder (ADHD) and Asperger's syndrome, vitamin B12 deficiency, infantile colic (prevention and treatment), and the list goes on.

As you can see, probiotics can help a wide-range of conditions, not just GI-related illnesses. The benefits can be seen and felt throughout the body.

After reading this, if you see yourself running to the pharmacy or grocery store to pick up a probiotic supplement, please read further. It is not enough to pick up any probiotic supplement off the shelf. Consideration must be given to the specific species and strain of probiotic, the dose, the brand, and the duration of treatment.

To better understand the forthcoming discussion on probiotic strains, it is important to first be clear on how bacteria are named. **Genus** is the first name of the bacterium (i.e., Lactobacillus). It is somewhat general and refers to a grouping of organisms based on similarity of qualities. **Species** is a bacterium's second name (i.e., rhamnosus). It is a much more narrow classification based on shared common features that distinguish them from other species within that genus. **Strain** is an even more specific classification that distributes members of the same species into subgroups based on one or more properties that these bacteria have that are distinct from other members of the species (i.e., strain GG).

Examples of various probiotics: What is a strain?

Lactobacillus	rhamnosus	GG
Bifidobacterium	lactis	Bb12
Saccharomyces	boulardii	Biocodex
↓	↓	↓
Genus	Species	Strain

Strain and Specificity: The probiotic strain, Lactobacillus rhamnosus GG (i.e., L. rhamnosus GG; LGG), is effective in treating over 30 different conditions, including AAD. It can be classified as a broad-spectrum probiotic because it helps treat and or prevent so many conditions. It is commonly found in probiotic supplements such as Culturelle.

If a probiotic supplement does not specify the actual strain of the bacteria, then it is advisable to search for another product that does. Since supplements are not held to the same regulatory standards as medications, some companies will try to include strains that have not been found to have beneficial effects. Careful attention to the strain and the conditions it treats is key. Make sure to look on the supplement bottle—confirm it includes the genus, species, and strain for each probiotic listed. If it is not listed, you can try to obtain it by calling the company and asking for it. Once you find a supplement with the genus, species, and strain listed, search the internet for available studies on the benefits of that specific strain. The more studies available, the more reliable the results of the benefits.

Dosing: There should be adequate amounts of viable organisms contained in the product at the time of consumption—for most strains this is currently considered to be $>10^9$ CFU of each organism per dose.

Probiotic doses are typically standardized in terms of the amount of living bacteria per unit of volume (dose). Each living bacterium is referred to as a colony forming unit (CFU). The dosage of probiotic foods

and supplements is based solely upon the number of live organisms present in the product. Successful results have been attained in clinical trials using between 10^7 – 10^{11} CFU per day. The minimum concentration of probiotic bacteria needed to achieve therapeutic effects appears to be strain dependent, in that for some strains (i.e., *Lactobacillus reuteri* Protectis) 10^7 CFU is a sufficient quantity to produce beneficial effects, whereas for other strains, 10^9 CFU is needed (i.e., *Lactobacillus rhamnosus* GG). This situation, unfortunately, makes it hard to give firm dosage recommendations, as the minimum effective dosage differs by strain.

Given the minimum dose for some strains is 10^9 CFU per day, it is best practice to ensure that supplements contain bacteria in concentrations $>10^9$ CFU per dose, unless research has demonstrated that the specific strain contained in the supplement is effective in smaller amounts. If a product contains multiple strains, then each strain should be present at levels of $>10^9$ to ensure effectiveness.

Dosing tips: Probiotic supplements are best consumed with or after meals in order to take advantage of the increased alkalinity of the stomach environment, which equates to greater bacterial survival.

Storage: Keep in mind when you buy a probiotic supplement, it contains live microorganisms. Carefully read the product's packaging. Some products require refrigeration and or be kept away from direct light. If you purchase a probiotic powder supplement, use in cold or room-temperature food or beverage. Unless the supplement states it is heat-resistant, heating a probiotic powder or adding it to hot foods or beverages will kill the beneficial bacteria.

Common Misconceptions: It is common for individuals to assume eating more yogurt will provide the same benefit as taking a probiotic supplement. This is not the case. The early definitions of probiotics were inclusive of traditional fermented foods such as yogurt (non-medicinal varieties), sauerkraut, and kefir, but the most recent interpretation of the definition has, somewhat controversially, excluded these traditional ferments. These are now considered food sources of "live and active cultures", but not probiotics. The reasoning behind this decision is that these foods are of undefined microbial content. Species and strain composition can differ from batch to batch, as can bacterial counts. Additionally, the strains contained in these foods may also lack specific therapeutic qualities – i.e., they may not confer any health benefit on the host, beyond the enhanced nutritional profile of the fermented food. It is for these reasons that traditional fermented foods cannot be relied upon for specific therapeutic effects in the same way that probiotic preparations containing well-defined strains, with well-characterized clinical effects, in precise doses can.

Lastly, some assume it will not help to take probiotics while taking antibiotics. This is not the case. The beneficial effects will be seen and felt even during a course of antibiotics. Recommended duration of treatment is at least two weeks following antibiotic therapy. For individuals with chronic low immunity, daily probiotic supplementation is suggested.

Take home message: research which strain will be most effective for the condition you wish to treat or prevent. Confirm the supplement lists the actual strain of each probiotic listed in the supplement. Ensure dosage is within the necessary therapeutic range to provide the desired health benefit(s).

References

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