UW Integrative Medicine
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University of Wisconsin
SCHOOL OF MEDICINE
AND PUBLIC HEALTH

Probiotics and Prebiotics: Frequently Asked Questions

1. What are probiotics?

Our intestines contain over 100 trillion bacteria. This is 1,000 times the number of cells that make up the entire human body. Many of these bacteria play an important role in protecting our health:

- They make compounds that keep harmful bacteria from spreading, helping to prevent infections.
- They help with digestion.
- They stimulate the gut's immune system.
- They help our bodies digest foods more efficiently.
- They change certain vitamins.
- They change which genes are active in gut cells.
- They may help to prevent colon cancer.

The balance between helpful and harmful bacteria in the gut can change. If that occurs, the helpful bacteria in the body may not be able to do these important tasks as well as before. Antibiotics, poor nutrition, inflammation, stress, and other factors can kill off the helpful bacteria in the gut.

When this happens, probiotics and prebiotics may be helpful. Probiotics are products containing live microorganisms. They can be taken to improve the balance of bacteria in a person's intestines. It is now easy to find them as dietary supplements in health food stores and pharmacies. Good quality yogurts with live active cultures, kefir, fermented milk, miso, and a number of other foods are also probiotics.

2. What problems can probiotic foods or supplements treat?

The jury is still out on how well these supplements work for different health problems. The best research has been done for the following conditions*:

Proven Benefit

- Diarrheal Illness (viral) - treatment and prevention
- Prevention of antibiotic-associated diarrhea

Suggested Benefit

- Food allergies
- Inflammatory bowel disease
- Lactose intolerance
- Treatment of recurrent *Clostridium dificile* infection (Clostridium dificile is a bacteria that can cause serious infection in the intestine).
- Eczema

Holds Promise

- Allergic rhinitis
- Asthma
- Attention deficit disorder (ADD) / Attention deficit hyperactivity disorder (ADHD)
- Autism
- Colic
- Colon cancer prevention
- Cystic fibrosis
- Dyslipidemia
- Liver disease
- Rheumatoid arthritis
- Traveler's diarrhea / bacterial enteritis
- Vaccine immuno-augmentation
- Genitourinary tract infections (UTI's)

*list taken in part from "Prescribing Probiotics" in Rakel D, ed, *Integrative Medicine*, 2nd ed

3. How do I know which probiotic to choose?

First, look at what genus, species and strain(s) are in the product. Probiotics' names have three parts, usually listed in order. The first part is the name of the genus, the second part is the species, and the third part is the name of the strain. For example, *Lactobacillus rhamnosus* GG, is from the genus Lactobacillus and has the species name rhamnosus. GG is the name of the strain. Different companies patent different strains that they develop.

Lactobacillus is usually abbreviated with an L, and Bifidobacterium is usually abbreviated with a B. Lactobacilli work in the small intestine, and Bifidobacteria work in the large intestine. Because antibiotics can kill the bacteria in the whole intestinal tract, it is important to add back both of these types of bacteria for people who have just taken antibiotics.

Some of the most-researched probiotics are:

- *Lactobacillus rhamnosus* GG (available as the brand Culturelle)
- *Bifidobacterium lactis* BB12 (abbreviated as B. lactus BB12).
- *L. acidophilus* NAS (sometimes just called Acidophilus)
- *L. bulgaricus* LB-51
- *L. gasseri*
- *L. plantarum*
- *B. bifidum* Malyoth strain
- *B. longum*
- *L. acidophilus* DDS1
- *Saccharomyces boulardii* – this is actually a fungus that has been found to have several benefits.

Others which have been studied less but are often taken are *L. johnsonii, L. reuteri, L. rhamnosus, B. breve, B. infantis, E. faecalis, and Streptococcus salivarius.*

When selecting a probiotic, avoid products that just use general terms like "Lactobacillus" or "Acidophilus" on their labels. Some experts say that vaginal problems respond best to *L. rhamnosus* GR1 or *L. fermentum* RC14. Do not use *Enterococcus faecium*, because it can cause infections. Some research supports taking a mixture of strains rather than just one.

How effective a probiotic is depends on how many live cells it contains. Pasteurizing without adding the bacteria back in afterward leads to a product with no live bacteria. Unfortunately most manufacturers label their probiotics based on how many bacteria were present *before* processing.

It is best to protect probiotics from direct light. It is also best to buy probiotics that are kept refrigerated, because refrigeration helps bacteria survive longer. Some freeze-dried forms claim not to require refrigeration

4. How much of a probiotic should I take?

Usually $1x10^9$, or 1 billion colony forming units (CFU's) is a good daily dose. For Crohn's disease or irritable bowel, $1x10^{11}$ or 100 billion CFU's is recommended daily by some experts. For treating bacterial infections in the vagina, vaginal suppositories with 1 billion CFU's of Lactobacillus organisms are typically used. Many experts recommend taking probiotics on an empty stomach, when there is less stomach acid present. Children are often given doses in the $1x10^8$ range. Many products that are tailored to infants or young children are available.

5. How long do I need to take probiotics?

Various sources recommend taking probiotics daily anywhere from 2 weeks to 2 months to fully re-colonize the bowel's healthy bacteria. After the initial course, it may be possible to back off to 2-3 times per week. In Crohn's or Irritable Bowel Syndrome (IBS), people often need daily doses for longer time periods. Improvement in symptoms can help guide this decision. It has

recently been argued that it is okay to take probiotics and antibiotics at the same time, though some sources say it is best to take them 2 hours apart from each other. Start the probiotic as soon as possible and continue it until at least a few days after the antibiotic course is complete. (Some say until 2 weeks after the antibiotic is finished.)

6. Are there any people who should not take probiotics?

Probiotics tend to be quite safe, with few adverse effects. Some prescribers recommend that they should be avoided in people whose immune systems are severely compromised because of reports of bacteria entering the bloodstream. Occasionally, people will feel more gassy when they first start taking probiotics. Twenty billion doses of probiotics are taken each year, but only a handful of people develop complications from taking them.

A recent study of patients with severe acute pancreatitis found that giving probiotics might increase risk of death, though a later analysis of multiple studies did not show a change in death rates. For now, it is probably best for people with acute pancreatitis to avoid probiotics.

7. Can't I just eat probiotic foods?

Fermented dairy products must contain live-cultures to have probiotic effects. Yogurts, kefir, and other fermented foods, such as sauerkraut, miso, and tempeh may contain helpful bacteria. How many bacteria each food contains varies a lot. Look for foods labeled "contains live active cultures." Frozen yogurt has *no* live bacteria. Many yogurts contain organisms that are not native to humans and don't survive in their intestines.

8. Will the bacteria even make it to my intestines if I take them?

It is important to be sure that the probiotic can survive moving through stomach acid. It should be able to handle a pH of less than 3.5 in the stomach. It must also be able to survive in the duodenum (the first part of the small intestine), with all the bile salts and digestive enzymes there. Most probiotics have added compounds to help protect the bacteria from digestion. People on a Candida reduction diet should keep in mind that dextrin, contained in many probiotics, is often listed as a yeast-stimulating compound. In general, *Lactobacillus, Bifidobacterium,* and *Streptococcus* species do not need to be in a special preparation to survive moving through the stomach. *L. bulgaricus* and *S. thermophilus,* as well as *Leuconostoc* and *Lactococcus* species *canno*t survive passage through the stomach and must be in enteric-coated capsules. These have a special coating that protects the bacteria until the capsule reaches the intestine.

9. What are some reliable brands?

Remember that different studies test different bacterial species, which makes it difficult to know if a particular product will work for a particular problem.

ConsumerLab.com, a site that evaluates supplements to see if they contain what their packaging claims, tested over 25 different products. Of these, several contained fewer bacteria than they claimed. Products that passed ConsumerLab testing (contained the amount of organisms claimed on the packaging) are listed below. Note, however, that there are many other products that were not included in the testing.

Probiotics – General Products	
Product	**Bacterial Contents**
Culturelle	*Lactobacillus GG*
Enzymatic Therapy Acidophilus Pearls	*L. acidophilus and B. longum*
Florastor	*Saccharomyces boulardii*
Garden of Life Primal Defense	*L plantarum, B bifidum, B lactis, L rhamnosus, B breve, L casei, L brevis, L salivarius, L acidophilus, B subtilis, L paracasei, B longum*
Jarrow-Dophilus	*L rhamnosus, L casei, L plantarum, L acidophilus, B longum, B breve, Pediococcus acidilactici, L diacetylactis*
Kal Acidophilus	*L acidophilus, L bulgaricus, S thermophilus, B bifidum*
Kyo-Dophilus	*L acidophilus, B bifidum, B longum*
Nature Made	*L acidophilus*
Nature's Sunshine Bifidophilus Flora Force	*L rhamnosus, L casei, L acidophilus, B longum*
Nature's Way Primadophilus Ultra	*L casei, B longum, L acidophilus, L plantarum, L rhamnosus, B breve, B bifidum, Lactococcus lactis, S thermophilus, B infantis, L bulgaricus, L salivarius, L helveticus*
Nutravite Acidophilus Plus	*L acidophilus, L rhamnosus, B longum*
PB8 Pro-Biotic Acidophilus	*L acidophilus, L plantarum, L rhamnosus, L casei, L paracasei, L salivarius, B bifidum, B longum*
Pharmanex ProBio PCC	*L fermentum*
Probiotic Gut Buddies	*B longum, L rhamnosus, L acidophilus*
Webber Naturals	*L rhamnosus, L paracasei, L acidophilus, B longum*

**L=Lactobacillus, B=Bifidobacterium, S=Streptococcus*

Probiotics - Children's Products	
Florastor Kids Saccharomyces boulardii lyo	*Saccharomyces boulardii*
Natural Factors Children's Acidophilus	*L rhamnosus, B infantis, S thermophilus, L acidophilus, L delbruekii bulgaricus*
Mitomax	*Pediococcus acidilacticii, Saccharmomyces boulardii*

**L=Lactobacillus, B=Bifidobacterium, S=Streptococcus*

Please note that listing the products above does not mean that any one particular product brand is recommended by this handout.

10. What are prebiotics and synbiotics?

Prebiotics are ingredients in foods that increase the growth or activity of the healthy bacteria that live in our bowels. They are usually carbohydrates (fiber) that are not digested until they get to the large intestine. They are found in the following foods: honey, beer, onions, burdock root, asparagus, rye, Jerusalem artichokes, bananas, maple sugar, oats, and Chinese chives. These can be added into the diet of someone taking probiotics.

The most common prebiotics used in supplements are fructo-oligosaccharides (FOS's). FOS's are plant sugars found in cereals, fruits, and vegetables. Examples include inulin and oligofructose. Other prebiotics include lactulose, lactitol, and gluco-oligosaccharides.

The dose for fructo-oligosaccharides is 10 grams daily for constipation, but 4 to 10 grams can be used to increase 'good' bacteria numbers in the gut. As with so many supplements found in foods, it is not clear that supplementation is any better than a diet rich in a variety of healthy fruits and vegetables.

Side effects from prebiotics are rare. They can cause gassiness, bloating, intestinal sounds, and sometimes mild abdominal pain, but at low doses (under 10 grams a day of FOS's) this is rare. Inulin lowers triglyceride levels and may help a bit with cholesterol levels as well. It makes stools bulkier. These compounds can be very helpful for constipation in elderly patients.

Some products mix probiotics and prebiotics. These products are called synbiotics.

11. Where can I get more information?

Check out the websites below:

http://nccam.nih.gov/health/probiotics/index.htm

http://www.nlm.nih.gov/medlineplus/druginfo/natural/patient-acidophilus.html

http://www.usprobiotics.org/basics.asp - nice summary of the scientific research

http://www.medicinenet.com/probiotics/article.htm

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