

From The Medical Letter on Drugs and Therapeutics

Probiotics Revisited

Probiotics are live, nonpathogenic microorganisms (usually bacteria or yeasts) marketed as dietary supplements. They have not been approved by the FDA for any indication. Since our last article on this subject,¹ some new data have become available.

Mechanism of Action

Several mechanisms have been proposed to explain how probiotics could have beneficial effects. *Saccharomyces boulardii*, a strain of the yeast *S. cerevisiae*, has been shown to inhibit the pathogenicity of bacterial toxins.² Acetic, lactic and propionic acid produced by *Lactobacillus* spp could lower intestinal pH and inhibit growth of pathogenic bacteria such as *Escherichia coli* and *Clostridium* spp. The presence of *Lactobacillus* spp and other probiotics in the intestinal tract might physically or chemically prevent adhesion and colonization of pathogenic bacteria. They may also induce or enhance an immune response.

Sources

Probiotics can be found in various foods and dietary supplements (Table). Yogurt is probably the most familiar source; according to the FDA, it must be made with *Lactobacillus bulgaricus* and *Streptococcus thermophilus* to be called yogurt in the US. Probiotics are also available as dietary supplements in various powders, liquids and capsules; the quantity and quality of the bacteria or yeast and the purity of these products are uncertain.

Clinical Studies

Studies of probiotics for treatment of gastrointestinal disorders, including some recent randomized controlled trials, are listed in a table on The Medical Letter's web site (www.medicalletter.org/downloads/tml1407b-2.pdf). In addition to these, a recent meta-analysis concluded that moderate-quality evidence suggests that probiotic prophylaxis results in a large reduction in *Clostridium difficile*-associated diarrhea.³ Probiotics have also been used in the treatment of many other conditions, including atopic dermatitis, lactose intolerance, bacterial vaginosis, allergic rhinitis, asthma, and peptic ulcer associated with *Helicobacter pylori* infection.^{4,5}

Adverse Effects

Probiotics can cause gas, diarrhea, bloating and hiccups; these are usually mild and transient. Infectious complications have occurred with specific probiotics, including sepsis with *Lactobacillus casei*,

Table. Some Probiotic Products

| Brand Name | Bacterial Species |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Foods | |
| Activia yogurt (Dannon) | <i>Bifidobacterium lactis</i> DN-173010 (plus <i>Lactobacillus bulgaricus</i> , <i>Lactobacillus lactis</i> , <i>Streptococcus thermophilus</i>) |
| DanActive yogurt (Dannon) | <i>L. bulgaricus</i> , <i>S. thermophilus</i> , <i>Lactobacillus casei</i> DN-114001 |
| Original Kefir cultured milk (Lifeway) | <i>L. lactis</i> , <i>Lactobacillus rhamnosus</i> , <i>Streptococcus diacetylactis</i> , <i>Lactobacillus plantarum</i> , <i>L. casei</i> , <i>Streptococcus florentinus</i> , <i>Leuconostoc cremoris</i> , <i>Bifidobacterium longum</i> , <i>Bifidobacterium breve</i> , <i>Lactobacillus acidophilus</i> , <i>B. lactis</i> , <i>Lactobacillus reuteri</i> |
| Dietary Supplements | |
| Phillips' Colon Health Probiotic Caps (Bayer) | <i>Lactobacillus gasseri</i> , <i>Bifidobacterium bifidum</i> , <i>B. longum</i> |
| Align capsules (P&G) | <i>Bifidobacterium infantis</i> 35624 |
| Culturelle Digestive Health tablet or capsule (i-Health) | <i>Lactobacillus GG</i> |
| Florastor capsules (Biocodex) | <i>Saccharomyces boulardii</i> lyo |
| VSL #3 capsules (Sigma-Tau/VSL) | <i>B. breve</i> , <i>B. longum</i> , <i>B. infantis</i> , <i>L. acidophilus</i> , <i>L. plantarum</i> , <i>Lactobacillus paracasei</i> , <i>L. bulgaricus</i> , <i>S. thermophilus</i> |
| Florajen capsules (American Lifeline) | <i>L. acidophilus</i> |

fungemia with *S. boulardii*, and liver abscess due to *Lactobacillus GG*, all in highly immunosuppressed and/or critically ill patients, particularly those with an indwelling vascular catheter.⁶

Drug Interactions

Antibiotics can inactivate bacteria-derived probiotics. Florastor, which contains *S. boulardii*, should not be taken with oral systemic antifungal medications, such as fluconazole.

Conclusion

The results of a few randomized controlled trials suggest that probiotics such as *Lactobacillus* spp and *Saccharomyces boulardii* may be helpful in some gastrointestinal disorders, such as *Clostridium difficile* infection and antibiotic-associated diarrhea. While most probiotics have few, if any, adverse effects in otherwise healthy people, they have caused serious infections in some highly immunosuppressed or critically ill patients.

ARTICLE INFORMATION

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