



Edward A. Bell

PHARMACOLOGY CONSULT

Numerous probiotic products available to children

by Edward A. Bell, PharmD, BCPS

Probiotic products are increasingly advertised to the public, and as dietary supplements, they are commercially available at a variety of locations, including health food stores and pharmacies.

Advertised benefits of probiotics, whether or not supported by evidence from scientific human trials, are numerous. The AAP recently published a clinical report on the use of probiotics in the pediatric population. This month's column will further discuss the numerous probiotic products available to caregivers of infants and children.

A probiotic, as defined in the clinical report, is an oral supplement or a food product that contains a sufficient number of viable microorganisms to alter the microflora of the host and has the potential for beneficial health effects. Probiotics are commonly referred to as "good bacteria" by the public and commercial manufacturers. Beneficial effects of probiotics relate to their prominent role in the gastrointestinal tract and their modulating effects over pathogenic bacteria. Probiotic bacteria most commonly evaluated in published studies include *Lactobacillus rhamnosus* GG (LGG), *Bifidobacterium lactis* and *Streptococcus thermophilus*.

However, probiotic products often contain numerous other bacterial species that may have similar beneficial effects. This can easily add confusion to product choice by health-care providers and caregivers.

Clinical uses

Probiotic products are frequently ad-

vertised as having numerous health benefits. Numerous published studies have evaluated many potential clinical uses, including prevention and treatment of specific infections or diseases. The AAP clinical report reviewed many of these uses in the pediatric population, and they are discussed in detail in the report. The use of probiotics for several common pediatric conditions and implications for product choice will be discussed here.

Several randomized controlled trials have yielded "modest benefit" for use of probiotics to prevent acute infectious diarrhea. Diarrhea induced by rotavirus was mostly studied. Probiotic species used in these trials include LGG, *S. thermophilus*, *L. casei*, *L. reuteri* and *B. lactis*. Although some benefit was demonstrated in these studies, use of probiotics is not recommended routinely for this use in the report. Better evidence from controlled trials exists for the use of probiotics to treat acute infectious diarrhea. Several controlled trials have demonstrated that probiotics can significantly reduce viral diarrhea duration and output by about 1 day. It is important to also note from these studies that not all probiotics "are created equal," as LGG has demonstrated greater efficacy than other probiotics for treatment of acute viral infectious diarrhea.

Dosing of LGG is additionally important, with doses of least 10^{10} (10 billion) colony-forming units (CFU) most effective. Probiotics have also demonstrated efficacy in prevention of antibiotic-associated diarrhea when given with antibiotics (mostly studied for otitis media), with a number-need-

ed-to-treat of seven. Probiotic species most commonly evaluated include LGG, *B. lactis*, *S. thermophilus* and *Saccharomyces boulardii*. The AAP report additionally reviewed probiotics for the use of atopic disease, necrotizing enterocolitis in low birth weight neonates, chronic inflammatory bowel disease, irritable bowel syndrome and constipation, colic and extra-intestinal infections.

Probiotic products

A stroll into a health food store or pharmacy for "probiotics" will likely lead one to an array of products. Some products are refrigerated, others are not; some products are available as capsules, whereas other products targeted for infants and children are available as chewable tablets, powders, straws or liquids. Several nutritional infant formulas are also available that contain probiotics. What may be most confusing to consumers (and health care providers), however, is the different probiotic species contained in these products, and the amounts of the different species contained in each capsule, tablet, milliliter or gram of powder.

Although the total amount of probiotics contained in a specific product is stated on the product label, the amount of each bacterial or yeast species is often not stated. Many products contain more than one probiotic (bacteria or yeast), with some products containing five or more probiotic species. Probiotic products are considered dietary supplements, and this should be stated on product labels. Thus, probiotic products are not regulated by the FDA for requirement of review

of efficacy before commercial availability, as are traditional medication products. Product purity or exactness of dosage content per dosage form is also not regulated, as with medication products.

This makes it health care providers or consumers to choose a product that is most likely to be effective for infants and children. It may be reasonable to choose products that contain probiotic species that have been more extensively evaluated in clinical trials. Demonstrated clinical effectiveness of a specific probiotic species may not equate to similar effectiveness with a different species, as has been shown in some clinical trials. Dosing (amount of probiotic organisms per dosage form) is

also important to consider, as has also been demonstrated in clinical trials. Probiotics most studied include LGG, *B. lactis* and *S. thermophilus* and yeast *S. boulardii* has also been extensively evaluated. Health care providers may wish to become more familiar with a select, few specific probiotic products that contain probiotic species with demonstrated efficacy and those that are more suitable for administration to infants and children.

Available products

Numerous yogurt products are additionally advertised as offering benefits of containing probiotics. Yogurt is produced by fermentation with *L. bulgaricus* and *S. thermophilus* (starter cultures). Some products may be heat-treated after fermentation, however, which kills these organisms. The Na-

Selected Probiotic Products

Product	Probiotics Included	Comments
Culturelle for Kids	• <i>Lactobacillus rhamnosus</i> GG (LGG)	• 10 billion (10 ¹⁰) CFU/packet • \$27/box of 30 packets • contains a probiotic species well studied in an amount likely to be effective for clinical use
Yum-Yum dophilus chewable tablets	• <i>L. acidophilus</i> • <i>L. plantarum</i> • <i>Bifidobacterium bifidum</i> • <i>B. lactis</i>	• 1 billion total CFU (4 different species)/2 chewable tablets
Baby's Jarro-dophilus powder	• <i>B. breve</i> • <i>B. lactis</i> • <i>B. longum</i> • <i>B. bifidum</i> • <i>L. casei</i> • <i>L. rhamnosus</i>	• 3 billion total CFU/0.25 teaspoon (6 different species)
Florastor Kids powder packet	• <i>Saccharomyces boulardii</i> lyo	• 250 mg (5 billion)/packet
• BioGaia probiotic drops • BioGaia probiotic straw	• <i>L. reuteri</i>	• 100 million CFU/5 drops or straw

Source: Bell EA

tional Yogurt Association uses a "live active culture" seal to differentiate products that contain live cultures. For refrigerated yogurt products, this means that they will contain 10⁸ live lactic acid bacteria/gram at manufacture. Some yogurt products add probiotic species. For example, Dannon, a well-known yogurt brand, adds *Bifidus regularis* to its Activa brand and *L. casei* to its DanActive brand. Dannon would not reveal the amount (dose) of these probiotic species in these yogurt brands. Dannon yogurt products with live active cultures are not heat-treated and contain at least 10 million CFU/g (total of *L. bulgaricus* and *S. thermophilus*), which equates to 1.7 billion CFU in a 6 oz (170 g) cup of yogurt commonly available in grocery stores. *S. thermophilus* and *L. casei* have been

shown to be effective for some uses in children, including prevention of acute infectious diarrhea and antibiotic-associated diarrhea. The amount of these probiotics in yogurt products, however, may or may not be similar to what was evaluated in published clinical studies.

Edward A. Bell, PharmD, BCPS, is Professor of Clinical Sciences at Drake University College of Pharmacy and Blank Children's Hospital and Clinics in Des Moines, Iowa, and a member of the INFECTIOUS DISEASES IN CHILDREN Editorial Board.

Szajewska H. *J Pediatr*. 2006;149:367-372.

Szymanski H. *Aliment Pharmacol Ther*. 2006;23:247-253.

Thomas DW. *Pediatrics*. 2010;126:1217-31.

Weizman Z. *Pediatrics*. 2005;115:5-9.