

Probiotics: The Basics

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Expanded Commentary from the Faculty

From the time of birth, through childhood, and into adulthood, humans are colonized by a large number of microorganisms, some of which may have favorable effects on our health. Probiotics are live microorganisms, which, when administered in adequate amounts, confer a health benefit on the host.^{1,2} The administration of probiotics is increasingly receiving attention as a promising therapeutic strategy for the prevention and treatment of infant- and childhood-related conditions such as infectious gastroenteritis, infant colic, and cow's milk protein allergy.

Probiotics act through a variety of mechanisms, including blocking adhesion of potentially pathogenic bacteria onto the bowel surface, improving gut barrier function, and affecting immunological and inflammatory responses. Probiotic effects are specific not only to a genus and species, but to a particular strain, which is an important consideration for clinicians looking to treat specific conditions.

Among common clinical scenarios that pediatric clinicians may encounter in which probiotics may be helpful, evidence from clinical trials supports their use in the following conditions:

1. Cow's milk protein allergy during infancy. This is the most common allergy encountered in infancy; it usually resolves at some point during childhood. It can manifest with various symptoms, including diarrhea and mucus and/or blood in the stools.^{2,3} In an Italian study, use of an extensively hydrolyzed casein-based formula, that also contained *Lactobacillus rhamnosus* GG, in infants with presumptive allergic colitis, significantly reduced the percentage of infants with occult stool blood, and improved levels of fecal calprotectin—a marker of intestinal inflammation—compared with formula alone.² In another Italian study, administration of an extensively hydrolyzed casein-based formula with *Lactobacillus rhamnosus* GG accelerated the acquisition of tolerance to cow's milk protein compared with soy-, hydrolyzed rice protein-, and amino acid-based formulas.³ Acceleration of tolerance to cow's milk protein in infants with cow's milk protein allergy was not seen in a study using 2 different probiotics.⁴

Cow's milk protein allergy also may be seen in breastfed infants as a reaction to dairy proteins that mothers ingest and which may be present in breast milk. If cow's milk protein allergy is suspected in a breastfed infant, the mother may be instructed to eliminate dairy products from her diet. There are few data from clinical trials regarding the potential use of *Lactobacillus rhamnosus* GG or other probiotics in this setting.

2. Infant colic. *Lactobacillus reuteri* DSM 17938 has been shown in several studies to have a beneficial effect in both breast-fed and formula-fed infants on this common and bothersome entity.⁵⁻⁸ One study showed it did not have benefit.⁹ Despite the contrary study, *Lactobacillus reuteri* may be worth trying for infants with colic. It is widely available in liquid form; the typical dose is 5 drops by mouth.

There is also evidence that probiotics can limit antibiotic-associated diarrhea and acute infectious gastroenteritis.^{10,11} A hot topic in neonatology is the potential role of probiotics for infants in the NICU to prevent necrotizing enterocolitis (NEC). Based on available research data, some experts argue that certain probiotics should be given prophylactically to preterm infants at risk for NEC, while others express caution.^{12,13} Although not currently standard practice, if positive data continue to accumulate, this will likely change.

Group Discussion Items

- In our institution, are probiotics routinely given to preterm infants in the NICU?
- Do we currently recommend a probiotic-containing formula to parents of infants with symptoms of cow's milk protein allergy and other GI issues? Why or why not?
- Does the information in this clinical pearl reinforce our current practice?
- If we were to implement or adopt this clinical pearl, what would we do first?
- What are the barriers to adopting this clinical pearl in our institution?
- Are there other related problems we have not talked about?

Suggested Readings and Resources

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5. Savino F, Cordisco L, Tarasco V, et al. *Lactobacillus reuteri* DSM 17938 in infantile colic: randomized, double-blind, placebo-controlled trial. *Pediatrics.* 2010;126:e526-e533.
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7. Chau K, Lau E, Greenberg S, et al. Probiotics for infantile coli: a randomized, double-blind, placebo-controlled trial investigating *Lactobacillus reuteri* DSM 17938. *J Pediatr.* 2015;166:74-78.
8. Indrio F, Di Mauro A, Riezzo G, et al. Prophylactic use of a probiotic in the prevention of colic, regurgitation, and functional constipation: a randomized clinical trial. *JAMA Pediatr.* 2014;168:228-233.
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12. AlFaleh K, Anabrees J. Probiotics for prevention of necrotizing enterocolitis in preterm infants. *Evid Based Child Health*. 2014;9:584-671.
13. Ofek Shlomai N, Deshpande G, Rao S, Patole S. *Neonatology*. 2014;105:64-70.