

Sabine Hazan, MD, Series Editor

Probiotics: What Do We Know So Far?



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Probiotics have grown in popularity in recent years, marketed as a healthy dietary supplement and placed in popular foods such as yogurt, kombucha, kimchi and more. In 2014, Sales of probiotics in the United States exceeded more than \$1 billion, constituting a \$25 billion market worldwide.¹ The media and proclaimed health magazines have been quick to push the consumption of these products into our everyday lifestyle and diet. However, there is some confusion on the background and potential risks involved with an increased intake of probiotics that needs to be addressed. Furthermore, “probiotic,” has become increasingly misused, with many companies exploiting the term’s popularity without meeting the requisite criteria.

Probiotic is a general term for live, nonpathogenic microorganisms, many of which exist in a symbiotic relationship within the normal human gut flora.¹ They have been used to treat Gastrointestinal (GI) and non-GI medical conditions, but data demonstrating their effectiveness has been conflicting. The Federal

Drug Administration also views probiotics as a health food, not a drug, and does not regulate these products.¹ One major issue is the fact that selection and dosing vary among products and the specific, beneficial effects of each probiotic strain cannot be generalized.¹ Not all species of probiotics are a part of the normal human gut bacteria and the benefits associated with one strain cannot be generalized to others.¹ Therefore, not all brands should promise equal effectivity and choosing a probiotic can be incredibly confusing and potentially harmful,¹ especially in immunosuppressed individuals or critically ill patients. For example, two cases of Lactobacillus Bacteremia during probiotic treatment of short gut syndrome have been discovered demonstrating that probiotics may not be as benign a treatment as generally thought.² Yet, as a result of media and marketing, most consumers now believe that probiotics are key to helping remedy a variety of health issues, keeping the demand for these products high.¹

Evidence has shown, however, that probiotics have been beneficial for the treatment of acute diarrhea, pouchitis, atopic eczema, and some genitourinary infections.¹ A 2010 analysis of 63 studies, totaling 8014 participants, concluded that probiotics helped decrease the duration and severity of acute infectious diarrhea.³ In fact, Irritable Bowel Syndrome (IBS) is one of the most

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common reasons that probiotics are consumed in clinical practice and also one of the most commonly studied with over 80 clinical trials of probiotics for IBS. The main reason for use of probiotics for both IBS constipation or IBS diarrhea is lack of pharmacologic treatment options.⁴

There has been no evidence or even weak evidence that probiotics help in conditions of Crohn's disease or ulcerative colitis.^{5,6,7} In fact, Rolfe et al. in 2006 showed that out of 160 participants with Crohn's disease, probiotics were not superior to a placebo or aminosalicylates for the maintenance of remission in patients.⁸ In 2007, Lirussi et al. conducted further studies on liver disease that showed no benefit or harm from probiotics in patients with end-stage liver disease.⁹ However, Xu and al. showed probiotics "significantly reduced the development of overt hepatic encephalopathy" in patients with liver cirrhosis.¹⁰

With regards to metabolic diseases, probiotics have shown to significantly decrease plasma glucose and glycosylated hemoglobin. However, there is no agreement that they reduce blood insulin levels in diabetes patients.^{11,12,13,14,15} For patients with cardiovascular and cholesterol conditions, studies found that probiotics decreased LDL, but did not raise HDL. Although Cho and Kim, like several others, emphasized, "both the efficacy of probiotics for cholesterol lowering and safety should be investigated further in well-designed clinical trials."^{16,17,18,19}

When looking at the role of probiotics in GI infections like *Helicobacter pylori* and *Clostridium difficile*, the data has been controversial. Chao et al. in 2016 showed that probiotics, plus standard therapy, did not improve the eradication rate of *H. pylori* compared to placebo, however, probiotics did improve the side effects of diarrhea and nausea from the antibiotics.²⁰ When given with antibiotics, probiotics did decrease the risk of developing CDAD by 64%.²¹

There is also inadequate evidence recommending probiotics for respiratory tract infection,²² Bacterial vaginosis,^{23,24} UTI,²⁵ or chronic periodontitis.²⁶

Overlooking the literature, it is evident that some effects of probiotics are well-documented, and their use alone or in combination with other

therapies can be considered "evidence-based," such as antibiotic-associated diarrhea, and *C. diff*-associated diarrhea, and yield positive results. In other conditions, however, further studies are crucial to determine the benefits of probiotics, because the available evidence is insufficient to show the efficacy of probiotics themselves and the studies included a wide swath of participants with varying degrees of ailments. Careful trials are needed to validate the effects of particular strains of probiotics given at specific dosages and for specific durations²⁷ but more importantly, probiotics need to be specific to the individual because, clearly, microbiome profiling has demonstrated species-specific patterns.^{28,29} ■

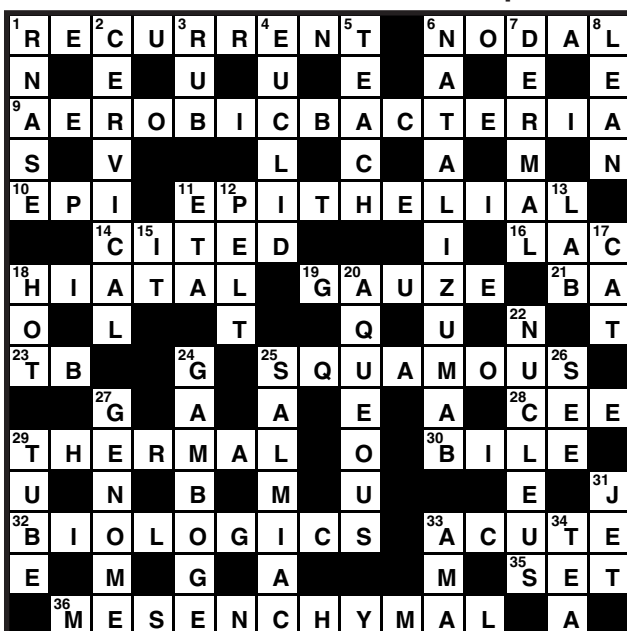
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