

History of Probiotic Research

Jody L Vogelzang, PhD, RD, LD, FADA, CHES

Gastrointestinal (GI) disease and discomfort are widespread in the American population. Irritable bowel disease alone affects one out of every five Americans.¹ Dietitians have long grappled with treatment of GI related symptoms. Restrictive diets, modified food preparation methods, specially formulated products, and functional foods have been some of the common therapies recommended to clients suffering from GI disease. Although history indicates that lactic acid producing bacterial strains were studied as early as 1900 it wasn't until the last three decades that American researchers looked at probiotics as viable microorganisms which may positively impact GI related symptoms.¹ This article will detail the past and current research involving probiotics.

Early research on lactic acid producing bacteria (LAB) began in the first decade of the 20th century by Metchnikoff at the Pasteur Institute in Paris. Researchers studied fermented milk products and postulated that the consumption of fermented milk products contributed to longevity in Bulgarian peasants.¹ By the 1950s, with the proliferation of antibiotic use, research began to focus on the detrimental effect of antibiotics on gut flora. It was suggested that the introduction of "good" bacteria would alleviate the side effects of antibiotics by reintroducing gut flora.²

Research on probiotics in other parts of the world helped set the stage for probiotic food products in the United States. Over 40 years ago, Japan began to stress the health impact and importance of *L. bacillus* in fermented products. In Germany, scientists were the first to add a probiotic to yogurt for both sensory and health benefits.

For over 20 years viable strains of *L. acidophilus* and *Bifidobacterium bifidum* have been common ingredients in German dairy products. Later, the US followed with the introduction of acidophilus milk for those suffering from lactose intolerance.³

The current definition of probiotics originated with Robert Fuller during the late 1980s. Scientists agree that probiotics are "living microorganisms which upon ingestion in certain numbers exert health benefits beyond inherent general nutrition".³ This definition sets the requirements that the microorganisms must be alive, not pasteurized, and present in high numbers, generally more than one billion per daily ingested dose.³

The actual discovery and isolation of a probiotic that would affix and multiply in the gut took several years of research. Common bacteria in dairy products did not have the properties that allowed them to consistently implant in the gut. In 1985 *Lactobacillus rhamnosus* was identified as a microorganism with the necessary properties to adhere to the lining of the intestinal tract and positively affect the GI tract. Upon the discovery of the *Lactobacillus* strain, research proliferated with over 200 studies published since 1987.³ According to Holzapfel and Schillinger, the longest history of proved health benefits and "safe-use" is probably be documented for *L. casei* and some strains of the *L. acidophilus* group; "the functional properties and safety of particular strains of *L. casei*, *L. rhamnosus*, *L. acidophilus* and *L. johnsonii* have extensively been studied and well documented".²

Researchers have suggested several beneficial functions of probiotic bacteria including: nutritional benefits,

vitamin production, availability of minerals and trace elements, production of important digestive enzymes (e.g. β -galactosidase), barrier/restoration effects after infectious diarrhea (traveler's diarrhea, children's acute viral diarrhea), antibiotic-associated diarrhea and, irradiation-associated diarrhea, cholesterol lowering effects, stimulation of the immune system, enhancement of bowel motility/relief from constipation, and maintenance of mucosal integrity.³ Future research in the area of probiotics includes prevention of colon cancer. It appears that probiotic bacteria have the capacity to change the microflora in the large intestine preventing the mutation of mucosal cells. Injection of probiotics into the bladder after resection due to cancer also appears promising. Animal studies have shown a decrease in recurrence of bladder cancer with the use of probiotics.³

With the long list of potential health benefits of probiotics, research continues on bacterium strain identification and food enhancement (functional foods). It has been estimated that probiotic enhanced foods comprise about 65% of the functional food world markets. "Probiotics represent the major and still growing segment of this huge market, estimated to exceed a total volume of \$ 75 billion (US dollars)".³ According to the National Institutes of Health, "interest in probiotics in general has been growing; Americans' spending on probiotic supplements, for example, nearly tripled from 1994 to 2003".⁴

As probiotics grow in the market place, food scientists have an ethical obligation for the safety and efficacy of their products. The American

RDPG Chair-Elect

Martha McMurry MS, RD, LD



Looking Backwards and Forwards

As Chair-Elect my responsibilities are to support Jeanene Fogli, PhD, RD, current RDPG Chair, and to develop plans for my term as chair in 2010-11. My first deadline is to submit a plan for RDPG educational programs for the 2010 FNCE meeting being held in Boston November 6-9. My second is to be ready on June 1, 2010 when my term begins.

I am starting by looking back – I am thinking about what brings us together in the Research DPG. Our Google Groups electronic mailing list

does this in an immediate way and The Digest, now online, shares official news and information. Our chance for face-to-face interactions is at the annual RDPG Members' Breakfast at FNCE meetings. We have a lot to be proud of as we identify each other's expertise and successes, and our familiarity with each other's names and interests gives us the chance to learn together. Our website has great potential for being an essential resource for our work.

I am looking ahead to see how my term can contribute to the future of the RDPG. How can our practice group be more effective in meeting the needs of members? What is at the core of our membership? How can we make that \$25 membership fee an even better deal?

I plan to ask a lot of questions this year, and I hope to have conversations with many members about our future. I welcome messages to my email (mcmurrymrd@gmail.com) with ideas and questions from RDPG members.

Probiotic Research

continued from page 11

Dietetic Association addressed probiotic efficacy in an April 2009 "Hot Topic" and concluded that while "research in the area of probiotics and digestive health is active and encouraging...at this point (it) is inconclusive".⁵ Dietitians are encouraged to work with clients and consumers on identifying products that may be helpful by translating scientific evidence regarding probiotics into practice.

Hammes and Hertel summarized this obligation in 2002 when they stated: "Thus, as we live in a changing world in which the eating habits and the diet change and the number of

people with reduced defense system increases in the population, the study of bacteria associated with humans is a great challenge for future research. It is a desirable aim of that research to protect the population from adverse reactions and to select the most effective microorganisms and those with the lowest potential to become an opportunistic pathogen".⁶

References

1. Gibson GR, Fibre and effects on probiotics (the probiotic concept). *Clinical Nutrition Supplements*. 2004; 1:25-31.
2. Holzapfel WH, Schillinger U. Introduction to pre- and post-biotics. *Food Research International*. 2002; 35:109-116.

3. Gorbach SL. Probiotics in the third millennium. *Digest Liver Dis*. 2002; 34: 62-67.
4. National Center for Complementary and Alternative Medicine. An introduction to probiotics. National Institute of Health. 2008. <http://nccam.nih.gov/health/probiotics>. Accessed July 30, 2009.
5. Marra MV. Probiotics and digestion. *American Dietetic Association*. 2009. http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/nutrition_21211_ENU_HTML.htm. Accessed July 30, 2009.
6. Hammes WP, Hertel C. Research approaches for pre and probiotics: challenges and outlook. *Food Research International*. 2002; 35: 165-170.