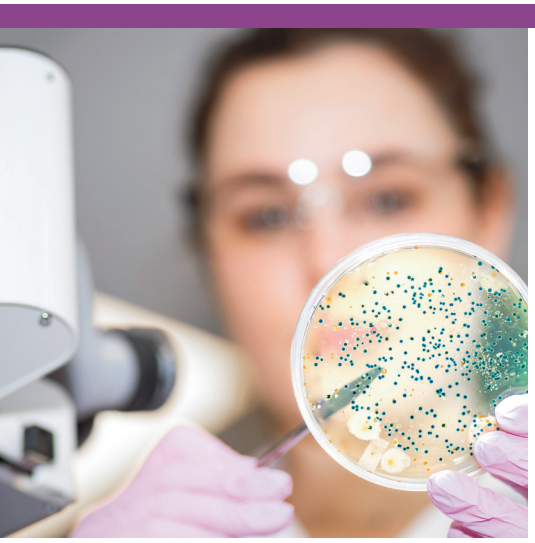
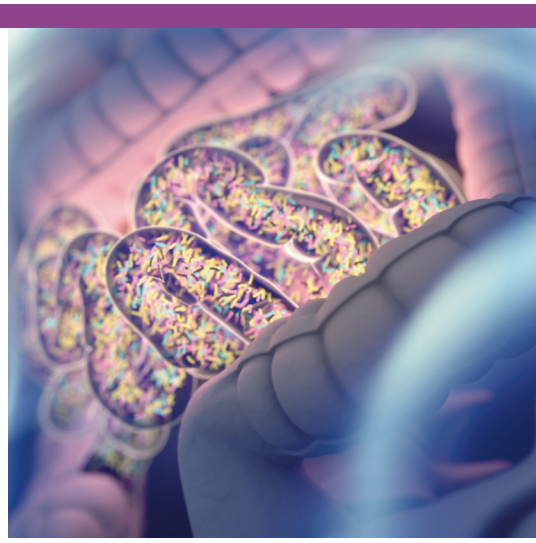
Clinical Applications of Synbiotics

By Leah Linder, ND,
Science and Education Manager at SFI® USA, Klaire Labs®





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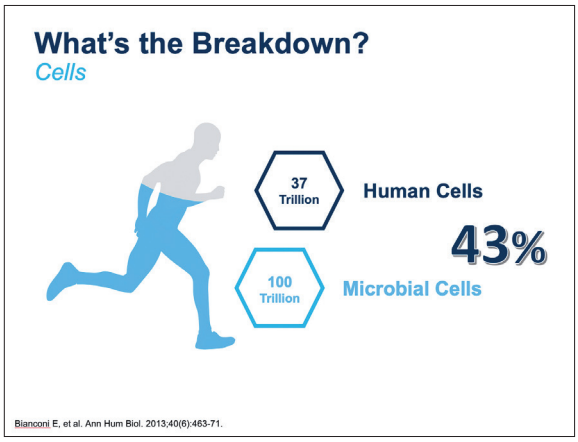
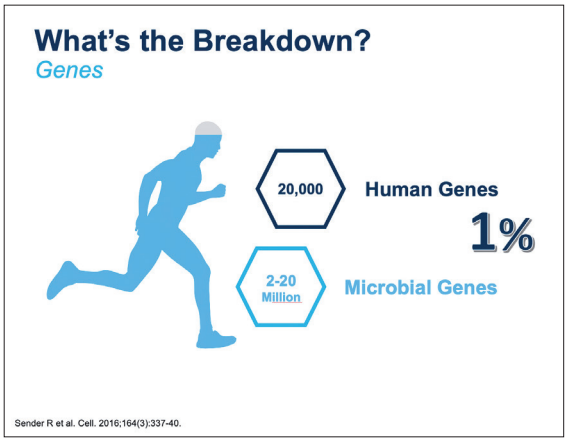
When a person gets up in the morning and looks in the mirror, their reflection is of a body that is only 43 percent human at the cellular level. The average adult body has 37 trillion human cells and is home to another 100 trillion microbial cells, that largely reside in the gastrointestinal (GI) tract. At a genetic level, we are even less human. Each person has roughly 20,000 human genes, yet our microbial gene catalogue (i.e. our microbiome) contains between 2 and 20 million genes, which makes up approximately 99 percent of our total genome.

The number of human genes is mostly fixed at conception, but the microbiomes living in and on us are incredibly malleable. Leah Linder, ND, of SFI® USA, Klaire Labs® explains how individuals and healthcare providers can use synbiotics to support healthy microbiome ecology for better health.





SYNBIOTICS: WHAT AND WHY?

The microbiome is a vast ecosystem teeming with different bacteria, fungi, protozoans, and viruses. The type of microbes living in the gut (and the metabolic reactions they drive) significantly impact human physiology, from cognitive function and immune system regulation to the body's utilization and absorption of nutrients.

Synbiotics help to reestablish a healthy ecology of microflora within the gastrointestinal (GI) tract by strategically combining probiotics (beneficial strains of microbes) with prebiotics (food for beneficial microbes), which encourages a more profound effect on GI ecology than probiotics or prebiotics alone. Physicians and patients who use synbiotics are akin to gardeners tending soil: seeding it with worms and mushroom mycelia and fertilizing it with nutrient-dense compost, thus creating a self-regenerative and self-supportive system. With targeted synbiotics, patients can nurture and grow a healthy microbiome within their GI tract.

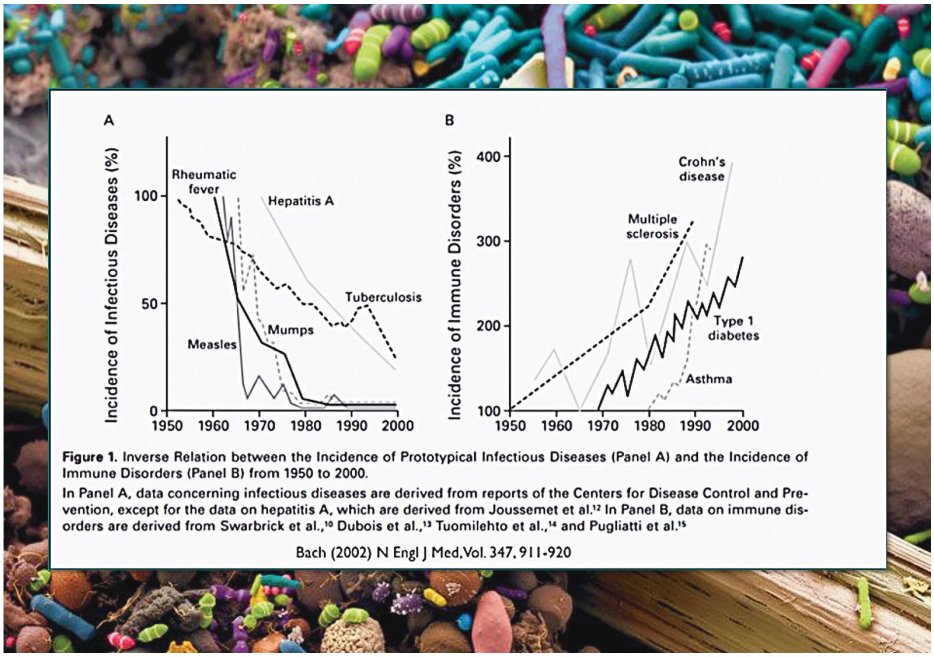


Figure 1. Inverse Relation between the Incidence of Prototypical Infectious Diseases (Panel A) and the Incidence of Immune Disorders (Panel B) from 1950 to 2000.

In Panel A, data concerning infectious diseases are derived from reports of the Centers for Disease Control and Prevention, except for the data on hepatitis A, which are derived from Joussemet et al.[12] In Panel B, data on immune disorders are derived from Swarbrick et al.,[10] Dubois et al.,[13] Tuomilehto et al.,[14] and Pugliatti et al.[15]

Bach (2002) N Engl J Med,Vol. 347, 911-920

THE MICROBIOME IN SYSTEMS MEDICINE

Our healthcare model is set up to perform systems medicine. This interdisciplinary approach integrates genomics and public health with various biological systems, such as the cardiovascular, neuroendocrine, or gastrointestinal. Considering how the microbiome contributes to 99 percent of our genetic catalog, the microbiome plays an essential role in how each of those systems interacts and functions.

In the last century, modern medicine has made remarkable advancements in the fight against infectious disease. Rates of measles, hepatitis, tuberculosis, and other diseases caused by single pathogens have declined precipitously over the course of the 20th century. Yet, at the same time, there has been an explosion in chronic disease. Today, we know from epidemiological data and microbiome DNA sequencing that dozens of major chronic diseases—such as multiple sclerosis, asthma, and type 1 diabetes—are all linked to the microbiome. Because of the metabolic impact the microbiome offers, the ability to influence and manipulate it offers a profound strategy in addressing systems medicine and chronic disease.

The GI tract is home to the majority of our microbiome, and the GI epithelial lining is the interface where the gut microbiome really talks (interacts) with its human host. The lining is in constant contact with trillions of both helpful and pathogenic bacteria. By modulating epithelial inflammatory responses, antimicrobial protein expression, and tissue repair functions, indigenous microbial populations prove essential for the maintenance of healthy epithelial barrier function and can impact human health through a variety of mechanisms.

For example, intestinal microflora can influence digestive and metabolic functions through nutrient production and absorption, bile salt metabolism, enzymatic activity, and the fermentation of non-digestible carbohydrates into beneficial metabolites such as short chain fatty acids (SCFAs). These processes in the GI tract can also influence neural development and cognitive function, which are regulated through the bidirectional communication network between the gut and the brain (gut-brain axis).

The GI & Beyond…

Clinical Applications of Probiotic Supplementation

Clinical Application	Condition
GI	• Pediatric AID & Colic • Antibiotic-associated diarrhea • IBS & IBD • Oral health & tooth decay
Immune/Inflammation	• Allergy • Infection • Atopic dermatitis • Food sensitivities • Autoimmune disease • Asthma
Cardiovascular	• Hypercholesterolemia • Heart failure • Congenital Heart Disease
Metabolic	• Obesity • Diabetes – Type 1, 2 & 3
Neuroendocrine and Psychiatry	• Depression & Anxiety • Rumination
Genitourinary	• Dysbiosis – bacterial & fungal • Interstitial cystitis

Huang R, *et al.* Front Cell Infect Microbiol 2017;7:392.
Schnadower D, et al. N Engl J Med 2018;379:2002-14.
Szajewska & Kolodziej. Aliment Pharmacol Ther 2015;42:793-801.
Suzumura EA, et al. Nutr Rev 2019.
Foster JA et al. Trends Neurosci. 2013; 36(5):305-12.
Pedersen HK et al. Nature. 2016;535(7612):376-81.
Yvette C. Terrie. Pharm Times. 2016-07-12 01:55:01

Between 70 to 80 percent of the immune system resides within the gut-associated lymphoid tissue (or GALT for short). By supporting the induction of food tolerances foods and regulating IgA production, as well as controlling local and general inflammatory responses and repairing intestinal permeability, the intestinal microflora also plays a significant role in immune system development, education, and function. Microflora can also provide protective functions against pathogens through pathogen displacement, nutrient competition, and the production of antimicrobial agents.

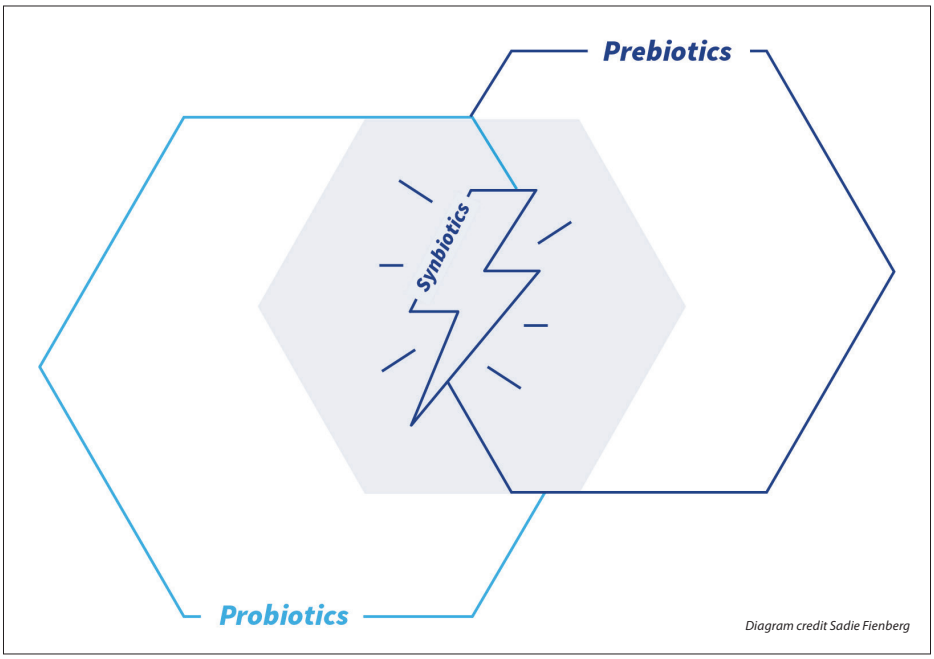
PREBIOTICS VS PROBIOTICS

Just as systems across the human body can be influenced by gut microflora, it's well accepted that probiotic supplementation can improve health across various biological systems. But, what is not often discussed in probiotic treatments is the fact that probiotic supplementation has relatively transient effects.

With probiotic supplementation, people ingest beneficial microbes that travel through the GI tract, do their work, and then leave the body. Because probiotic supplements provide such a small number of microbes compared to the vast quantities of microbes that are already living within the GI tract, it's important to consider the complementary work of prebiotics.

Prebiotics really shift the microbial community in the gut because they act as food, or nourishment, for the healthy probiotic microflora in the GI tract. Prebiotics are non-digestible by the host and will pass through the human GI tract untouched by human enzymes or processes.

Prebiotics induce the growth or activity of beneficial microorganisms, which, in turn, can improve many different metabolic functions within the body. As a byproduct of bacterial fermentation of prebiotics, these helpful microbes secrete metabolites that support immune system function, reduce inflammation, and maintain gut integrity. As part of a downstream effect, prebiotics can help maintain energy balance,



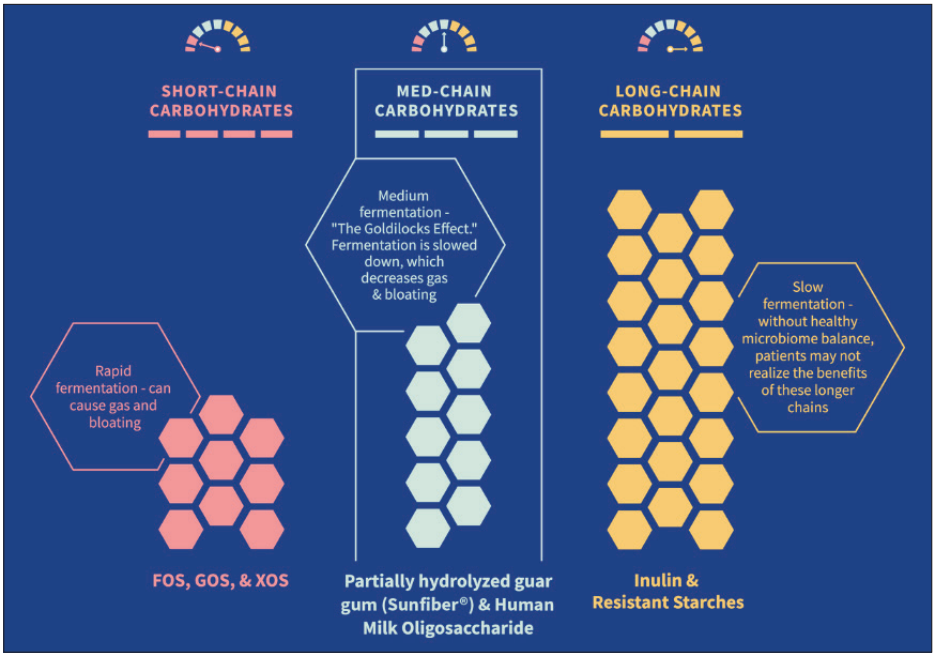
control obesity, support healthy cognitive development and function, and support nutrient bioavailability and uptake in the gut, particularly in the case of calcium. Prebiotics can also improve laxation and the regularization (motility) of the GI tract.

All prebiotics are classified as fiber, which is the indigestible portion of plants. But, not all fibers are prebiotics. Dietary fiber can be split into two categories: soluble fiber, which is fermented by gut bacteria, and insoluble fiber, which is not fermentable and acts as roughage. Although prebiotics fit the chemical definition of a soluble fiber, not all fibers are prebiotics because they are not all metabolized by beneficial gut microbes. Well-researched prebiotics include gluco-oligosaccharides (GOS), fructo-oligosaccharides (FOS), and partially hydrolyzed guar gum.

WHICH PREBIOTICS TO USE

When starting prebiotic supplementation, it's key to look at the molecular size of each prebiotic and the effect it will have on digestion. Start with a molecule that's too short and small, and the microbes will ferment it so fast that the person becomes uncomfortable with gas. Start with prebiotics that are too long, and there might not be enough healthy microbes in the person's GI tract to recognize the benefits of the prebiotics. Thus, it's best to use a "Goldilocks" approach. Start in the middle with medium-chain molecules and build up the populations of healthy microbes. Then, slowly expand the supplementation with shorter or larger prebiotic molecules as the patient's microbiome adapts.

FOS and GOS may come in shorter or longer molecular versions, so healthcare providers should be mindful of the patient's GI ecology, as effects (both beneficial and potentially uncomfortable) vary between individuals. Partially hydrolyzed guar gum and human milk oligosaccharides (HMO) are mid-sized prebiotics that are usually well tolerated by patients, producing less symptoms of gas and bloating. Prebiotics, such as resistant starch or inulins, have longer molecular lengths and so may be best suited for patients who have built up enough of a healthy microbiome to take advantage of these prebiotics' benefits.



SYNBIOTICS IN ACTION

Synbiotics are an approach to microbiome supplementation that strategically combines probiotics with targeted prebiotics. Research has shown that the synbiotic approach has several advantages.

Synbiotics help improve the survival of probiotics in the upper GI tract, protecting them through digestive processes and improving the implantation of these healthy probiotics where they flourish within the large intestine. Research has shown that feeding (with prebiotics) and seeding (with probiotics) together results in a more efficient metabolic impact than prebiotics or probiotics alone.

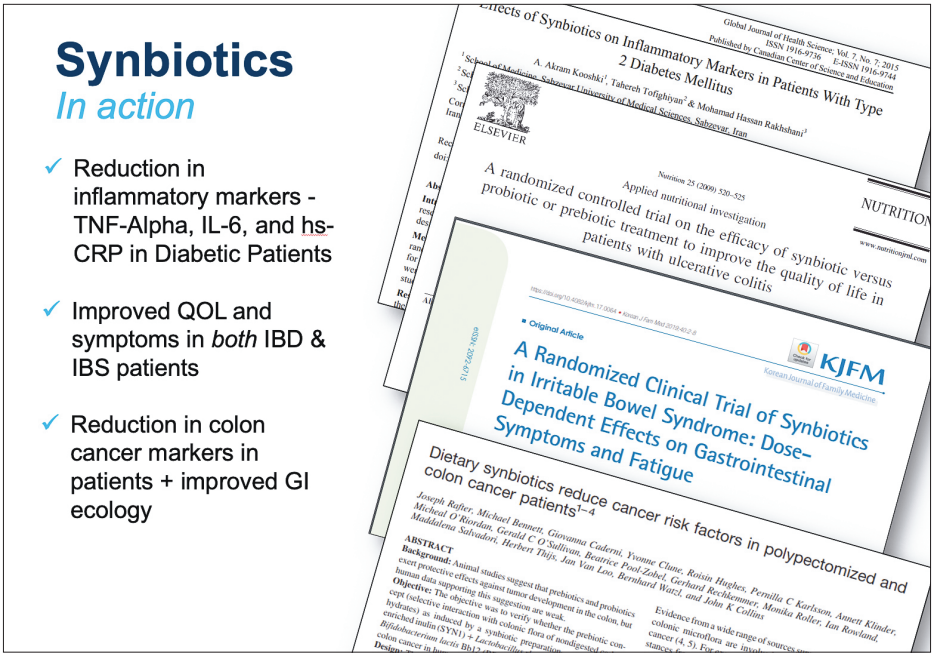
A balanced microflora ecology results in healthy nutrient recycling, which can boost metabolism, calm inflammation, balance hormone and lipid levels, support healthy moods, help nutrient production and absorption, and maintain a healthy intestinal barrier.

Clinical research into synbiotics

Clinical research into synbiotics has shown its potential to improve symptoms of chronic disease and reduce cancer risk factors.

A 2015 study in the Global Journal of Health Science showed that synbiotics can reduce inflammatory markers, especially TNF alpha, IL-6, and CRP in diabetic patients. This study mentioned that, because prebiotics are non-digestible soluble fibers, they can help stabilize blood sugar levels throughout the day for all patients. By avoiding big spikes and big drops in blood sugar, patients experience healthier inflammation modulation and, in some cases, regulation in highs and lows in mood, too.

Synbiotics have also demonstrated the ability to improve both symptom management and quality of life for IBS and IBD patients, according to research published in the journal Nutrition in 2009 and a 2019 study in the Korean Journal of Family Medicine.



A 2007 paper in the American Journal of Clinical Nutrition has also shown that synbiotic supplementation can reduce colon cancer markers. Cancer is an inflammatory process. Because synbiotics help to calm inflammation within the GI tract by supporting healthy GI ecology, wider beneficial effects, especially concerning inflammation-related symptoms, are an unsurprising outcome of synbiotic supplementation.

CONCLUSION

The goal of synbiotics is to seed the gut with specific strains of probiotics, then feed those probiotics with the nourishment they need to thrive. This has synergistic effects toward achieving a balanced microflora ecosystem that has powerful implications for common health problems.

Most healthcare providers see patients who eat a standard American diet and have high cholesterol and hypertension. These patients with metabolic dysfunction have high inflammation within the body. Synbiotics can stabilize blood sugar and lower inflammation in the body, which will innately lower inflammatory markers such as high cholesterol.

Synbiotics have implications from cardiovascular health to immune system function. Research has also found huge implications for synbiotics in building the utilization and absorption of nutrients. And, most profoundly, synbiotics help to re-establish a healthy ecology within the GI tract that protects the patient from many chronic disease risk factors and pathogenic bacteria.

BIOGRAPHY

Leah Linder, ND, is a licensed naturopathic doctor, owner of Anü Natural Health, and science and education manager at SFI® USA, which manufactures professional nutritional supplements under the Klaire Labs® brand.

Linder specializes in optimizing digestive function and cognitive health, as well as naturopathic gynecology. She received her doctorate in naturopathic medicine from Bastyr University in Seattle, Washington, and holds a dual Bachelor's degree in Cellular and Molecular Biology and Biochemistry from Fort Lewis College in Durango, Colorado.