

# Functionally Targeted Probiotics

An emerging approach to wellness by reintroducing functionally targeted probiotics is going to have a profound effect on our industry, as well as our health.

by Peter Leighton

We are now on the cusp of a revolution. Perhaps it's more of a micro-revolution, since this quantum leap in health & wellness is really more of an evolution in our understanding of microbes. But revolutionary nonetheless, since it is triggering profound changes in how we look at the microbiome and its effect on the health of its host. Put more simply, we now understand that our bacterial make-up can change our physiology and we are identifying specific strains of bacteria that can produce these targeted effects.

## Specific Metabolic Functions

We've known for some time that microbes perform essential functions in the body, such as digesting food and synthe-

sizing nutrients. But we are now learning that many unique bacterial strains are linked to specific metabolic functions, and a wide range of health conditions such as obesity, cardiovascular disease, Irritable Bowel Disorder (IBD), high blood pressure, even autism, anxiety and depression. Some species are demonstrating an ability to increase physical performance. The bottom line is that the human microbiome has profound consequences for our health, something we didn't really understand until recently.

For instance, when there is a "good" balance of microflora in the gut, the body is more effective in the absorption of many nutrients, better able to repress the growth of harmful bacteria that cause illness, form a protective barrier that keeps harmful bacteria and pathogens from entering the bloodstream, and actually train the immune system to better respond to pathogens.

Like the rainforest, the healthy human microbiome is a balanced ecosystem. And like any ecosystem, if equilibrium is destroyed, these imbalances affect every function in its environment, often resulting in a slow degradation.

## Sources of the Bacteria

The bacteria living in the human body come from a variety of sources. From birth, a newborn passes through the vaginal canal and is washed with the bacteria of its mother.

The species native to the mother are transferred via breast milk and other species are introduced to the baby through environmental contact. We've come to realize that not all "germs" are bad, and keeping a baby in a sterile environment does more long term harm than good. Furthermore, the foods we eat not only

deliver a plethora of bacteria, but also feed the bacteria in our microbiome.

The diversity of our diet (or lack thereof) affects the diversity of bacterial species in our gut.

Different species of bacteria have unique dietary preferences, which explain why a typical "fast food" diet leads to a microbiome heavily weighted towards species that increase inflammation and cholesterol.

These recent insights are leading to a whole new approach towards diet. Of course the use of antibiotics has dramatically changed the diversity of bacteria that take up residence in our body, much like using pesticides changes our environment, for better and for worse.

## Advances in Understanding

We first learned about probiotics from Nobel Laureate Elie Metschnikof, who studied the longevity of Balkan peasants, a population who ate a diet consisting of large quantities of fermented milk. In theorizing why these people had such robust lifespans, he suggested that aging was a result of proteolytic microbes producing toxins in the large bowel. As the body digests proteins, these proteolytic bacteria produce toxic by-products. As it turns out, the lactic acid in fermented milk inhibits the growth of the proteolytic bacteria. Metschnikof believed that fermented milk would seed the intestine with "healthy" bacteria (lactic acid) and thus suppress the growth of "bad" bacteria.

The last 50 years has advanced scientific understanding of the role of bacteria in our body, and we have begun characterizing the various species of bacteria that make their home in us. Then along came a tool that dramatically increased our ability to research bacteria, much like the microprocessor changed computing.

## Functionally Targeted

Advanced gene sequencing allows us to now identify many bacterial strains that have specific functional benefits. By isolating and cultivating these strains, we have the ability to provide them to consumers who have depleted colonies of these strains, so as to proactively bring them into a healthier state of balance.

How these functionally targeted probiotics are discovered and applied is sometimes a bit odd. For instance, consider Biosyntrix, the first probiotic nutraceutical for weight management.

One of the only successful treatments for *c. difficile*, a resistant bacterium that can be life threatening, is a process known as fecal microbiota transplant (FMT). As

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➤ Purely Elizabeth Gluten Free Maple Walnut Probiotic Granola (US).



its name might imply, FMT is a rudimentary, yet 90% effective treatment whereby a fecal preparation from a carefully screened, healthy stool donor is transplanted into the colon of a sick patient. Understanding that bacteria from a "healthy" donor can colonize and treat a "sick" patient, and noticing that the bacterial make up of overweight people is significantly different than those who are "thin," scientists used germ-free mice to study how the microbiome can affect weight and obesity. The objective was to identify strains that affect weight gain and metabolism.

They showed that microbial changes encourage increased consumption of "bad" types of foods. Furthermore,

in other studies researchers introduced bacterial species prevalent in normal weight ("lean") individuals into the gut of overweight subjects, only to find the overweight individuals lost weight.

### Behind the Craving

The bacterial make up of our gut is interacting with us in ways that drive our biology. As bacteria eat food, they secrete metabolites and by-products that affect hormones and a host of biological activity including metabolism. Perhaps we should question whether it's us who crave the unhealthy foods or our bacteria. But we are starting to see that by changing the make up of bacteria in our gut, we can reduce the cravings for these "bad" foods and certainly the metabolic effects that they produce.

Since so many of the cells in our body are bacterial, and these bacteria cells proliferate based upon the foods they prefer, many scientists are speculating that the western diet is proliferating "bad" bacteria species, which compete against "good" bacteria. For example, with an abundance of simple carbohydrates and saturated fats, certain bacteria gain an advantage and overpopulate the gut, limiting the growth of more healthy bacteria and perpetuating the biological signals to eat more of the same.

### New Opportunities

We are not what we eat. We are all – for better or worse – the product of what our microbes eat. Understanding that perhaps it is the overabundance of "bad" bacteria signaling the brain to eat more junk food, opens the opportunity to address weight management (and a host of other issues) through functionally targeted probiotics.

Furthermore, the bacteria that colonize in our gut influence our sense of taste, they can produce toxins to make us feel bad, and they can influ-

ence the quality of our mood. Even chronic diseases such as diabetes are being tracked to changes in the microbiome.

### A Wealth of Insight

Accelerating research studies into many of these unique strains is providing a wealth of insight and excitement. Much of this work is confirming the link between the gut-brain axis. Data from rodent studies has indicated that modification of the gut microbiota can alter signaling mechanisms, emotional behavior and instinctive reflexes. For instance, *B. longum* 1714 and *B. breve* 1205 may decrease anxiety in lab mice and *B. longum* NCC3001 normalizes anxiety-like behavior and hippocampal brain derived neurotrophic factor (BDNF) in mice with infectious colitis.

Others promising strains include *B. animalis* Lactis, *S. thermophiles*, *L. bulgaricus*, and *Lactococcus lactis*. Plus prebiotics, the food that fuels certain strains (think of it as Miracle Gro for bacteria), are demonstrating tremendous potential in affecting behavior. For example, Bimuno (B-GOS), a unique trans-galactooligosaccharide, demonstrated the ability to reduce anxiety in healthy subjects. Clinical trials showed that the consumption of B-GOS produced a decrease in both waking cortisol levels and attentional vigilance toward negative versus positive information.

*L. reuteri* NCIMB 30242 has demonstrated benefits for cholesterol reduction; Subjects treated with *L. gaseri* CHO-220 and inulin had significantly greater improvements in total and LDL cholesterol levels; *L. curvatus* HY7601 and *L. plantarum* KY1032 may reduce triglyceride levels, and improve other markers of heart health; *B. coagulans* demonstrated effects to help breakdown lactose and balance cholesterol levels. There is mounting data supporting strains that reduce bad breath and gingivitis, di-

minish eczema and skin sensitivity, limit Candida and other vaginal infections, treat mastitis, show benefits in autism, reduce acne, and a host of other benefits beyond the basic immune function and digestive balance we've come to know from these little creatures.

### Tip of the Iceberg?

As with any ecology, the diverse bacterial colonies in our body are being disrupted and many species are being eliminated through the overuse of antibiotics, as well as the changes in our diet and lifestyle. It turns out that these heretofore-unrecognized bacterial species quietly living among us may have a profound effect; their depletion may be our demise.

This emerging approach to wellness of reintroducing functionally targeted probiotics is going to have a profound effect on our industry, as well as our health.

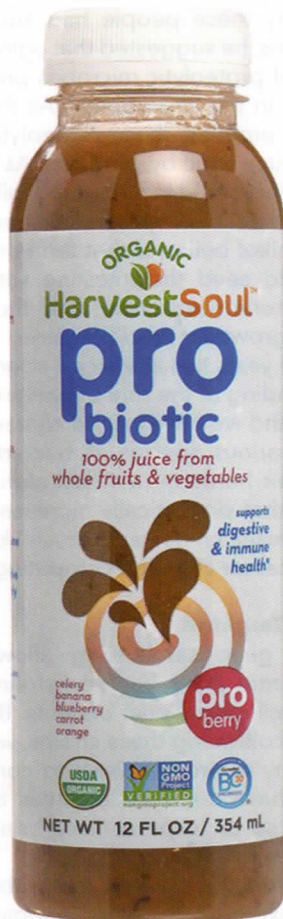
Sales of probiotics were the fastest growing of all supplements in 2014, climbing 22% and exceeding \$10 billion. Global consumption of probiotics is more than 3 times that of omega 3, making probiotics the most successful functional ingredient in FDM after vitamins and minerals.

Yet this is just the tip of the iceberg, as emerging science is now identifying functionally targeted probiotics at the same time consumers hunger for alternatives, and the media is beginning to articulate this amazing story.

Whether as a maintenance for sufferers of one of dozens of gastrointestinal disorders, or as a safe approach to weight management, mood enhancement or cholesterol reduction, functionally targeted probiotics are an emerging solution to better health and wellness. ▼

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SOURCE: INNOVATION MARKET INSIGHTS



› Harvest Soul Organic Probiotic Pro Berry Juice Blend. "GanedenBC30 (contains 2 billion CFUs of GanedenBC30). GanedenBC30 delivers active cultures 10x more effectively than yogurt."