



**The Evolution
of Microbiome
Nutritional
Ingredients:**
New Opportunities
to Support Health



CONTENT

| | |
|---------------------------------------------------------|----|
| New frontiers in microbiome research | 3 |
| A complex ecosystem | 4 |
| The potential of synbiotics | 5 |
| Raising the bar: ecologically-advanced probiotics | 6 |
| The quest for true synergy | 7 |
| Microbiome market at a crossroads | 7 |
| Probiotics | 8 |
| Sticking with the gut | 9 |
| Prebiotics | 9 |
| Search for new sources | 10 |
| Synbiotics | 11 |
| Getting personal | 12 |
| Food for thought | 12 |
| Conclusions | 13 |
| The future of human microbiome science | 13 |





New frontiers in microbiome research

The gut microbiome has both stimulated scientific interest and captured consumer attention like few other aspects of human health and wellness. The premise—and the promise—are beyond fascinating. The discovery that trillions of microorganisms live in a symbiotic relationship with us has truly opened a portal into a new universe. Scientists are only now beginning to understand how to optimize this complex biological ecosystem and manipulate it to support gut health, the immune system, and other health benefits.

The first investigations into human-associated microbiota began in the late 17th century with the invention of microscopes that let scientists see the abundance and diversity of microbes in and on us. Fast forward a couple of hundred years and researchers with names like Pasteur, Metchnikoff and Koch used culture-based techniques to find connections between bacteria and disease, but hypothesized that other microorganisms might play important, even beneficial roles in our health. As early as 1917, a German physician cultured a strain of *Escherichia coli* that is still a commonly used probiotic today. Research would continue to pick up speed, enabled by techniques to culture oxygen-sensitive organisms which were developed mid-century.¹

However, for many people, the modern-day field of microbiome research really came on the radar in the late 90s and early 2000s when DNA-based methods were invented that let scientists move far beyond the limits of microscopes and culture techniques and study microbes in deeper and broader ways. In particular, a 2006 paper

that linked gut microbiota to obesity attracted considerable attention.² The scientific literature on the gastrointestinal microbiome has swelled to at least 30,000 fundamental and clinical studies, showing associations with digestive, metabolic and immunological health as well as tantalizing hints about how the gut microbiota may influence mood, cognitive function, stress, and physical performance. Indeed, a recent preliminary study suggested that the state of our microbiomes may be more predictive of our health than our own genomes are.³ The idea that it is possible to modulate the microbiome and improve human health by purposefully introducing probiotic bacteria has bolstered a global industry now estimated at about \$45 billion USD by the International Probiotics Association (IPA).

This report aims to provide a well-rounded overview of how the microbiome relates to the food and nutritional supplements industry. We begin with a dive into the current state of the microbiome market through the lens of a startup spun out from a U.S. university, Synbiotic Health, which has the mission to bring scientific rigor to the development of probiotics, prebiotics and synbiotics. To provide context, we begin with an introduction to the company and its ecosystem-level approach to design ecologically-advanced products. Later, we turn to the scientific experts driving today's microbiome research and business, and then a view from analysts to fully understand the current market drivers and conditions. In conclusion, we look ahead to where all of this is headed, with research implications and market opportunities.



A complex ecosystem

The progress in microbiome science over the last 15 years—spurred by technologies like rapid DNA sequencing, computational biology, and now machine learning—is impressive. However, it has also created an environment where sometimes the promises have outstripped the scientific premises. Pushback against industry hype on overselling the science in specific commercial segments of the microbiome field was inevitable. This included high-profile criticism of probiotics airing in June 2020 on the news program 60 Minutes. That segment, in particular, asserted that mixed results of probiotic clinical trials negate the claims that probiotics create a healthier microbiome that leads to better overall health.

The skepticism isn't entirely unwarranted, according to leading experts in the microbiome and nutrition field.

"We now have a much more comprehensive set of human diseases that have been linked to the microbiome. That's both an opportunity and it's also a problem," said Jens Walter, PhD, a professor for Ecology, Food, and the Microbiome at the APC Microbiome Ireland, the School for Microbiology, and the Department of Medicine at University College Cork. "The research is currently sorting out what of this is actually real and what of this is really just noise."

The Khem Shahani Distinguished Professor of Food Science at the University of Nebraska-Lincoln (UNL), Robert Hutkins, PhD, said it's exciting to consider the possibility of addressing systemic diseases like diabetes or heart disease by changing the gut microbiota through dietary interventions (including probiotics

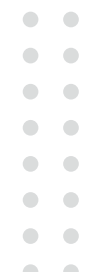


Bob Hutkins, Ph.D., University of Nebraska – Scientific Founder, Synbiotic Health

and synbiotics), but it remains a big, open question for now. "The 60 Minutes story was an effort to inform the public, but I think it also short-shrifted scientifically and clinically-supported probiotics," he said.

Andy Benson, Ph.D., a fellow professor in the Department of Food Science and Technology at UNL and director of the university's Nebraska Food for Health Center, noted that study of the microbiome is a "relatively new field" of research that is attempting to understand how complex microbial ecosystems are assembled, how a wide range of factors (environmental, host, dietary) influence assembly and function of microbial communities, and how these factors relate to downstream effects on wellness or disease predisposition in the host.

"I think when you start putting it into those terms, as a complex resilient ecosystem, then it really starts to open your eyes about how difficult it is to perturb and cause a major change in an ecosystem," he explained. To realize the potential of the field to develop new strategies in maintaining good health, science still





needs to learn how and when to make impactful changes that last. “We’re learning how you can cause short-term disturbances, and how do you turn that into a long-term beneficial change? How do you engraft an organism into a complex ecosystem, if there isn’t a niche or the niche is currently occupied by an undesirable organism or group of organisms?” said Benson. “If you consider the steps you would take to re-establish small sections of your lawn that have been overtaken by undesirable weeds, you can then imagine the challenge of achieving the same level of precision in displacing undesirable organisms in the complex gut ecosystem and re-establishing desirable organisms.”

The potential of synbiotics

It has been understood for some time that “prebiotics” – commonly referred to as compounds that modulate gut microbiota to improve health – have great potential to impact our complex bacterial communities. Early studies involving both Hutkins and Walter assessed the effects of the prebiotic galactooligosaccharide (GOS) on the gastrointestinal microbiome in healthy adults.^{4,5} In the peer-reviewed journal *PLOS One*, for example, the researchers found through DNA sequencing that GOS “consistently and significantly” enhanced levels of a beneficial genus of bacteria called *Bifidobacteria*, with five- to ten-fold increases in cell count in half of the study subjects.⁶

To maximize the potential of probiotics and prebiotics to impact our health and bring scientific rigor to the

industry, Walter, Hutkins and Benson, among others, co-founded Synbiotic Health in 2019. The company’s namesake refers to an emerging category of products that combine beneficial bacteria with food for bacteria, usually a carbohydrate prebiotic. Emerging research suggests that thoughtfully-designed combinations of the two may be more effective when paired together.

The official definition from the International Scientific Association for Probiotics and Prebiotics (ISAPP), which Hutkins helped draft, describes a synbiotic as a “mixture comprising live microorganisms and substrate(s) selectively utilized by host microorganisms that confers a health benefit on the host.”⁷

The new definition represents a quarter century of evolution in how scientists understand synbiotics since the term was introduced in a 1995 paper that also described prebiotics.⁸ The more recent ISAPP panel concluded that restricting synbiotics to a mixture of established probiotics and established prebiotics could stifle innovation, so it leaves open the possibility that the components might confer health benefits only in tandem. In addition, the group of experts clarified the difference between *complementary* synbiotics and *synergistic* synbiotics.

The former represents the vast majority of products calling themselves synbiotics on the market today—random pairings of probiotics and prebiotics. “In fact, we know from *in vitro* studies that the probiotic may not even grow on the prebiotic under any circumstances [in] some of the synbiotics that are in the marketplace,” Hutkins said.

Synergistic synbiotics, as the name implies, are designed with a combination of live microorganisms and a substrate, which scientists hypothesize should have an effect greater than the sum of the parts—the idea that 1+1=3. So far, no one has successfully demonstrated the superiority of a commercial synergistic synbiotic in a clinical trial, according to Hutkins.





Raising the bar: ecologically-advanced probiotics

That's the challenge that the science team behind Synbiotic Health and their collaborators have been trying to meet for the past decade. They have adopted an ecological framework by which to assess what combination of probiotics and prebiotics will produce a true synergistic synbiotic. Synbiotic Health leverages understanding from the field of ecology that different organisms are good at living in different environments. For example, whales live in the ocean and monkeys live in jungles. If you took a whale and transported it to the jungle, it wouldn't thrive or even live very long. Likewise, the monkey would not make a significant impact in an ocean ecosystem.

In this context, ecology suggests that introduced strains with established evolutionary history in the human gastrointestinal tract ("native strains") will more likely outcompete ones that originated

elsewhere because the latter lack the required traits to successfully colonize gut ecosystems. For historical and regulatory reasons, many of the commercial strains are not native to the human gastrointestinal tract, with many being sourced from soil or food instead.⁹ While many non-native strains may still provide benefits, Synbiotic Health considers them to be of relatively limited potential and sub-optimal for impacting human health.

"We're just one of a handful of startup companies in this field that have adopted science-first, ecologically rational kinds of products," Hutkins said. "There are not very many out there that do that."

In 2015, Hutkins, Walter, and colleagues published a paper that described a "novel method" to find an appropriate probiotic strain in order to design a synergistic synbiotic. The *in vivo* selection (iVS) method involved isolating a probiotic candidate using fecal samples from the human subjects who had consumed increased doses of GOS in previous studies. The analysis hit on a *Bifidobacterium adolescentis* strain (iVS-1), which showed an eight-fold increase in one subject.¹⁰

The team then put iVS-1 to the test in an experiment using rats that demonstrated that the strain not only had a strong preference for GOS but that the affinity helped it outcompete a closely related resident species.¹¹

"It really persists in the gut in significantly higher numbers than some of the competitive probiotics, and it also boosts the resident bifidobacterium population," Walter said. "We say it's ecologically advanced."





The quest for true synergy

A major clinical study on the iVS-1/GOS synbiotic followed in 2018. The research involved pitting the promising synbiotic against another GOS-based synbiotic using *B. animalis* subsp. *lactis* BB-12 that *in vitro* studies show also has an affinity for GOS. The experiment involved participants receiving treatments containing one of the two synbiotics, or standalone treatments with just the probiotic strains or the prebiotic.

In addition to tracking changes in the microbiota community, the study investigated gut barrier function in an obese population. A disrupted gut barrier can lead to inflammation and trigger changes in gut microbes that lead to a range of gastrointestinal disorders.

The results of the parallel-arm, placebo-controlled human trial, showed promise but were mixed. The iVS-1 strain easily outcompeted the BB-12 synbiotic with tenfold higher cell numbers. In addition, iVS-1 increased cell numbers of total bifidobacteria and their parent taxonomic groups, a first for the adult probiotic field from simply introducing a strain.¹²



However, the hypothesis that the synbiotic would perform better than the standalone probiotics or prebiotics in improving gut permeability didn't meet expectations, according to Hutkins. All of them performed equally well, he said. The team has some theories as to why, though it may have simply been a matter of statistics.

"It would have taken a lot more samples to show an effect above and beyond what the individual treatments gave

us," Hutkins said. "Most importantly, it did show that the test strain iVS-1 by itself can improve gut barrier function by the measurements that we made." The team plans to re-approach demonstrating synergistic efficacy between a prebiotic and probiotic in future clinical efforts.

Microbiome market at a crossroads

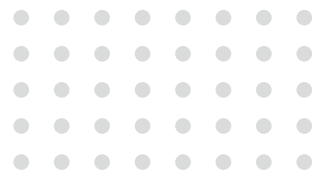
Synbiotic Health is poised to join the natural products industry with commercialization of its first ecologically-advanced probiotic strain, iVS-1, at a time when the microbiome market is at something of a crossroads. Probiotics remain the biggest product category by a large margin in the United States and globally, though sales had plateaued in recent years. That is until the COVID-19 pandemic had consumers scrambling for natural products promising to support overall wellness and, in particular, immune health in 2020. Synbiotics only entered the scene in discernible force about five years ago, but are already the No. 2 category in microbiome products for health, followed by prebiotics.

The *Nutrition Business Journal* (NBJ) estimated the combined 2020 dietary supplements market for all three categories at about \$2.6 billion, a jump of more than 9% thanks to the COVID effect. A snapshot of the global market late last year provided a similar estimate of 10% growth in the probiotics category (not including prebiotics or synbiotics), according to Euromonitor International, which estimates global sales at about \$6.5 billion in 2020.

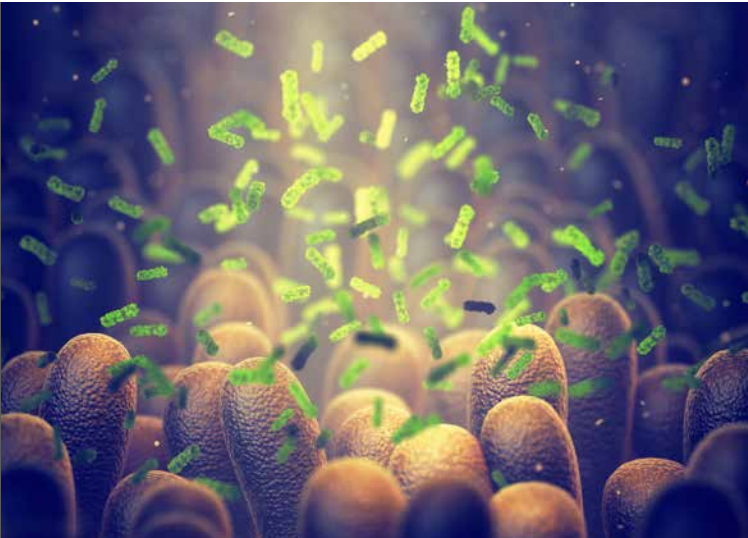
"We've found exploding interest in immunity-positioned vitamins and dietary supplements is really a global phenomenon," said Matthew Oster, head of Consumer Health at Euromonitor International during a webinar jointly hosted by the Natural Products Insider and IPA. "It's crossing cultures and communities, as many consumers in almost every market have sought out products that offer the promise of broad prevention from disease."

And, again, because of the pandemic, more consumers of probiotics, and all supplement categories, are bypassing store aisles for e-commerce. In the United States, direct-to-consumer (DTC) sales of specialty supplements like probiotics were already trending much higher before the brick-and-mortar economy





shut down across much of the country. DTC sales now account for roughly a third of all specialty supplement sales, according to NBJ.



The global e-commerce market size for probiotic supplements was valued at \$973 million in 2019, according to Lumina Intelligence, which tracks market data through digital signals like online reviews. Lumina estimated that probiotic sales through e-commerce channels would grow between 20% and 30% in 2020 to hit the benchmark of \$1.2 billion. One metric of higher sales growth, online consumer reviews, grew by 113% in 2020.

“In some of our previous studies, we actually found that in the developed e-commerce markets, there was a correlation between reviews and sales,” noted Ewa Hudson, director of Insights at Lumina Intelligence, during a webinar.

Renewed interest in immunity and the digitization of the market represents a fraction of the larger trends driving the general market for microbiome-modulating products today. Read on for further insights as we drill deeper into the individual ingredient categories.

Probiotics

To paraphrase Mark Twain: Reports of the death of the probiotics market have been greatly exaggerated. Certainly, before 2020, sales of probiotics as a standalone dietary supplement category had recently flattened. Food and beverage applications have certainly cannibalized the category, which remains No. 1 among specialty supplements at more than \$2 billion in annual U.S. sales. Probiotics also fragmented with the rise of synbiotics, as more companies added prebiotics to formulations in a bid to reinvigorate demand for their products.

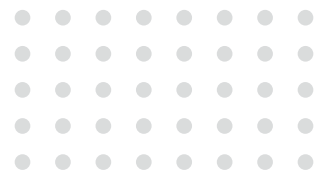
However, there are signals that the category remains extremely relevant, especially in certain segments of the market. For example, while proprietary strains account for 34% of products on the market, these products generate 57% of customer reviews and score higher ratings compared to generic bugs, according to Hudson at Lumina Intelligence.

And while the United States remains the largest dietary supplement market for probiotics, China recently surpassed Italy as the No. 2 market, according to IPA. The Asia-Pacific (APAC) region overall continues to grow and now accounts for more than half of the entire probiotic global category, noted George Paraskevagos, IPA executive director.

“With so much research and science tied to probiotics and immune support and with a public increasingly



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looking towards prevention as a new way of being, the market for probiotic supplements went up globally," he said.

Consumer awareness is growing around the basic idea that 70% of the immune system resides in the gut. More than 30% of people took a probiotic in 2020 for an immune health benefit, according to consumer survey data from Euromonitor. In the United States, NBJ says condition-specific use of probiotics for immune health accounts for 17.5% of overall sales. Indeed, immunity is expected to remain a near-term driver of growth in the category, even as concerns about the pandemic begin to fade in 2021, according to the business analysts.

"This hypothesis is the consensus view of industry experts polled by Euromonitor twice [in 2020]," Oster said. "It seems likely that a demand for immunity functionality will not only last until 2021, but also it potentially sets the stage for broader behavior changes in the future."

Sticking with the gut

Research into probiotics remains robust. Last year, IPA published research looking at two clinical registry databases and found more than 1,600 clinicals with probiotics registered. However, the quantity of clinical research does not necessarily translate to quality for the probiotic products that appear on store shelves or e-commerce websites.



"I struggle with the rationale for many of the products out there, and I ask myself, 'Why would they actually work, what mechanistically do they actually do?'"

Walter of Synbiotic Health said. "There are a few probiotic products that were developed with a strong scientific basis, and that were clinically validated in robust studies. They do exist, but I could probably count these products on two hands."

Walter and other experts have argued that investigations into the microbiome should focus on "causality and mechanism with an eye toward phenotypes that are large in magnitude, easy to measure, and unambiguously driven by the microbiota."¹³

In other words, stick with the health benefits where the science is strongest. Currently, proving efficacy much beyond gut or metabolic health remains challenging until researchers better understand the biological pathways between therapy and target, according to Hutkins.

"What appears to be driving the interest in probiotics is kind of your normal gut issues that people have," he said. "The most popular products out there ... and some of the yogurts and so forth, promote their products based on improving gut digestion and reducing some of the 21st century maladies of gas and bloating and cramps."

Gut health, by far, remains the No. 1 reason consumers buy probiotics, dominating the condition-specific categories with more than 70% market share, according to NBJ.

Prebiotics

Prebiotics have long had an identity crisis, with many consumers assuming that the word is a misspelling of the word probiotics. That's no longer the case. Awareness of prebiotics, substrates that feed beneficial gut microbes, continues to rise with more than 80% of supplement consumers familiar with the term, according to Len Monheit, executive director of the Global Prebiotic Association (GPA).

Quantitative data on the global prebiotic market remains elusive, but in the United States, the category has been climbing steadily and should edge closer to \$200 million in sales by 2023, NBJ reported. Inulin, fructooligosaccharides (FOS) and GOS continue to



dominate the market, Monheit said. However, market share among the trio is slipping, down from about 90% to a little more than 50% today, he estimated.

"You're starting to see excitement and awareness in the other areas," Monheit noted. The emerging types of prebiotics include resistant starch, polyphenols, human milk oligosaccharide (HMO) and xylooligosaccharide (XOS), among others. The commonalities among most of these newer non-digestible fiber compounds are that they are easier to formulate and effective at dosages of 1 g or less.

"We see new research on novel prebiotics that are a smaller dose," Monheit said. "If you can get a four-gram dose down to a one- to two-gram dose—and you can with some GOS—that's going to be much more flexible."

The newer prebiotics, which have different properties, are also driving applications beyond gut health, according to Monheit. Research on polyphenols, for example, suggests they directly affect inflammation, which influences immunity and metabolic health, he said. Science on how our microbial community, our guts, and our brains affect each other (the "microbiota-gut-brain axis" for short) has inspired claims reflecting other health conditions.

"All of the other applications beyond just gut health, in many cases, are reliant on some of the novel prebiotic ingredients," Monheit said. "The body of research that is emerging now is 10 times what it was five years ago."

Search for new sources

Aside from GOS, Synbiotic Health is also investigating XOS as a potential prebiotic for the company's pipeline of microbiome-modulating synbiotic products. The



Andy Benson, Ph.D., University of Nebraska – Scientific Founder, Synbiotic Health

low-dose potential is only part of its appeal, as XOS is a prebiotic that's commercially available at high purity, according to Hutkins. More importantly, he said, a narrow group of microbes—bifidobacteria, in particular—prefer XOS as a fermentable substrate. "So we like the specificity of that prebiotic," he noted.

Few clinical studies have been conducted on XOS to date, but the research so far has been tantalizing. In one pilot study the results suggested XOS may be beneficial in supporting gut microbiota composition associated with health in certain populations.¹⁴

But Synbiotic Health is not stopping at XOS or GOS. The company is leveraging a research platform to discover novel prebiotics by identifying components in grain and other food crops that impact the gut. "We do use a unique, automated high throughput

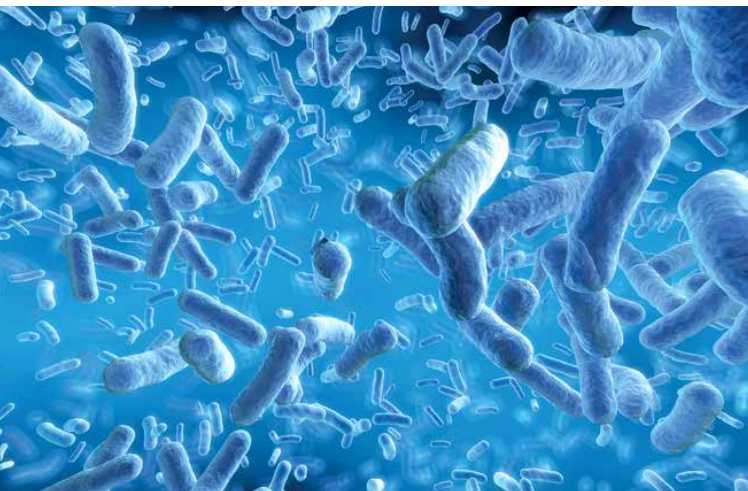


“The ultimate goal would be to tell you what probiotic, prebiotic or synbiotic you ought to be consuming to get a measurable response. We have really impressive data that's getting us to that point.”

Robert Hutkins, Ph.D., The Khem Shahani Distinguished Professor of Food Science at the University of Nebraska-Lincoln (UNL)



in vitro microbiome screening system as a phenotyping tool and feed human microbiomes individually *in vitro* with grain from hundreds to thousands of genetic lines of food crop. Then we use genetic mapping in the food crop to actually identify the pathway that's giving us the response that we're seeing in the microbiome. This enables us to use genetic analysis in the food crop to identify genes and pathways that drive response patterns detected in the *in vitro* microbiome screen," Benson explained. "The whole approach is agnostic, and provides an open-ended platform for pre-clinical discovery."



Another scientific shortcut developed at the Food for Health Center predicts unique metabolic pathways. For example, researchers studying the microbiomes of New World monkeys (common marmosets) have isolated several different bifidobacterial species that are unique to marmosets and are dominant members of their microbiome. By gazing (computationally) at the genomes of these microbes—a technique for finding features in the genome that may help interpret function—the scientists are able to predict which substrates are preferred by different species of microbes.

Common marmosets are omnivores, but they also consume large amounts of tree gums in the wild. "After isolating a unique species of *Bifidobacterium* capable of growth on tree gums, we were able to identify unique genes and pathways in this organism's genome that encode enzymes for degrading tree gums and growth on the resulting degradation products," Benson explained. "Thus, by comparative genomic analyses, you can start to predict what types of substrates these organisms will chew up."

Ultimately, these discovery platforms may help produce novel synbiotics that don't currently exist on the market today.

Synbiotics

NBJ first started tracking synbiotics as a separate category in 2016, according to Claire Morton Reynolds, NBJ senior industry analyst. The category quickly outgrew prebiotics in total market share of microbiome-modulating ingredients, as well as outpaced sales growth of probiotic dietary supplements. In 2018, for instance, U.S. consumers spent \$658 million on synbiotics, up 16% from the year before.

NBJ projects synbiotic formulations will hit \$1 billion in sales by 2021 or 2022 at the latest, while sales of standalone probiotic supplements will gradually decline post-pandemic. Globally, Lumina Intelligence claims that 52% of all probiotic supplements now contain at least one prebiotic.

Morton Reynolds said there appears to be strong consumer understanding on how prebiotics and probiotics work together, which is likely helping drive the trend in synbiotics. "So it makes sense to have a formula—offering both feels more sophisticated," she said.

Monheit at GPA noted that the explosion of synbiotics on the market is mostly the result of opportunism at present.

"I think the categorization is weak, because we went through a three-year period where there wasn't a lot of product proliferation in the world of probiotics. Companies were reformulating, adding prebiotics to their probiotic supplements," he said. "Most formulations that we've seen on the marketplace are not intelligent formulations. It's just taking a probiotic strain or two or three, dropping in a little bit of inulin or a little bit of FOS, and calling it a synbiotic.

"That's not where synbiotics are going," he added. Instead, he argued, companies need to focus on the prebiotic [itself] which will provide more of an impact than choosing the right bugs, followed by clinical research that demonstrates a synergistic effect.

"That's where true synbiotics are going to eventually move," Monheit proclaimed.

And that's exactly where Synbiotic Health already sits. Its automated *in vitro* microbiome assay platform identifies



potential prebiotics with microbiome-modulating effects on particular probiotics. In fact, this year the company will conduct a clinical trial on a new synbiotic design based on the XOS prebiotic and bifidobacterium pair that resulted from thousands of bioassays.

“The [clinical] outcomes that we’ll be looking at are typical gastrointestinal symptoms—occasional gas, bloating, and diarrhea—as well as overall gut well-being,” Hutkins said. “We’re confident that our pairing is going to be effective at supporting gut health.”

Getting personal

Synbiotics may also be the bridge that connects general wellness and personal health.

On one hand, the approach adopted by Synbiotic Health can overcome individual variation to some degree, according to Walter. In the earlier studies on the GOS prebiotic, for example, exactly half of the 18 participants showed a bifidogenic response, meaning 50% of the group were microbiome non-responders.^{15,16} However, Walter believes from the research that an ecologically-advanced probiotic may still confer a health benefit across more human microbiome ecosystems than not.

“We haven’t really seen any evidence that [iVS-1] doesn’t survive in certain individuals. It might well not engraft in all individuals and it might not colonize in all, but we can definitely supply it to all individuals,” he explained. “If we feed it in high enough numbers, they’re definitely exposed to it, so we are at least removing some of this inter-individual difference. I’m not saying that we are completely getting rid of it ... [but] I think the approach that we are doing is at least more likely to enhance the effect of a certain strategy.”

On the other hand, the potential to provide personalized health products using synbiotics is a realistic and achievable goal, according to Hutkins. That’s thanks, in part, to advances in diagnostics, gene sequencing, and now machine learning that can help predict what assortment of probiotic capabilities and prebiotic types may be needed across a range of microbiomes.

“The ultimate goal would be to tell you what probiotic, prebiotic or synbiotic you ought to be consuming to get a measurable response,” he said. “We have really impressive data that’s getting us to that point.”



Jens Walter, Ph.D. University College Cork – Scientific Founder, Synbiotic Health

The idea isn’t to create 300 million different formulations. Rather, think of classifying people into broad groups of microbiome composition much like the Myers-Briggs test.

“What you would want is a relatively small number of synbiotic combinations that would impact, in a predictable way, broad categories of individuals,” Benson explained. “We’re not there yet.”

Food for thought

The health-conscious consumer is also becoming more focused on a functional foods and optimized diets as well as supplements. Food as medicine is a natural fit for probiotics and prebiotics—yet another type of synergistic effect.

“This is definitely something we are getting into,” said Walter whose research also focuses on nutrition and dietary fiber. The dietary gap in today’s high-fat, sterile Western diet directly affects metabolic and immune responses in the microbiome.¹⁷

The intent of the company has always been to be in both supplements and foods, Hutkins noted. Food applications are still in the early stages at Synbiotic Health, but the scientists did head into its food production laboratory last year to test the resiliency of the iVS-1 strain as a food ingredient.

The experiment involved mixing the synbiotic into a nutrition bar. It was successful in two meaningful

ways. First, the probiotic showed remarkable stability, even at room temperature. Second, the bar was pretty delicious.

“Our intent for synbiotics is not necessarily to be in the bar business. At least it wasn’t at the outset; we just wanted to make a prototype that would be attractive to potential partners,” Hutkins mused. “But we’re starting to think that we might be in the bar business.”



Walter, commenting more generally about the synergy of synbiotics and food, said, “I’m super excited about this. There is not really that much out now in synbiotic foods.”

And there are really not many companies out there doing the kind of rigorous science as Synbiotic Health.

CONCLUSIONS

The future of probiotics, prebiotics, and synbiotics

A breakthrough that produces a true synergistic synbiotic, whether in food or as a supplement, would have far-ranging implications. It would introduce a scientifically validated product with real efficacy, cutting through the criticism of ambiguous research or shoddy science. It would likely shake up how business analysts currently track the microbiome market today, though experts believe the distinctions between categories like probiotic and prebiotic will endure. How they frame that future, unsurprisingly, depends on their biases.

“Do probiotics get lost or convoluted amongst other product ingredients? Not at all,” Paraskevacos at IPA argued. “These live organisms are the main characters or catalysts of health. The other elements simply enable these great little bacteria’s benefits to thrive.”

Monheit sees the relationship between pre- and pro- in more synergistic terms. “I think that prebiotics and probiotics will remain separate but connected,” he said, “and part of that connection will be in synbiotics.”

The future of human microbiome science

A 2011 study on the time lag between the discovery of ways to improve human health and the clinical implementation of those interventions estimated that it takes about 17 years for basic research to be translated to practice for patients and consumers.¹⁸ As discussed above, the modern microbiome science began to pick up speed around 2006. Assuming that the microbiome field moves at average speed and takes 17 years to penetrate the health care system — a speed which many would argue underestimates reality — the next 2-3 years should see the broader roll out of microbiome interventions to audiences of health care practitioners and other key opinion leaders and influencers at a mass scale, leading to greater awareness of the importance of the human microbiome. Synbiotic Health feels it is perfectly poised to ride this rising tide and is set up well to capitalize on this advantageous timing.



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