



MICROBIOME MOVEMENT HUMAN NUTRITION

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POST EVENT REPORT

Harnessing Microbiome R&D To Develop Benefit-Driven Nutritional Interventions That Promote Long-Term Human Health

By Dana Barberio, MSc
Edge Bioscience Communications

“This event brought together companies that have never shared the stage together before. This created visibility to companies advancing microbiome science into real products and services and established Microbiome Movement as a place to present innovation.”

Sunny Jain, CEO, Sun Genomics

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The study of the microbiome has added a new level of innovation to the nutrition and food industries. There are many challenges and opportunities, as companies get down to business to gain a deeper level of understanding of the amazingly diverse health benefits that are possible. There is a notably strong presence of well-established nutrition corporations that are now major players in the microbiome space, including Procter and Gamble, Dupont Nutrition & Health, Church & Dwight and Danone Nutricia Research. A wide variety of smaller, specialized companies are also in the game. We heard from these companies and many others at the **2nd Microbiome Movement - Human Nutrition Summit** this November.

Nutrition and the microbiome are interwoven to orchestrate a wide

array of health benefits, including gastrointestinal health, cardiovascular health, metabolic and immune health, personalized nutrition, infant health, mental health, and sports performance. During the conference, we heard about these topics, as well as engaging talks on study design, product development, consumer engagement, and offerings by expertise partners.

A New Avenue to Fight Heart Disease

There has been a dramatic increase recently in the number of publications showing a correlation between the heart, diet, and the microbiome.

Jose Carlos Garcia-Garcia, Principal Scientist at Procter & Gamble

discussed their partnership with the **Cleveland Clinic** to explore the TMAO pathway and the link with diet, the microbiome, and cardiovascular disease. Gut bacteria metabolize

choline and carnitine, nutrients found in red meat and liver, which leads to trimethylamine (TMA) and TMAO production. This can cause a wide array of harmful effects, such as an increased risk of atherosclerosis, heart failure, obesity, and diabetes. By uncovering the details of the mechanisms behind the gut microbiome's role, P&G and the Cleveland Clinic are exploring inhibitors of the bacterial pathway that lead to TMAO production.

Predictable Personalized Nutrition Based on Your Gut Microbiome

Josh Stevens of DayTwo discussed their personalized nutrition platform, which is based on work at the **Weizmann Institute**. By continuously monitoring

blood sugar levels in a thousand people, they found that there was a highly individualized response to all foods. DayTwo has developed a unique machine learning algorithm that is based on numerous factors, including the individuals' microbiome and various biometrics such as lifestyle and medical background. Furthermore, personalized dietary interventions based on the algorithm were clinically shown to lower blood glucose levels and cause consistent changes in the microbiome composition.

A Hunter-Gatherer Diet for a Healthy Microbiome

Ben Goodwin, CEO of Olipop, reflected on the sad state of affairs in the US, with

“Spot on in terms of bringing the right mix of people together with the right mix of topics.”

Dale Pfof, CEO, Microbiome Therapeutics



Chris Damman, Gates Foundation, Raja Dhir, Seed Inc and Mike Janusz, Procter & Gamble discuss the greatest challenges and opportunities when harnessing the microbiome for nutritional product development.

“The networking programs really added value to this event as there were many talented and knowledgeable attendees in the audience.”

**Ali Arjomand, Founder & CEO,
Modulla Health**

two-thirds of Americans experiencing gut distress, and 10-25% with IBD. One clear problem is in our nutrition – the average American eats only 10 grams of dietary fiber a day, compared to our hunter-gatherer ancestors, who ate a whopping 150 grams. More in-depth studies have shown that the benefits of eating fiber include increased diversity of the microbiome, more beneficial bacterial metabolites, and a mucosal membrane 4 to 5 times as thick, which in turn promotes immune and metabolic health. Did you know African-Americans have a 13-times higher incidence of colon cancer as compared to rural South Africans? In a small study, African-Americans and rural South Africans swapped diets. The African-Americans ate high-fiber, low-fat diets, while the rural Africans ate high-fat low-fiber diets. Within the short 2 week study, there were remarkable reciprocal changes in the microbiomes and metabolomes associated with cancer risk as well as in mucosal biomarkers of cancer risk. Olipop offers a solution to our deleterious Western diets – sparkling tonic with fiber, prebiotics, and botanical extracts.

A Healthy Start for Infants

Human Milk Oligosaccharides (HMOs) promote beneficial Bifidobacteria in the infant microbiome and infant formula supplemented with HMOs is safe and well-tolerated, enhances immunity and prevents pathogens.

Ratna Mukheriea, Global R&D Leader at DuPont Nutrition & Health, discussed their development of a colon simulator used to explore the effect of pre- and probiotics on bacterial composition and fermentation end products. Their HMO, FL-2, as well as a galacto-oligosaccharide (GOS) and lactose, were shown to increase the total amount of Bifidobacteria. This strengthens gut barrier function and blocks attachment of pathogens such as Campylobacter and E. coli to gut epithelial cells, inhibits Norovirus and Influenza A, and reduces Necrotizing Enterocolitis in preterm infants. Overall, HMOs and GOS stimulate the immune system and provide building blocks for brain development.

Another major player in the field of infant nutrition is **Evolve BioSystems**, and their **CSO David Kyle** provided the backdrop for the development of their product. Historically, the natural infant microbiome has been dominated by Bifidobacteria infantis, which are highly dependent on HMOs from breast milk. A predominance of B. infantis protects a baby’s microbiome from an overgrowth of non-beneficial bacteria, which protects against autoimmune and metabolic issues like colic, allergies, diabetes, eczema, and obesity. While 80% of babies in developing countries naturally have the beneficial B. infantis in their gut, B. infantis is largely diminished in infants living in more developed parts of the world, in

part due to C-sections, antibiotic use, feeding mode (formula vs. breastfed), etc. Evolve BioSystem's HMO-based infant supplementation, Evivo, is clinically proven to restore B.infantis predominance, and reduce the levels of non-beneficial bacteria. Bifidobacteria also reduce the risk of atopic dermatitis by 2-fold and asthma at 6-years old, indicating long-lasting changes to the microbiome.

Epilepsy and the Ketogenic Diet

One in three patients with epilepsy is drug resistant. One alternative for these patients is to switch to a ketogenic diet, and the results have been astounding. 50-60% of patients had a 50% reduction in seizures, and 30% of patients had a 90% reduction in seizures. The ketogenic diet works through multiple mechanisms of action to reduce seizures, and mouse studies have shown that the microbiome is required for the anticonvulsant activity of the ketogenic diet. We heard from **Christopher Reyes, Co-Founder and CSO of Bloom Science** about their functional prospecting to screen for bacterial strains that have activity associated with GABAergic neurological conditions such as epilepsy. By using metaomics-driven translational biology, they are able to identify biomarkers and strains that are associated with neurological conditions.



Aurelien Baudot, ProDigest introduces the SHIME technology, a novel in-vitro technology to help model the complexity of the GI tract.

Outsourcing to Expertise Partners

For those seeking expertise in areas they'd rather not develop in-house, we heard from metabolomics specialists, **Metabolon**, bioinformatics specialists, **CosmosID**, as well as **Prodigest**, with their in-vitro technology platform for preclinical testing.

Host genetics only explains 18% of metabolic variation – the rest is microbial. **Geoffrey Feld, Senior Study Director of Metabolon**, described their precision metabolomics platform, which identifies and quantifies metabolites and maps molecular pathways. They cover canonical microbial metabolites, xenobiotic/dietary metabolites, novel microbial-derived metabolites, and

“If you want to be up to date with the latest trends and developments, you simply HAVE to be there.”

Alan Murray, CEO, Next Foods



Felice Jacka, Center of Food & Mood introduces the importance of Nutritional Psychiatry and the recent link between diet, gut microbiome composition and mental health.

host metabolites. Feld discussed a few applications, including a collaboration with the Weizmann Institute in which their platform revealed a persistent microbial metabolite change well after weight loss, which explains the phenomenon of yo-yo dieting.

Aurelian Baudot of Prodigest

described the SHIME® platform, which allows an integrated simulation of the full GI tract, including lumen, mucosa and host, allowing investigation of the mechanism of action of live bacteria in areas of the gut which are not easily accessible, generating data complementary to in vivo studies. Some of the areas of application for probiotics include: determining survival rate for a strain passing

through the upper GI, impact on gut microbiota composition/activity, targeted delivery, the effect of food/nutrients on probiotic survival, adhesion to the gut wall, and engraftment. For those studying prebiotics, SHIME can aid in determining the main areas of fermentation in the colon, impact on microbiota composition/activity, and determining immune effects. Also, researchers can evaluate anti-pathogenic activity, as well as digestibility of nutrients.

Educating Consumers

The popularity of probiotics and prebiotics has skyrocketed recently, with 4 million adults in the US alone now ingesting one or the other

“An ideal conference for connecting with thought leaders at global food and nutraceutical brands, gaining insights into novel product development and building your microbiome community.”

**Noah Voreades Principal
GenBiome Consulting**



Josh Stevens, DayTwo presents a new approach to personalized nutrition through machine learning of the gut microbiome.

“I took away more ideas and connections from this meeting than I could have hoped for, and was able to learn about new innovative products and practices from industry leaders who actually utilize them. Hope to be back next year!”

**Charlie Frahm, Agronomist,
Blue Prairie Brands**

(or both), and 60 percent of U.S. physicians prescribing probiotics. **Nalin Siriwardhana of Church & Dwight** listed top reasons of polled consumers for buying probiotics: gut health, immune health, and for regularity. To a lesser extent, they also buy probiotics to promote a healthy microbiome, or because of physician recommendation, or for brain health. While nearly three-quarters of polled users are taking probiotics for gut health, Siriwardhana pointed out that there is an opportunity to educate consumers by linking gut health to some of the other benefits: improved immune system functioning, weight loss, and detoxification, for example. New claims need consumer education, preferably by creatively communicating meaningful science.

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Promoting Peak Performance in Athletes

In a highly unique application, **Jonathan Scheiman, Co-Founder and CEO of FitBiotics** discussed a discovery made in Boston marathoners—a spike in abundance of a particular genus of lactic acid-metabolizing bacteria. Fitbiotics has a patented idea to isolate these particular bacteria from athletes and incorporate the strains into a nutritional supplement to be used before competition, to promote endurance and reduce fatigue. Fitbiotics is purifying unique performance probiotics from athletes to be validated in preclinical and clinical models. Initial studies show a 13% improvement in mice.

Hope you enjoyed this summary of the exciting progress in the microbiome field explored in-depth at the *Microbiome Movement – Human Nutrition Summit*, brought to you by Hanson Wade and Edge Bioscience Communications. We will see you next time! ■