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**Foods Bring Their Own Stowaways**

We’ve learned that the microbiomes of our digestive and urogenital tracts, skin, nose, and lungs consist of organisms that may roughly be classified as 1) beneficial, 2) neutral or commensal, and 3) potentially or absolutely pathogenic. It has also come to light that growing plants also have their own unique microbiomes, which can also vary part by part; the microbiome of a plant’s leaf may be different from that of its roots and fruits. More recently, this realization is spreading: most of the Earth’s surface is populated by specialized microbial communities, and animals also have their own microbiomes. And just as human gut ‘bugs’ allow us to make use of vitamin B12 and to create the short-chain fatty acids that are beneficial to intestinal health, those of plants and animals influence their function and adaptivity.

Our ability to consume a broad variety of foods from plant as well as animal sources has much to do with how humans became human. Considering the importance of our microbiomes to our evolution, it is perhaps not such a surprise that microbes also provide plants with the opportunity to specialize to life in particular habitats and subject to particular challenges. Analogous to human microbiomes, those of plants facilitate their growth, protection, stress management, and life-long health and resilience—thus, much as phytonutrients enable plants to variously withstand drought, heat, cold, and other disadvantageous conditions plants’ microbiomes also help support and optimize their survival. As phytonutrients also confer benefits upon humans consuming them, it is also worthwhile to ponder how plants’ microbiomes also ‘feed’ our well-being.

Foodomics is the study of food at its most basic molecular level, and includes all organisms that inhabit food, all of their interactions among themselves and with foods, and how all of these variables influence human health. In this [Smithsonian magazine](https://www.smithsonianmag.com)
Immune balance is a manifold challenge: while immune tissues and cells must accurately target and proportionally respond to potential infectious, allergenic, and toxic agents, they shouldn’t cross-react to the body, and yet should also give us signals about proinflammatory lifestyle inputs without crippling us with the message before we act upon it. Over time, immune subsystems face an increasingly complicated (and potentially confusing) milieu within the body:

- as we age; detoxification function can lose efficiency
- if diets include processed foods, poor-quality proteins, carbohydrates, and fats, inappropriate macronutrient balance, or insufficient amounts of nutrients that support metabolic detoxification
- if we have health conditions related to increased oxidative stress
- if we are not physically active enough
- as we are environmentally exposed to more drugs and toxins yet may lack “normal” exposures, as below
- if we don’t pursue regular whole-body detoxification strategies

Lifestyle factors like these determine the quality and quantity of immune challenges
received, how the body perceives them, and the type of response mounted. As one example, autoimmunity is increasingly related to certain infectious exposures, which also influence whether the microbiome plays an active role in such conditions. Immune subsystems are “trained” by normal stimuli such as dirt, weak pathogens, our mother’s vaginal flora during birth, animals, and even parasitic intestinal worms—and according to the Hygiene Hypothesis, experiences of this nature provide beneficial immune “exercise” that helps establish healthy long-term adaptivity. Even breastfeeding or coffee-drinking can affect immunity, as breastfed children appear to have reduced risk for autoimmune and allergic conditions, while coffee consumption may increase that for rheumatoid arthritis and type 1 diabetes, reduce it for multiple sclerosis and ulcerative colitis, and cross-react with gliadin antibodies in celiac disease. Regular physical activity tends to equilibrate the immune system’s offensive and defensive functions while also stimulating metabolic detoxification and antioxidant processes. It helps keep balance between cells that play different roles in immunity (Th1 and Th2 types of T-helper cells), and is reported to improve the course of conditions like rheumatoid arthritis, systemic lupus erythematosus, multiple sclerosis, inflammatory bowel disease, and type 1 diabetes.

Diet is another large determinant in immune function, and while recommendations should be considered on an individual basis, insufficient intakes of zinc, vitamins C, D, and E, and omega-3 fatty acids are common and adversely affect immune function. Recent preclinical research finds that increased nutrient density in relation to calories may reduce inflammatory potential and that prebiotic carbohydrates such as dietary fiber can help maintain immune balance through improving the gut environment and composition of the microbiome. Butyrate, a short-chain fatty acid produced in the gut from dietary fiber, appears to cultivate balance in T-helper cells that control T-helper numbers, which may be a significant means by which a high-fiber diet protects against autoimmune, allergic, and inflammatory conditions. An animal study of rheumatoid arthritis suggests that giving coenzyme Q10, zinc, bifidobacteria, and lactobacilli may be another way to beneficially influence numbers of T-helper cells and the T-regulatory cells that control their populations.

Long-term management of immune burdens should include lifestyle-embedded metabolic detoxification and strategies for minimizing toxic exposures. The program developed by Dr. Joseph Pizzorno (recipient of the Integrative Healthcare Symposium’s 2018 Leadership award) and detailed in his book The Toxin Solution provides many practical suggestions ranging from specific foods to eat and ingredients to avoid to using saunas and massage to boost detoxification.

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**SNiPpets**

How significant to health are particular single nucleotide polymorphisms, also known as SNPs? SNiPpets is a ongoing exploration of this topic.

**These Zinc SNPs Link to Insulin Function and Blood Sugar Control**

Better zinc status generally relates to more efficient insulin function and reduced risk for type 2 diabetes, though some research has not found this relationship to be entirely consistent. Several genome-wide association studies (GWASs) have identified genetic variations affecting zinc metabolism that additionally impact glucose and insulin responses. Two such single-nucleotide polymorphisms (SNPs) are particularly compelling, because 1) they occur together even more frequently than predicted by the relative proximity of their gene
addresses,’ and 2) while one is a less-common gene variant, the other is actually the major (most common) gene variant.

The SLC30A8 gene codes for a zinc-transporting protein involved in the secretion of two pancreatic hormones of paramount importance to energy metabolism and the body’s control of blood glucose levels: insulin and glucagon. At the rs13266634 locus of this gene, a C-to-T switch is associated with an impaired insulin response and a higher risk for type 2 diabetes. However, among non-diabetic, overweight subjects having this T-allele SNP, 2 weeks of supplementation with 50 mg of zinc twice daily (which is much higher than most countries’ reference daily values, which are usually around 11-15 mg) significantly ameliorated the insulin response. This level of zinc supplementation also improved the insulin response in persons with the major C allele at the same locus, but the effect in this population was less strong than among subjects with the T allele. Researchers felt that zinc status may influence the insulin response at an early stage in the formation of insulin from proinsulin—a relatively subtle (yet instrumental) effect that may not previously have been fully appreciated.

Another polymorphism within this SLC30A8 gene, at its rs11558471 locus, relates zinc intake to blood glucose levels; the major gene variant at this locus is A, while G is the minor SNP allele. Individuals having either one or two copies of the major A allele at this gene locus show a greater probability of having elevated fasting blood glucose levels than those with 2 copies of the minor G allele (a GG haplotype). However, this risk diminished with each additional milligram of zinc received daily, and the strongest benefit was seen among those with two A-allele copies (an AA haplotype). This study also confirmed that greater overall zinc intake was widely associated with lower fasting glucose levels, suggesting that even the general population may benefit from receiving more dietary or supplemental zinc.

Minerals influence each other’s absorption in the digestive tract, and other minerals besides zinc (magnesium is a prime example) play valuable roles in the glycemic response. For this reason, individuals having either of the above gene variants affecting insulin and glucose may wish to discuss optimal dietary and supplementation strategies with a Functional Medicine practitioner.

What a Rush! Claim Your Seat Before They Are Gone!

Four months to go before the 2019 Thought Leaders Consortium and we experienced a flurry of registrations at the end of June.

Here’s a quick snapshot of the current situation:
- We’ve got a dynamic host (Dr. Jeff Bland), an incredible faculty (link below), and a fantastic waterfront venue in the beautiful Pacific Northwest. In other words, SELLOUT EXPECTED!
- Rooms at the Hyatt Regency Lake Washington are available on a first come, first served basis. A conference registration is required to access the PLMI room block. The sooner you register, the sooner you can secure a guest room at the event venue.
- The Thought Leaders Consortium is an event that stands out from the rest not only because of its many educational attributes, but also for its affordability and value-adds. PLMI is, of course, dedicated to nutritious and delicious food options. Every year, our staff works directly with the chef at the conference venue on the development of a custom menu. Breakfast and lunch each day are free to attend and enjoy, and a variety of healthy snack options are made available at breaks. This year, a sponsored reception featuring hors d’oeuvres and beverages (plus awards!) will be offered on
Friday evening, October 11th.