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In this issue: Seventh Annual Thought Leaders Consortium Announcement; Meet & Greet Your Microbiome; Nutrition Profiling and Cancer; SNiPpets: Omega-3 Fat Conversion; New Videos Available in the Free PLMI Education Portal

Save the Date and Watch Your In-Box!

Dr. Jeffrey Bland and the PLMI team are excited to announce details about our Seventh Annual Thought Leaders Consortium. Join us in October 2019!

Meet & Greet Your Microbiome

Think of the microbiome as a message board, on which note is made of every nutrient you ingest, every microbe that accompanies everything you swallow, every metabolite that shows up in your intestines, and fathoms of information flowing among it, your central nervous system, and the large portion of your immune system that resides within your digestive tract. As social networks go, the microbiome puts others to shame in terms of responsivity to input and the sheer amount—and meaningfulness—of data it shares, and its output is recorded in your genes. Because
the microbiome constitutes a multi-pound organ unto itself, we can’t help but ask ourselves how to change it for the better. Though the answer will depend on each individual’s state of health, initial microbiome composition, and desired changes, careful research provides a few pointers.

Multitudes of microbes populate the microbiomes of the mouth, nose, ears, and urogenital tract as well as different areas of the digestive tract, with each possessing its own distinctive balance of numbers and types of organisms. While there is as yet no broad scientific consensus on what constitutes an “ideal” microbiome composition, much research seems to agree that, at least in the gut, broad diversity among non-pathogenic bacterial species is desirable and reflects greater variety in dietary and environmental exposures. As the dominant communities within human microbiota, the ratio between members of the Bacteroidetes and Firmicutes phyla of organisms is often the next step in characterizing the gut microbiome. This update from the expanded Human Microbiome Project states that individuals appear to maintain fairly steady gut equilibrium among Bacteroidetes, while Firmicutes vary more over time. In this video, Dr. Bland discusses this basic balance and how overabundance of Firmicutes is associated with poor eating patterns, meat in the diet, obesity, and type 2 diabetes.

Bacteroidetes are generally considered intestinal commensals (neither “good” nor “bad”) associated with eating plant foods and fibers, though a few may be opportunistic pathogens, and common species include *Alistipes*, *Bacteroides*, and *Prevotella*. Firmicutes include lactobacilli, *Christensenella*, and producers of butyrate (a beneficial fatty acid in the gut) such as *Roseburia* and *Faecalibacterium*, but also include pathogens like staph and strep. Among Firmicutes are species within the Clostridia class, which is well-known for several virulent pathogens yet also includes the listed butyrogens (butyrate producers). A microbiome study of Bacteroidetes and Firmicutes in vegans, ovo-lacto vegetarians, and omnivores found that vegans showed the highest ratio of Bacteroidetes to Firmicutes, followed by omnivores and then vegetarians. This study also looked at biomarkers of inflammation among these subjects, and found that omnivores displayed the highest overall levels of pro-inflammatory mediators and the greatest insulin resistance while vegans showed the lowest inflammatory propensity. Omnivores showed relatively high levels of Proteobacteria and Bacilli, associated with a western-style diet, while ovo-lacto vegetarians showed the greatest abundance of *Faecalibacterium* butyrogens, which may correlate with dairy and egg intakes.

Bifidobacteria are another important beneficial species, especially in children. They are members of the Actinobacteria, which include potential pathogens such as *Gardnerella* and *Corynebacteria* but also demonstrate a wide range of immunomodulating activities. While dairy oligosaccharides are a common food for Bifidobacteria, these bacteria are also seen in higher numbers in those eating high-fiber (versus low-carbohydrate) and omnivorous (versus vegan) diets. Other bacterial species consistently regarded as immuno-metabolically beneficial include *Akkermansia muciniphila* and *Faecalibacterium prausnitzii*.

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**Nutrition Profiling and Cancer**

Imagine tracking the dietary habits and incidence of cancer in over 500,000 people in 23 different locations in 10 western European nations for an average of 15 years each. That is what the aptly-named EPIC study did, and after analyzing data gathered for over 20 years, the results of this research have recently been published. One of the outcomes of EPIC was to test the validity of the Nutri-Score color-coded food labeling scheme. In some European countries, Nutri-Score allows consumers to receive reliable information about foods’ relative density in metabolically advantageous as well as disadvantageous nutrients. It profiles foods according to their contents of calories, sugars, sodium, saturated fats, dietary fiber, protein, fruits, vegetables, nuts, seeds, and legumes, and assigns each a Nutri-Score of one to five.
(sometimes translated into a green-to-red color range on labels), with a higher score (or redder color) indicating lower nutritional quality.

Nutri-Score is based upon Britain’s Food Standards Agency Nutrient Profiling System, which researchers used to assign each study participant an overall Dietary Index (called the “FSAm-NPS Dietary Index”) reflecting long-term balance in their intakes of these foods and nutrients—again, with higher score denoting lower overall nutritional quality in a given person’s diet. Researchers found that participants with higher FSAm-NPS Dietary Indices were more likely to consume higher amounts of overall calories, alcohol, and red and processed meat, and lower amounts of fruits, vegetables, and fiber. In the final analysis, higher FSAm-NPS Dietary Indices were linked to higher overall risk for cancer, and especially for colorectal, liver, kidney, upper digestive tract, lung, stomach, prostate, and postmenopausal breast cancers.

Other global nutrition profiling schemes have been difficult to scientifically validate as well as for consumers to interpret, but the simplicity of Nutri-Score will likely lead to its wider usage on food labels. And while it is far from personalized, it is easy to understand and provides food producers some incentive to provide more nutritious offerings—especially now that it may help people weigh their food choices against risk for cancer.

**SNiPPets**

How significant to health are particular single nucleotide polymorphisms, also known as SNPs? SNiPPets is a ongoing exploration of this topic. This column is produced by Jeffrey Bland, PhD and the Personalized Lifestyle Medicine Institute.

**These SNPs Impact Omega-3 Fat Conversion**

Unlike most animals, humans require dietary vitamin C because, somewhere during evolution, we traded away the enzyme that converts glucuronic acid into the ascorbic acid form we need. With essential fats like the omega-3s EPA and DHA, the story is different. We retained the enzymes that are necessary for the final conversion of precursors into these fatty acids, yet their activity tends to be low, and most of us will benefit from omega-3 supplementation. Research into these desaturase enzymes has found that those of some individuals have particularly low function, and this is reflected in lower blood lipid and breast milk levels of EPA and/or DHA—with health implications during pregnancy and breastfeeding as well as for children and adults.

Despite comparable dietary intakes of EPA, DHA, and their precursors, women having a GG haplotype (a double A-to-G single nucleotide polymorphism or SNP) at gene locus rs174553 showed lower plasma lipid levels of EPA during pregnancy compared to women having the more common AA or GA haplotypes at this locus. Within the FADS1/FADS2 cluster of genes coding for these omega-3 fatty desaturases, women having two SNPs (minor alleles) at any of the rs174553 (A-to-G switch, thus the GG haplotype), rs99780 (C-to-T switch, so TT haplotype), or rs174583 (C-to-T switch, so TT haplotype) loci showed lower breastmilk levels of EPA, while women with double minor alleles at the rs174575 locus (C-to-G switch, so GG haplotype) showed lower breastmilk levels of both EPA and DHA.

This study compared blood lipid, red blood cell, and breastmilk levels of these essential fats and their precursors in pregnant and
breastfeeding mothers, which is useful for demonstrating how the body partitions these essential fats between mothers and infants. The overall results would seem to indicate that, during pregnancy and nursing, the developmental needs of infants are prioritized and that mothers may sacrifice their own essential fat status during these crucial periods—but also that mothers with particular SNPs may deliver lower omega-3 fats to their infants through their breastmilk. Those (especially prospective mothers) having these SNPs may wish to discuss strategic omega-3 fatty acid supplementation for themselves and their children (possibly including arachidonic acid for infants) with a Functional Medicine practitioner.

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