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In this issue: The Oral Microbiome, BMI, and a Moderate Female Sweet Tooth; Genetic Identicals are Metabolically Unique; SNiPpets: This SNP Relates to High Blood Pressure and Caffeine; The Most Personal Energy Economy

The Oral Microbiome, BMI, and a Moderate Female Sweet Tooth

It’s been known for some time that diversity among the microbial communities living within the intestines is both commendable, usually representing healthy variety in prebiotic carbohydrates and plant species consumed, and desirable, generally indicative of better immunometabolic function. We’ve also found out that a less-diversified microbial range (more strictly limited to lactobacilli) is reflective of better pregnancy and birth outcomes.

While research into microbes inhabiting the oral cavity is still quite young, a recent cooperation between researchers at Michigan State University and “Citizen-Scientists” visiting the Denver Museum of Nature & Science has discovered that greater diversity among oral microbiome members is related to a lower body mass index (BMI) and thus to a lower likelihood of being overweight or obese, especially in females. Particular bacteria such as Clostridiales, Bacillus, and Corynebacterium members (all of which have potentially pathogenic as well as health-related species) were markedly characteristic of normal weight or underweight persons and less commonly found in the oral microbiomes of overweight or obese persons.

Researchers also investigated connections between the degree to which participants liked sugar solutions of 4 levels of sweetness (as well as plain water) and oral microbiota composition, and found that, at least in females, greater diversity was related to liking the sweetness of the weakest sugar solution. While it may not seem entirely logical that 1) liking sweetness and 2) being normal weight or underweight would simultaneously be linked to a seemingly beneficial bacterial composition in the oral cavity, it may be worth noting that this relationship held only for the least-sweet
solution—not sweeter solutions, not plain water. Though this has not been confirmed, it would seem to be consistent with the metabolic health benefits of consuming mildly sweet prebiotic phytonutrients like those found in root vegetables, whole grains, fruits, and dairy foods containing galactooligosaccharides, as opposed to having a stronger preference for more concentrated and refined sweets.

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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.

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**With these SNPs, that Java Could Be Making Your Blood Pressure Jumpy**

Coffee makes some people feel alert and ready to work, but it can also result in feelings of jitteriness and anxiety. A number of genome-wide association studies (GWAS) have looked at connections between genetic variants and high blood pressure, but an August 2019 GWAS took it further, looking at particular single-nucleotide polymorphisms (SNPs) that interlink hypertension with consumption of coffee.

Researchers performing this GWAS created a genetic risk score based upon four previously-identified SNPs related to high blood pressure:

- A C-to-T switch at the rs2470893 locus and a C-to-T substitution at the rs2472297 locus, both which are located between genes coding for two crucial liver enzymes associated with metabolic detoxification of caffeine and aromatic components of roasted coffee (CYP1A1 and CYP1A2)
- An A-to-C switch at the rs6495122 locus between the CPLX3 and ULK3 genes (which has been found to be common among Italians in Tuscany, Mexicans living in Los Angeles, and Utah residents with European ancestry)
- An A-to-G SNP at the rs17367504 locus of the MTHFR gene (which may also affect the expression of several other genes)

They discovered that adults with a higher genetic risk score had an almost doubled likelihood of having high blood pressure, higher systolic (active) blood pressure, and higher diastolic (resting) blood pressure—and that those drinking more than 3 cups of coffee daily had a 5-times greater chance of having significantly high blood pressure. Interestingly, the rs2470893, rs6495122, and rs2472297 SNPs are themselves positively associated with coffee consumption; for lifestyle- or metabolism-related reasons, people with these SNPs are simply more likely to drink it.

Because caffeine is a potentially addictive substance, individuals having any of the above SNPs who regularly consume coffee, tea, or other caffeine-containing foods may wish to reduce their intakes or consult with a Functional Medicine practitioner about their metabolic detoxification function, especially if they or someone in their family have elevated blood pressure.
The Most Personal Energy Economy

In the US, men’s mean body weight is 198 pounds, and women’s is 171 pounds.

Even if you usually eat three square meals each day, your body can adjust if you are unable to eat for several days or start eating two meals daily instead—it will strive to maintain your weight and energy level despite the change. Though this may not seem helpful when you are trying to lose weight, it comes in handy during famine! The energy economy of the human body is a marvel, carefully tracking our physical and metabolic activity as well as the arrival, storage, utilization, and departure of nutrients. Many of us have ancestors who survived food shortages, and vivid remembrance of such times lives on in inherited genetic mutations that gave advantage to those whose thrifty metabolism conserved energy and created bodily reserves.

The above statistic represents an average weight gain of over 30 pounds since 1960, and though body weights in other nations may be different, populations all over the globe are becoming heavier. This reflects a change in body shape and composition, with ‘energy reserves’ stored mainly around abdominal organs and on thighs, but also under the skin and ‘marbling’ larger muscles. This pattern of fat deposition is similar to what happens during biological aging, and it is accompanied by low-grade inflammation, as it is difficult for blood circulation to oxygenate, protect, and clear waste from growing fat cells, especially if one’s level of physical activity is low.

Team Members in Body Weight Regulation
1. The heart and larger skeletal muscles help set our basic metabolic pace, depending on our physical activity level
2. Cellular nutrient sensors monitor the quality and quantity of proteins, carbohydrates, fats, nutrients, and phytonutrients received over time, and signal back to brain regions that regulate appetite
3. The digestive tract constantly adjusts its creation of enzymes and receptors to optimize nutrient absorption, and the gut microbiome can produce specialized energy sources for the intestines
4. The endocrine system (especially thyroid, pituitary, and pancreas) work in concert with muscles and the liver to determine how strongly tissues respond to the message of insulin
5. Within cells, mitochondria that create cellular energy from food determine how much energy is ‘burned off’ as heat (and oxidation, as well) and how much is used to power cellular function
6. The genetic codes we inherit and our ‘ON-OFF’ epigenetic switches represent energy management guidance from our ancestors’ and our own living experiences
7. Perception and interpretation of events and long-term stress response patterns give executive-level direction to core energy systems

Long ago, simply having food enabled reproduction and meant, at a fundamental biological level, that life was good, but modern life presents a different kind of metabolic challenge. Now, despite plentiful food supplies, we don’t always exert ourselves enough or receive the balance of nutrients needed to optimally process all these calories, and this sends a metabolic signal that ‘something isn’t right: proceed with caution.’ Other worries may also trigger stress programs that convince our cells that it’s a struggle to survive, and that they must conserve and store as much energy as possible until conditions are better. One result of this is that the average Body Mass Index (BMI, used to define normal, low, and high weight) in the US is over 29—edging towards obesity. For adults aged 20 and older, a BMI calculator is available by clicking here. For children and for teens under 20, a special BMI calculator is available by clicking here. BMI values are interpreted as below:
- SERIOUSLY UNDERWEIGHT: BMI under 16.5
- UNDERWEIGHT: BMI of 16.5-18.49
- NORMAL WEIGHT: BMI of 18.5-24.99
- OVERWEIGHT: BMI of 25-29.99
- OBESE: BMI of 30 and over
Helping Your Body Regulate Weight

- Enjoy regular sweat-inducing physical exertion that conditions the heart, preserves core strength, and challenges flexibility.
- Have your body composition analyzed, and learn how it is affected by your lifestyle. A few popular apps include: Body Composition Monitor, My Fitness BMI Calendar, Feelymos Body Composition, Weight Logger, DNA Nutrition Tracker Pro, and BMI Monitor.
- Increase the overall nutrient density of your diet: total essential nutrient, fiber, and phytoneutrient contents versus total calories. Avoid caloric foods and beverages for at least 3-4 hours before you go to bed. Consider setting yourself a limited daily “eating window” of around 8-10 hours, but consult a Functional Medicine practitioner first if you have a metabolic or other serious health condition.
- Have your glucose response medically evaluated and consider getting a glucose monitor and using an app to track it over time. DayTwo is an online service that analyzes your gut microbiome DNA and blood test results to understand your glycemic response to individual foods.
- Using a heart rate monitoring device, identify your target heart rate for exercise and metabolic readjustment, and to help manage your stress response, use apps for tracking your heart rate and variability over time, such as Heart Rate, EliteHRV, or Polar Heart Rate Sensor.
- Enjoy more beans, nuts, seeds, leafy greens, and Brassica family vegetables, and be sure to get enough omega-3 fats and soluble and insoluble dietary fiber through your diet and supplements. Enjoy foods and nutrients that help the body ‘quench’ inflammation by gently stimulating cells’ PPAR receptors or mimic the effects of caloric restriction, such as green and black teas, resveratrol, omega-3 fats, quercetin, isoflavones, fiber, phytosterols, anthocyanidins, berries, and complex carbohydrates like resistant starch or those in okra, mushrooms, and sea vegetables.
- Learn about how medically-supervised metabolic detoxification can help reduce your body’s toxic burden, and discuss with a Functional Medicine practitioner whether you might benefit from periodically following a Fasting-Mimicking Diet.
- Consider body-mind techniques/practices (like martial arts, meditation, tai-chi, or yoga) that, over time, help re-set your stress response and metabolic balance.
- Consider genomic testing to help develop fine-tuned dietary and activity strategies that help you achieve better body composition and metabolic balance.

The fundamental purpose of food is to nourish, protect, and energize life; it can also enhance social interactions and relationships. When life is stressful, though, many use food to briefly boost mood, turning nutrition into something drug-like—yet the types and ‘dosages’ of foods that temporarily soothe feelings are very different from those that serve health.

The body will always try to maintain normalcy despite change. A famous advice columnist is said to have called bad habits “undo-it-yourself projects.” Even when we are trying to make healthy changes, there is a certain resistance—and it deserves our respect rather than frustration. With self-awareness and determination, this natural tendency is also what allows us to solidify lifestyle improvements.