Wheat is Genetically Complex—We Made Sure of it!

First, it was a wholesome, life-sustaining staple food that helped assuage hunger—a major protein and calorie source over the course of human history. After a while, this or that person figured out how to combine it with yeast for breadmaking or fermentation into alcoholic preparations. Then, through cross-breeding and increasingly sophisticated genetic engineering, it was modified for flavor, starch, ease of cultivation, and, sometimes, nutrition. Now, except for specialty products aimed at preserving original strains, wheat consists of a few genetic types that are considered to be optimized for profitable exploitation. One result of this commercially limited expression of ‘what wheat is’ has led to greater numbers of individuals discovering some degree of physical intolerance for this highly manipulated entity and especially its major allergen gluten, consequently creating a burgeoning market for gluten-free food products.

It took decades of planning, fancy finance, and hard science to unlock the human genetic code, but wheat has proved even tougher to crack. This fascinating recent story explains that the genome of wheat is five times larger than ours, and whereas humans have two copies of each chromosome, the wheat plant has six—which adds up to enormous potential genetic variety. This complexity arises because modern wheat is a hybrid of multiple types of grasses, each of which started with a different set of DNA. Different bits of wheat DNA come from each of these grasses, and each variously affect the flavor, texture, growth patterns, nutritional characteristics, and other such traits of wheat. This article, recently published in the journal Science, describes ancient and modern challenges in understanding wheat’s genome and building ‘better’ wheat with it.
Telomeres' Likes and Dislikes

For something that has been compared to a shoestring guard, human telomeres actually have a lot to say about how one has lived, as their length correlates to both lifespan and healthspan (the comfortable, fully functional portion of one’s lifespan). Telomeres are repetitive DNA patterns that signal the end of usable genetic information on chromosomes, and they protect the integrity of functional DNA. Telomeres shorten with the passage of time and with each cellular division, and thus their length is increasingly thought to mirror one’s functional age (also called cellular or biological age). Chronic cellular stress (such as oxidative or energy stress) also hastens the loss of telomeres, causing them to age much as it increases the biological aging of the telomere’s human owners.

Telomeres’ Likes (what better maintains their protective spans):
- a Mediterranean-style eating pattern, with lots of fruits, veggies, nuts/seeds, olives/olive oil, beans, and pulses, moderate fish and alcohol intake, and little or no meat and dairy
- men and women who incorporate intense and regular physical activity into their lifestyles
- bodies with higher levels of carotenoids (such as alpha- and beta-carotene)
- the company of higher levels of vitamin C, lutein, and zeaxanthin
- diets with a higher omega-3:omega-6 fatty acid ratio
- the presence of vitamin E, lycopene, and other antioxidants
- taking a daily multivitamin supplement (at least in women)
- diets with higher fiber content
- good quality of sleep (as well as appropriate quantity)
- people who have a feeling of food security
- lifestyles that include meditation and mindfulness
- coffee consumption (according to data from female nurses)

On the other hand, telomeres don’t “thrive” well in lifestyles that include smoking, regular intake of sweetened sodas, heavy alcohol or processed meat intake, and chronic physical, emotional, or social stress. Telomeres also tend to be shorter in those with a larger waistline measurement, higher body mass index, chronic disease (especially those associated with inflammation), or a history of trauma in childhood.

Interesting fact: after orbiting the planet for a year, data from astronaut Scott Kelly recently showed us that outer space is stressful for telomeres, yet after his return to Earth, they re-adapted and appeared to recover to some degree. This illustrates a very reassuring truth about telomeres: they are resilient and respond in the appropriate manner given their exposures and experiences. In an interesting study among those at risk for cognitive decline, those whose lifestyle habits contributed most strongly to disease risk (as indicated by shorter telomere length) were the most responsive to lifestyle changes—one might even say that their telomeres were calling for help! The above short listing of telomeres’ ‘Likes’ exemplifies that they are pretty good at communicating what makes our genes feel that life is good—or when it could use some conscious modification.

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 May Affect Receptivity to Fish Oil Supplements

While some studies have found omega-3 fats to benefit the glucose and insulin response, not all agree, and gene polymorphisms may partially explain this inconsistency. Cellular effects of omega-3 fatty acids are largely mediated by fatty acid receptors and SNPs at the gene coding for the FFAR4/GPR120 receptor relate to the variability in insulin response to fish oils, with a SNP at rs17108973 accounting for a significant part of it. At rs17108973, carriers of CC genotypes showed decreases in fasting insulin and insulin resistance after omega-3 supplementation, whereas CT and TT carriers showed increases. At rs11187537, GG carriers demonstrated reduced fasting insulin and insulin resistance after omega-3s while CG and CC carriers showed increased values. At rs17484310, TT carriers showed decreases in these measures of insulin function after omega-3s while AT and AA carriers showed increases. Persons with CT or CC genotypes at rs7081686 showed little insulin response to omega-3s whereas TT carriers responded with reduced fasting insulin and insulin resistance values. While omega-3 fat supplementation shows many beneficial effects beyond insulin metabolism, these gene variations provide some understanding for why it may not impact insulin as strongly in certain individuals.

Hearts Go Pitter-Patter for Deep Sleep

Why is it that serious cardiovascular events like heart attacks or fibrillation are more likely to happen between 6 am and noon—and especially at the beginning or end of sleep? Sleep occurs in multiple phases, with more healing sleep states occurring when deeper non-rapid eye movement (non-REM) sleep is attained. This state is most commonly achieved at around 2:00 am, when body temperature is decreasing and there is more parasympathetic activity in the nervous system: relaxed, restful, and rejuvenative. REM sleep more commonly occurs towards the waking hour when cortisol levels generally increase and vigilant sympathetic activity becomes more predominant.

Research into chronobiology (how circadian rhythms affect function) has been investigating the way the heart rhythms vary during the day, and has found that changes in heart rate are very much affected by the cycling between sympathetic and parasympathetic states. A faster or slower heart rate prepares the body for different necessary activities, and altered heart rhythm patterns during the night increase the vulnerability to damaging cardiac events. This is particularly true if one’s sleeping schedule is not aligned with one’s chronotype; ‘morning types’ feel better going to bed and waking earlier, while ‘night types’ find it difficult to sleep and wake at earlier times. There are many ways to improve nervous system balance between sympathetic and parasympathetic activity, but in terms of deepening sleep, a few of these include: avoiding eating or using electronic devices near sleeping time, exercising between morning and early evening, keeping bedrooms dark, cool, and free of electronic routers, and engaging in quiet activities before bedtime.

HAVE YOU REGISTERED?
The Sixth Annual Thought Leaders Consortium
The countdown has begun! In less than two months, attendees from 13 countries will be traveling to Tucson for the Sixth Annual Thought Leaders Consortium. Dr. Jeff Bland and the rest of the PLMI team are excited to host this year's event at the beautiful Westin La Paloma Resort and Spa in the foothills of the Santa Catalina Mountains. Although time is running short, registrations are still being accepted.

If you would like to join us for this unique event, use this link to visit our registration website: [https://bit.ly/2NA0NFM](https://bit.ly/2NA0NFM)

Questions about this conference can be emailed to Annette Giarde, PLMI Operations Manager: [annettegiarde@plminstitute.org](mailto:annettegiarde@plminstitute.org)

Do you want to learn more about our venue, which is one of the most highly rated resorts in Arizona? Location details, hotel amenities, and spa services are described here: [https://westinlapalomaresort.com/](https://westinlapalomaresort.com/)

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