

# Gene Expression and Reprogramming

## Summary

1. Assorted genes throughout your body are constantly working, orchestrating the building of critical protein structures and enzyme pathways and repairing, regenerating, and sometimes even destroying your cells based on the signals they get from their immediate environment.
2. A complete set of *Homo sapiens* DNA is contained inside each of the 50 to 60 trillion cells in the body. Approximately 20,000 different genes are located on the DNA strands in each cell.
3. Genes can be viewed as an assortment of "on/off" switches for building the protein molecules that influence every element of body function and structure.
4. Gene switches turn on or off according to signals received from their environment. You can manipulate and optimize gene expression through foods, workouts, and lifestyle behaviors.
5. Genes don't know or care whether these environmental signals promote or compromise your health; they simply react to each stimulus in an effort to promote your immediate survival.
6. Familial genes determine fixed heritable traits, such as eye, hair, and skin color, and even predispositions to obesity, heart disease, cancer, athletic performance, mathematical or musical aptitude, and so on. Negative familial predispositions can be overcome by adhering to evolutionary-based lifestyle behaviors that promote optimal *Homo sapiens* gene expression. This notion is the essence of the Ancestral Health coaching philosophy espoused by the [Spartan Method](#).



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## Facts

### Genes:

Assorted genes throughout your body are constantly working, orchestrating the building of critical protein structures and enzyme pathways, and repairing, regenerating, and sometimes even destroying your cells based on the signals they get from their immediate environment.

### Conventional Wisdom:

Genes are commonly viewed in a narrow dimension: the fixed heritable traits that we have little influence over, such as hair color, eye color, and predispositions toward certain personality characteristics or diseases. The influence of environment on day-to-day gene expression is under-emphasized, as most people believe the particulars of their familial genes are unalterable. For example, a family history of heart disease or obesity will indeed predispose one to these conditions, but familial health problems that repeat over generations are highly influenced by a pattern of poor dietary and lifestyle habits. Altering the environmental signals that you send your genes can render familial predispositions to health problems or excess body fat storage virtually irrelevant.

### Familial Genes:

Coded into our familial genes are traits that environment has little to no influence over, such as eye, hair, and skin color; facial features; body shape; and even particulars such as flat feet or distinctive noses. We also have strong familial predispositions for obesity, heart disease, cancer, endurance athletic performance, sprint athletic performance, mathematical aptitude, and so on, as revealed by the incredible diversity among humans across the planet.

### *Homo sapiens* Genes:

We all share the identical genetic code that makes us *Homo sapiens*. The code has been molded by evolution to respond favorably to health-promoting lifestyle behaviors

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taught in the Spartan Method. We all respond negatively to behaviors that are in conflict with the evolutionary model (such as chronic exercise, sugar consumption, and insufficient sleep).

The degree to which you suffer or succeed in an assortment of areas depends on the particulars of your familial genes. Properly conducted sprint workouts promote the release of adaptive hormones that enhance fat metabolism, help tone and build lean muscle tissue, and improve explosive speed in all humans. However, only a select few can develop the ability to run at 27 miles per hour like world record holder Usain Bolt in the 100-meter dash. The goal of primal living is to promote optimal gene expression with respect to the limitations and positive attributes of your familial genes.

## Expression:

While we are most certainly stuck with our eye and hair color from birth, and our adult height can be influenced only slightly through optimal lifestyle behaviors during our growing years, nearly all the gene expression that influences health and longevity can be manipulated and optimized through complementary lifestyle behaviors.

Turn on "good" gene switches and you build muscle, increase fat burning, knock out an invading virus, or neutralize the oxidative damage to cells that characterizes the process of aging and decline. For example, consuming omega-3-rich foods or supplements activates anti-inflammatory genes. Likewise, vitamin D obtained from optimal sun exposure activates the P53 gene, known as the "spellchecker gene" because it helps regulate healthy cell division and prevent cancer. In contrast, smoking deactivates a gene known as the "MTHFR" gene. When this gene is not operating as desired, homocysteine levels in the blood become elevated, which increases the risk for many forms of cancer. Consuming sugar deactivates immune system genes and interferes with the cellular uptake of vitamin C, a consequence that leads to compromised immune function for several hours after consuming a meal high in sugar.

While each human has a complex makeup of genes that is entirely unique, it's important to understand that genes have no effect until they are expressed. For example, Usain Bolt, the fastest sprinter in history, could easily have realized a different destiny as a chicken-nugget-guzzling overweight deejay had he never

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participated in athletics. Similarly, elite endurance athletes are identified by the genetic advantage of being able to process oxygen more efficiently during strenuous exercise. This measurement, known as  $\text{VO}_2$  Max, has been shown to have minimal *trainability*; that is, you cannot improve your quotient very much even through diligent training. So, while an elite endurance athlete with a high  $\text{VO}_2$  Max will respond better to training than someone who is less fortunate genetically, being competitive at any level requires an extensive amount of carefully designed training.

The concept that genes have no effect until they are expressed is particularly relevant to those concerned with familial predispositions toward health problems, because conditions that are strongly associated with lifestyle (obesity, most cancers, heart disease, even arthritis and cognitive disorders) require a continual application of adverse lifestyle behaviors to make these otherwise static familial genetic predispositions a reality.

## Long-Term Health:

The mission of your genes is to promote short-term survival through homeostasis, the synchronistic functioning of all systems in the body. Genes don't know or care whether the signals you give them promote or compromise long-term health. They simply operate as they have been designed to do by evolution, molded by the precise behaviors of our ancestors.

The development of type 2 diabetes, the exhaustion of the insulin-producing mechanism in the body to the extent that insulin injections become necessary to regulate blood sugar, is actually an example of the body doing what it is supposed to do over and over again until it finally becomes exhausted. Excess glucose in the bloodstream is toxic and can become life-threatening in a short time, so pumping out insulin after the consumption of thousands of sodas, cereal bowls, and energy bars over decades is the body's valiant, and desirable, effort to ensure short-term survival. Similarly, the stimulation of the fight-or-flight response is obviously a design feature that promotes short-term survival in the face of life-threatening circumstances by enhancing both physical and mental function. The very common abuse of the fight-or-flight response that occurs due to the unrelenting stress and stimulation of modern life is another example of mismanaging the gifts of our *Homo sapiens* genes

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and compromising long-term health. Furthermore, prescription drugs are designed to manipulate gene expression by overriding natural homeostatic mechanisms to act directly upon various genes associated with the condition being treated. This can generate dramatic short-term results, without accounting for the long-term adverse health implications.

## Reprogramming:

Gene reprogramming is the essence of the Spartan Method: we have a blueprint for healthy living embedded in our *Homo sapiens* genetic code the DNA that resides in every cell of our bodies. This blueprint was created through the magnificent process of human evolution. Our genes expect healthy foods; frequent movement; regular brief, intense strength and sprint efforts; adequate sun exposure, sleep and leisure time, and so forth. When our genes are exposed to these environmental inputs (good food, good workouts, etc.), they respond with health-promoting gene expression. Modern lifestyle behaviors and environmental circumstances that conflict with our primal needs cause the mismanagement of genes and a consequent decline in general health, vitality, and longevity.

Gene expression happens instantly in response to eating a certain meal, conducting a certain workout, or even according to some scientists thinking a certain positive or negative thought. Always, genes respond to environmental stimulus by promoting short-term survival. A hostile thought might elicit the fight-or-flight response, as your body is tricked into thinking that a benign emotional stressor your boss snapping at you in the office is physically life threatening. Similarly, the ingestion of a large amount of carbohydrate will prompt the release of insulin into the bloodstream to help quickly store the excess calories that are not burned for future use.

To promote long-term health, a pattern of primal living that promotes optimal gene expression (over both the short term and the long term) must be followed for at least 21 days (results will vary but many see results this quickly) to solidify the process of gene reprogramming. For example, altering diet to moderate insulin production will up-regulate fat- and keto-burning genes and down-regulate glucose-burning genes. As this pattern is followed, excess body fat can be removed and kept off, daily energy levels regulated (instead of being dependent upon regular carbohydrate feedings), and disease risk factors normalized. Ceasing computer screen use after dark and

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increasing the duration of sleep each night for 21 days will normalize stress hormone levels and optimize immune and cognitive function throughout the day. Over the long term, this pattern will result in less afternoon or evening fatigue, fewer sugar cravings, more reliable evening release of melatonin, and subsequently more ease adhering to optimal sleeping habits.

The rapid effects of gene reprogramming can be observed by considering the blood markers for Metabolic Syndrome, the catch-all term that describes a litany of health problems relating to modern diet and lifestyle practices, most notably excess insulin production from a high-carbohydrate eating pattern. Metabolic Syndrome afflicts one in five Americans and is believed by many medical experts to represent today's number one public health challenge. Physicians use five generally accepted markers for this condition: elevated fasting blood glucose, high blood pressure, excess waistline measurement, high triglycerides, and low HDL. Of the five, four can be manipulated into safe zones in as little as 21 days of diet and exercise modification. Excess body fat around the waistline can also be significantly improved with a little more time, perhaps a few more weeks or a few more months depending on one's starting point. All the rapid changes in blood chemistry and body composition can be maintained long term through primal-aligned eating and lifestyle practices

## Systemic Inflammation:

Systemic inflammation, or chronic inflammation, caused by long-term adverse lifestyle practices such as eating a high-carbohydrate diet, can result in undesirable gene expression and mutation. Inflammation is the body's natural response to harmful environmental stimuli, such as a trauma or infection. The immune system's inflammatory response is a critical component of health and homeostasis. However, this inflammatory response, like the fight-or-flight response, is designed to respond to acute stimuli, not chronic stressors. For example, when we sustain a bee sting, take an elbow to the face in a basketball game, or turn an ankle on a hiking trail, the inflammatory response of tissue swelling in the injured area helps your body quarantine the damage from the trauma to the affected areas. Without the acute inflammatory response, toxins from the traumatized area might run wild through the bloodstream and create a system-wide disturbance. Over the ensuing days, the inflammatory response helps these injuries heal by increasing blood flow to the affected areas, accelerating the removal of toxins, and repairing or regenerating damaged cells.



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When inflammation-promoting environmental stimuli is chronic instead of acute, or occurs throughout the body instead of staying confined to the area of an acute injury, the inflammatory response becomes harmful. This is commonly described as chronic inflammation or systemic (system-wide) inflammation. For example, a high insulin-producing diet has a pro-inflammatory effect on the body. Consuming an excess of pro-inflammatory omega-6 fatty acids (pro-inflammatory properties) and insufficient amounts of anti-inflammatory omega-3 fatty acids (anti-inflammatory effect) also promotes systemic inflammation.

The condition of systemic inflammation results in excessive fluid retention in the cells. This can be reflected in bloating and puffy skin. Consequently, when dietary changes are made to achieve a better inflammatory balance, many experience less cellular fluid retention. This results in significant weight loss and noticeable changes in appearance in the initial weeks of diet modification. According to Dr. Steven Phinney, co-author (with Dr. Jeff Volek) of *The Art and Science of Low Carbohydrate Living* and *The Art and Science of Low Carbohydrate Performance*, a low-carbohydrate, low insulin-producing diet has a proven anti-inflammatory effect that is more potent than that of any known prescription drug.

## Chronic exercise:

Chronic exercise promotes systemic inflammation because the body's stress response is overwhelmed by repeated demands on the natural, desirable inflammatory process that occurs in response to the stimulation of exercise. The acute inflammatory response to a workout is actually desirable, as muscles swell with blood and heat up to perform work efforts with maximum efficiency. The problem comes when the inflammatory response and stress response to exercise is called upon too frequently and/or with insufficient rest between challenging efforts. Such a chronic exercise pattern results in muscles, joints, and entire systems (cardiovascular system, immune system, endocrine system, etc.) becoming chronically inflamed. Without sufficient recovery time to restore and repair cells stressed by excessive workouts, injury, illness, and burnout are likely.

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## Review

Genes that impact health and longevity can be altered by lifestyle behaviors, following the model of our hunter-gatherer ancestors. This counters the conventional wisdom view that genes are mostly fixed heritable traits that you have little influence over. Familial genes result in the tremendous diversity of the human race, such as the example of athletic dominance by specific ancestry. Furthermore, familial predispositions to health problems are relevant when lifestyle behaviors are contrary to optimal gene expression. However, optimizing the expression of *Homo sapiens* genes can render familial predispositions to disease irrelevant. Genes have no effect until they are expressed (e.g., Usain Bolt potential couch potato).

Genes are programmed to support short-term survival through homeostasis. Striving for long-term health requires an understanding of optimal gene expression based on the ancestral example, and of how to reprogram genes through healthy lifestyle changes.

Systemic inflammation occurs when the body is chronically stressed by adverse lifestyle practices, such as high carbohydrate eating patterns, chronic exercise patterns, or insufficient sleep. Unlike acute inflammation, which is a critical element of optimal immune function, systemic inflammation sets the stage for an assortment of health conditions and serious diseases.



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## Acknowledgement

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