Six ways your genetics affect your weight

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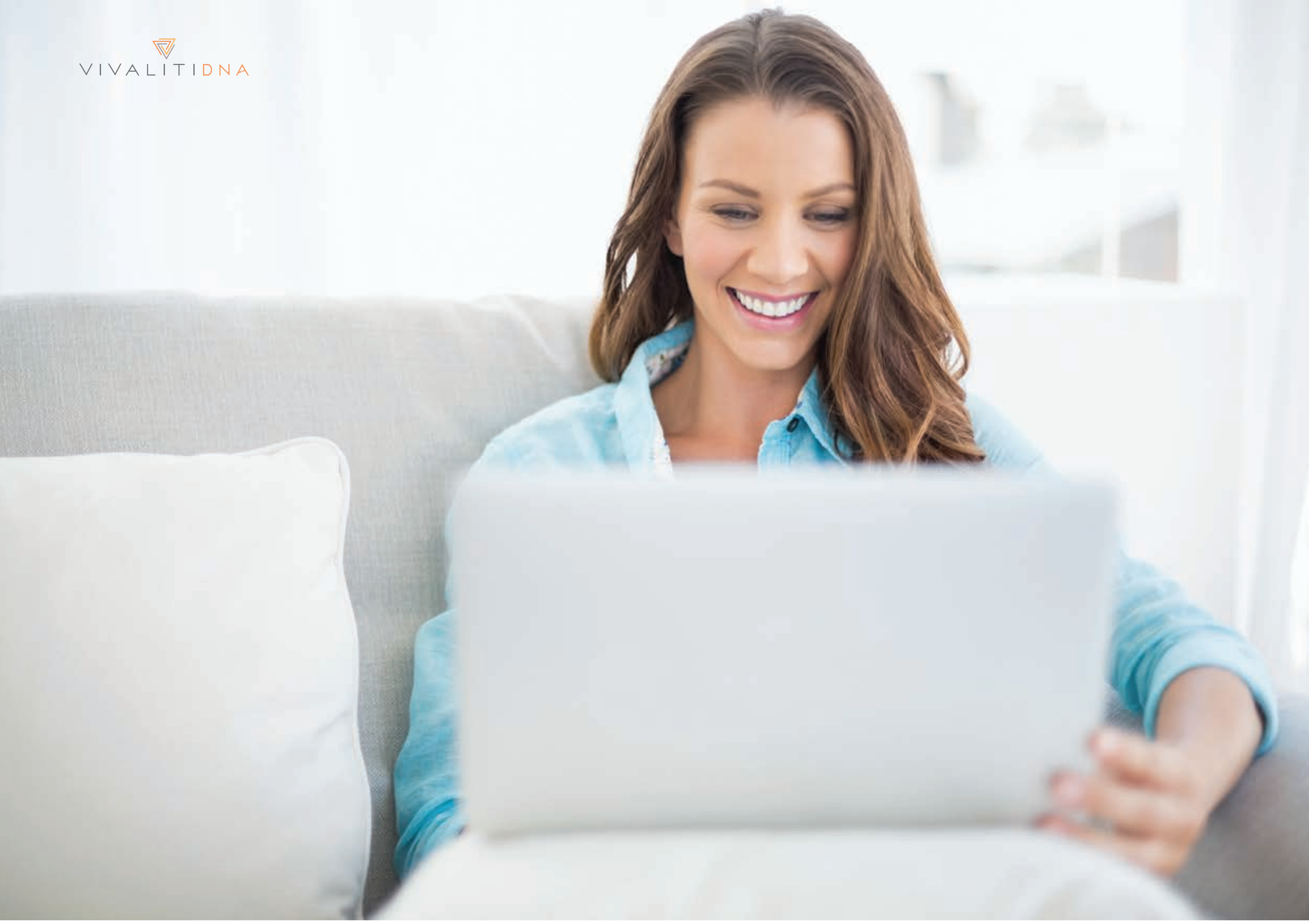

Conventional weight-loss doctrine tells us that losing weight is a matter of energy intake vs. energy expenditure. Simply put, to lose weight, you have to burn more calories than you take in.

However, more and more research is indicating that this approach is an oversimplification of how we use and store energy, which is subject to a number of complex metabolic processes that occur throughout the body. These processes are also heavily influenced by genetics. A wave of recent genetic research, made possible by the Human Genome Project, has identified hundreds of different ways that our genes affect our health – including our ability to lose weight or our propensity to gain it.

In light of this new research, health professionals are beginning to recognize that there is no single approach to health, wellness, or weight loss that works for everyone. Your responses to different foods, exercises, and dietary approaches are in large part determined by different genetic variants that control processes related to hormone production, nutrient absorption, energy metabolism, and other factors.

If you've struggled to lose weight, or tend to regain weight after you've lost it, the answer doesn't necessarily lie in cutting calories or amping up your workout. There may be other factors at play that influence how your body burns energy, how hungry you feel, or even which foods you crave.

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The following are 6 ways that your individual genotype influences your weight.

1. Adiponectin levels

Up to 85 percent of the population carries variants of the ADIPOQ gene that result in lower levels of a hormone called adiponectin. Adiponectin is produced by fat cells and travels through the blood to reach liver and muscle cells, where it initiates processes related to fat burning and glucose utilization. Low levels of adiponectin have been linked to both obesity and type 2 diabetes.

The ADIPOQ gene has several variants, two of which cause cells to produce less adiponectin. One variant results in a roughly 20 percent decrease in adiponectin levels, while another results in a 40 percent decrease. Carriers of these variants are less effective at burning fat and using glucose for energy, leading to an increased risk of weight gain and insulin resistance.

For carriers of these risk variants, avoiding excess calories and choosing low-glycemic foods can help prevent weight gain and improve insulin sensitivity. Regular exercise may also help increase adiponectin levels.

2. Sensitivity to dietary fat

Genes known as the PPAR genes (PPARG, PPARA, and PPARD) help control processes related to how we store and use fat for energy. When we overeat, conversion of excess energy into fat is triggered by a protein called PPARγ, which is produced by the PPARγ gene. This excess fat is stored until it is needed for energy.

Several PPAR variants affect how carriers store and use this excess energy, as well as which types of dietary fat are most beneficial. One PPARG variant is associated with an increased risk of obesity and type 2 diabetes. People with two copies of the variant (one from each parent) are more likely to gain weight on a high-fat diet. Carriers of this risk variant should reduce intake of saturated fat (found in meat, eggs, and dairy products) and focus on healthy sources of polyunsaturated fat, such as walnuts, flax seeds, and fatty fish.

Another PPARG variant leads to a reduced ability to convert food into fat. Carriers of this variant are less likely to gain weight and may benefit from a higher intake of monounsaturated fats, such as those found in avocado, olive oil, and nuts.

Other PPAR variants are associated with high LDL cholesterol, heart failure, and metabolic syndrome. Restricting total fat intake and focusing on healthy fats may help reduce these risks.

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3. Increased hunger

Although scientists have discovered more than 50 genes that influence weight, the FTO gene appears to be chief among them. The FTO gene helps control function of the hypothalamus, an area of the brain that regulates appetite and satiety.

Several FTO variants are associated with a higher BMI and increased risk of obesity. One variation of the FTO gene leads to higher levels of ghrelin, a hormone that triggers hunger. Carriers of this risk variant are more likely to feel hungry again after a meal, eat larger portions, and snack more frequently. The FTO variant also changes the way the brain's reward centers respond to ghrelin and to images of food.

People with the FTO risk variant should exercise regularly, which can help reduce ghrelin and cut their risk of obesity by more than 50 percent. Adopting a genetically appropriate diet can also help individuals with the FTO variant control their weight. People with one FTO risk variant may lose weight more effectively on a low-fat diet, while people with two risk variants may also benefit from higher protein consumption.

Another gene that influences appetite is the MC4R gene, which carries instructions for melanocortin 4 receptor, a protein that influences eating behavior and metabolism. Variants in the MC4R gene are the most common genetic cause of obesity. Twenty-two percent of the population carries a variant of MC4R that causes reduced levels of MC4R protein in the brain. These individuals have been found to experience both increased appetite and decreased satiety. They tend to eat larger portions of food, snack more often, and prefer foods high in fat. Each copy of the MC4R variant increases the risk of obesity by 8 percent.

Preliminary studies of the NMB gene, which is involved in the release of certain neurotransmitters, have also identified a variant that is associated with increased feelings of hunger. After six years, study participants with the NMB variant were found to have gained more than twice as much excess weight as those without the variant.

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4. Food cravings

A variation in the SLC2a2 gene can cause people to crave more sugar. The SLC2a2 gene carries instructions for making a protein known as GLUT2, which is involved in moving glucose into cells. Researchers believe that GLUT2 plays a role in telling the brain when you have consumed enough sugar, and therefore helps trigger a feeling of satiety.

Carriers of the SLC2a2 variant produce a slightly different version of the GLUT2 protein, which has been associated with an increased risk of type 2 diabetes. Individuals with the variant have also been found to consume more sugar, although not necessarily more food overall. This propensity to eat more sweets may stem from a need to consume more sugar in order to feel full.

Eating a diet high in sugar and other simple carbohydrates can lead to obesity, as excess carbohydrates are converted into fat to be stored in the body. However, the same risk has not been observed in natural sugars found in whole fruits. Carriers of the SLC2a2 variant should include plenty of whole fruits in their diet to satisfy their sweet tooth and reduce the risk of type 2 diabetes.

5. Leptin resistance

A variant in the TAS2R38 gene is associated with increased eating disinhibition, or the tendency to eat more than normal, in women. The TAS2R38 influences how sensitive we are to different flavors, and may play a role in which foods we prefer. Individuals with a certain TAS2R38 variant are more sensitive to bitter flavors and may avoid certain bitter-tasting foods.

One study found that female carriers of the TAS2R38 variant had high levels of leptin, a hormone that helps inhibit hunger. But these individuals also displayed increased eating disinhibition, suggesting that they may be resistant to the effects of leptin, and therefore likely to eat more than necessary.

Because leptin is produced by fat cells, people who are overweight tend to have higher levels of leptin in their blood, but despite all of the leptin in their bloodstreams, their brains don't receive the signal to stop eating. The brain also thinks it needs to conserve energy, and slows down the metabolism so that the body burns fewer calories. This leads to a continued cycle of overeating and weight gain.

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6. Exercise response

Your genes also influence how you respond to different types of exercise. In a study, women who carried a variant of the LPL gene lost more body fat following 20 weeks of endurance training. Participants exercised on a stationary bike three times per week, starting with 30 minutes of moderate intensity and working up to 50 minutes. While all participants experienced a significant reduction in body fat, white women with the LPL variant experienced a greater reduction in BMI, fat mass, and percent body fat, and black women with the variant experienced a greater reduction of abdominal visceral fat. The same association was not observed in men.

Understanding your unique genetic traits is the key to adopting habits that work best for your body and help you reach your health goals – whether that means increasing energy, preventing age-related disease, or maintaining a healthy weight. Research shows that people can lose up to 287 percent more excess weight when using a plan that is customized to their individual genetic traits.

Your personalized genetic report from Vivaliti DNA can help you identify the ideal diet, eating habits, and exercises that will allow you to say goodbye to fad diets and trial-and-error weight-loss approaches for good. We analyze more than 80 different genetic markers to give you unprecedented insight into how your body works, and provide actionable steps for combating your most challenging health obstacles.

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