Your Sign In Information

Web Address

https://app.geneticdirection.com/access

Email

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You will be required to set a password
so that you may sign in to the system.

GX slim™ Personal Report

Prepared for: John Doe

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Welcome to Your GxSlim Personal Report

GxSlim Personal Report

March 18, 2020

Congratulations!

You are about to receive insights about your body that, up until now, have never been available. The science of the human body only recently evolved enough to allow scientists to identify and analyze a person's DNA. Your report not only provides you with a road map of your specific genes, but gives direction on how you can potentially optimize your health and well-being with this knowledge.

We spend a lifetime trying to learn more about ourselves, especially how our body works and how our health is affected by our habits and behaviors. Traditionally, we have learned what works and what doesn't through trial and error. But experience alone doesn't always give us the information we need. *Your report will help you to better understand the factors that can affect how your body ticks.*

This report will provide you with results in 4 key areas that can affect the way your body looks and feels. Your report includes an analysis of your genotype for certain key genes that are related to weight management, nutrition and exercise.

What is Genetic Testing?

Genetic testing utilizes a physical specimen from the body (saliva, blood, or other tissues) to reveal information about a person's chromosomes or their genes. In addition to identifying key genes, information is evaluated about areas on each gene that may differ between people. These areas are known as single nucleotide polymorphisms (SNPs). We use the term genotype to describe the outcome of your individual genetic tests.

Which Body Traits Were Analyzed?

To produce your results we look at genes that are related to four major categories: *Weight Loss Tendency, Macronutrients in the Diet, Micronutrients in the Diet and Response to Exercise*. Some of the results are directly related to weight loss efforts from diet and exercise. Other results are relevant because they can affect how you feel and how your body functions optimally. This can affect your performance and your efforts to manage your body weight.

How Are Your Results Determined?

We provide a genetic analysis that indicates which gene combinations you have in each category. You will receive a rating based on our calculated score for each trait in a category. Some categories only have one gene associated with that trait; other categories have several genes associated with that trait. Our calculated score reflects the potential combined influences from one or more genes.

We also provide personalized health tips based on the potential implications of these results. In most cases, the outcomes for a genotype are a response to a specific diet or exercise prescription. For example, many of the results are based on looking at study subjects' response to an exercise program where participants did cardio exercise on only three days per week for a certain amount of time each session. Participants may have differed in their response to this regimen based on their genetics. Some may have had better weight or fat loss results than others. If your results suggest a more unfavorable response, be careful of assuming that this suggests that you cannot lose weight from exercise or from a certain diet. You may simply need a slightly different approach to get more favorable results. In some cases, it is unclear exactly what the ideal approach might be. But we have evaluated your potential genetic response and provided suggestions on how to enhance it based on evidence-based dietary and exercise research recommendations, as well as the experience of our medical team.

Your report uses the best available research on which to base your results. We have established stringent criteria for studies that can be used to help us evaluate the potential impact of your genotype for each gene tested. There are many studies that include genetic analyses, but for a variety of reasons, not all of them are reliable or valid. In determining how to process your genetic analysis, we do not accept just any research that has been performed on a gene. We use the largest and most scientifically valid genome-wide association studies to calculate a score for the different genes or gene combinations. It's important to keep updating the analyses as the science evolves. Your report maintains a continually updated research database, and our analyses are modified as new and better research becomes available. There is still much to learn in the field of genetic analysis. We chose the best available research upon which to base our analysis and recommendations.

Why Is Your Genotype Important?

Your genotype reveals the blueprint for your body. The ratings we provide reflect your genotypes for each gene or set of genes. This shows you your potential response, based on your genetic analysis, to different aspects of body weight management (e.g., how you might be affected by different types of diets and regular exercise.) Keep in mind that if your results show the presence of certain genotypes and your result suggest that you will exhibit either an "enhanced" or "below average" response, for example, this does not mean that the outcome associated with that genotype is definitely how your body will or does react.

Your phenotype is the physical manifestation, or expression, of your genotype. But your phenotype may be different than your genotype—not all the genetic variations seen in an analysis are manifested. That's because **how the genes that you have are expressed is largely affected by your lifestyle and other environmental factors**. While your analysis might show that you have an increased or decreased potential for a certain health trait, it does not mean that you will, in fact, express that trait. Your phenotype for the trait may be different than the genotype the analysis shows.

This is very important to keep in mind because there is a tendency to view genotype results as a definitive diagnosis and to assume that you absolutely have certain traits, when this is not what a genetic analysis measures. The analysis only measures your risk for different outcomes, or the likelihood that your phenotype will express what your genotype predicts. Your results only suggest that there is a greater or lesser chance that you may exhibit certain traits or responses. The fields of nutrigenomics and exercise genomics are new, but growing, areas of research. Much still needs to be known to understand about genes and their interactions with each other, and the role in which other influences such as diet, exercise and the environment play in whether you will express a trait associated with a certain genotype.

That said, results from a genetic analysis may provide insights into how your body might perform optimally. If you have a certain genotype for a specific trait, knowing how it might affect you and adjusting your behaviors to maximize this information could make a difference in getting better results from lifestyle changes such as diet and exercise. *We provide personalized suggestions that may help you achieve the best results from your weight management efforts*. Our team considers the results of your genetic analysis, along with an analysis of personal factors that you report which may also influence your body weight, as well as evidence-based guidelines that suggest the most effective strategies for weight management. All of this information combined is used to determine which lifestyle behavioral changes may be most helpful to you.

What You'll Learn About Your Body

On the following pages, you will see a summary of your results. You'll learn what your genotypes suggest about your tendency to lose weight and body fat in response to different types of diets and exercise programs. You will also gain insights into your potential status for a variety of micronutrients, as well as the likely health effects you may experience from regular exercise. Your analyzed genotype results are followed by a detailed explanation and success strategy. Our medical team has evaluated your potential response and taken in to account what evidence-based research recommendations on diet and exercise suggest are the optimal approach for effective body weight management to provide you with concrete success strategies. This guidance may give you that extra edge in finding the right plan that helps you maximize the results you get from dieting and exercise. While we can't change our genes, we can change our behaviors to take advantage of what our genes say about our bodies.

REPORT SUMMARY

WEIGHT LOSS

Metabolism	BELOW AVERAGE	LEPR, CHRNA3, CRY21
Weight Loss Tendency	BELOW AVERAGE	FTO, TCF7L2, MTNR1B, PPARG, BDNF, ABCB11
Weight Regain	BELOW AVERAGE	FTO, PPARG, BDNF, NEGR1, TMEM18, KTCD15, GNPDA2
Satiety	BELOW AVERAGE	FTO

FOOD

Protein Utilization	ENHANCED	FTO
Fat Utilization	LOW	PPARG, TCF7L2, APOA5, CRY2, MTNR1B, PPM1K
Carb Utilization	LOW	IRS1

FOOD SENSITIVITY

Gluten Sensitivity	LOW	HLA-DQ
Lactose Intolerance	UNLIKELY	MCM6
Caffeine Metabolism	SLOW	AHR, RP11-10017.3-001, ARID3B, CYP1A1
Sweets Preference	ABOVE AVERAGE	FGF21, SLCA2
Bitterness Sensitivity	LIKELY	TAS2R38

NUTRIENTS

Vitamin A Tendency	LOW	BCMO1
Vitamin B6 Tendency	LOW	NBPF3
Vitamin B9 – Folate Tendency	LOW	MTHFR
Vitamin B12 Tendency	NORMAL	FUT2
Vitamin C Tendency	BELOW AVERAGE	SLC23A1
Vitamin D Tendency	LOW	GC, NADSYN1, CYP2R1

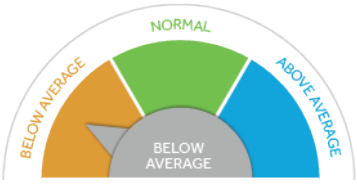
EXERCISE

REPORT SUMMARY

Fat Loss Response To Cardio	ENHANCED	ADRB2, LPL
Fitness Response To Cardio	BELOW AVERAGE	AMPD1, APOE
Body Composition Response To Strength Training	ENHANCED	NRXN3, GNPDA2, LRRN6C, PRKD1, GPRC5B, SLC39A8, FTO, FLJ35779, MAP2K5, QPCTL-GIPR, NEGR1, LRP1B, MTCH2, MTIF3, RPL27A, EC16B, FAIM2, FANCL, ETV5, TFAP2B
Hdl Response To Cardio	ENHANCED	APOE
Insulin Sensitivity Response To Cardio	NORMAL	LIPC
Glucose Response To Cardio	NORMAL	PPARG

METABOLISM

WHAT YOUR GENES SAY ABOUT YOU:



Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a BELOW AVERAGE RMR and to be less metabolically responsive to diet and exercise in terms of burning fat. You are more likely to burn a below average number of calories per day outside of physical activity and your resting metabolism is not likely to change much in response to diet and exercise. That does not mean you are destined to be overweight or unable to lose weight. Having a low RMR predicts weight gain in some studies, but not in others. Also, your genotype is not your phenotype, which is made up of your observable characteristics that are influenced by both your genetic makeup and your environment. It may, however, mean that you need to deliberately expend more energy in your daily life to make up for a lower RMR and to take other measures to boost your resting metabolism.

Your genetic profile indicates you are likely to have a BELOW AVERAGE RMR and to be less metabolically responsive to diet and exercise in terms of burning fat.

You may burn fewer calories at rest than people with other genotypes and be less able to raise your resting metabolism.

SUCCESS STRATEGIES

Metabolism is not just one "thing," but the combination of many processes that your body performs to use the food you eat and the fuel you store to keep you living and breathing and functioning. Your resting metabolic rate (RMR) is how much energy you use (i.e., calories you burn) at rest.

A high resting metabolism has long been regarded as the holy grail for weight loss. We all know (and envy) that person who can seemingly eat whatever they want and not gain an ounce. As you've likely suspected, they have a genotype that predisposes them to burn more calories at rest. As someone born with a genotype that makes you more likely to have a below average resting calorie burn, you may need to be extra vigilant about your diet and exercise habits and to take other measures to bump up your RMR in order to make weight loss easier. The following steps will help accomplish those goals.

RELATED GENES / SNPs

LEPR, CHRNA3, CRY21

The genes and associated SNPs included in this category have been shown to have significant associations with a person's resting metabolic rate (RMR) and how responsive their metabolism is to diet and exercise in terms of burning fat.

Your metabolism comprises all the chemical reactions that act as your body's engine, turning the food you eat into energy to maintain all the bodily functions you need to stay alive. We measure metabolism in terms of calories burned. RMR is the number of calories you burn when doing nothing more strenuous than sitting and watching your favorite shows.

RMR accounts for about 70% of daily calorie burn in sedentary people. It's influenced by your age, body size and composition, and

WEIGHT LOSS

METABOLISM

Know your numbers. The only way to really know your RMR is to have it tested in a special laboratory. But you can use a formula to get a ballpark estimate of your basal metabolic rate or BMR, which is your absolute resting metabolism taken in a dark room upon waking and after fasting. This is a good starting point for understanding your daily resting calorie burn, remembering that your number may be a bit below the figure you reach given your genotype.

Start by using following formula*:

Men	BMR = 88.362 + (13.397 x weight in kg) + (4.799 x height in cm) - (5.677 x age in years)
Women	BMR = 447.593 + (9.247 x weight in kg) + (3.098 x height in cm) - (4.330 x age in years)

* The Harris-Benedict equations revised by Roza and Shizgal in 1984.

Remember, that number represents the calories your body expends for general functioning. You can estimate how many calories you actually burn in a given day by figuring in your activity level. This is important because, as someone with a genetic tendency for a lower RMR, the calories you can burn through activity are 100% in your control.

Little to no exercise	BMR x 1.2
Light exercise (1–3 days per week	BMR x 1.375
Moderate exercise (3–5 days per week)	BMR x 1.55
Heavy exercise (6–7 days per week)	BMR x 1.725
Very heavy exercise (twice per day, extra heavy workouts)	BMR x 1.9

Move at the top of the hour every hour. Nearly everyone sits too much in our highly automated, computer driven world, and sitting is disastrous for your metabolism. When you sit a couple of hours without moving, your body starts to go into energy conservation mode, literally shutting down metabolic functions that keep you healthy. You also store more fat when you're sitting, as opposed to being on your feet. The best way to combat metabolic "sitting disease" is to get up regularly. A study published in the *International Journal of Behavioral Nutrition and Physical Activity* found that people who took six five-minute walks throughout the day—at the top of each hour in this particular study—enjoyed more energy, particularly late in the day, fewer food cravings, and less fatigue than their peers who were sedentary or who took a 30 minute walk in the morning and then sat all day.

gender. As you may have suspected, it's also influenced by your genes, which, depending on your diet, exercise, and lifestyle, can be triggered to influence metabolic factors that ultimately raise or lower your RMR.

In one study of 678 men and women, Canadian researchers found that volunteers with certain genotypes burned about 100 more calories (the amount in about 2 cookies) a day than their peers of different genotypes.

Your genes also can influence how your RMR responds when you diet and/or lose weight. In a large study of 722 overweight adults who were randomly assigned to one of four weight loss diets for two years, researchers found that certain genotypes experienced a 2% increase in RMR, so burned more calories throughout the day, following the intervention.

Your specific genotype also can have an impact on how many calories you burn overnight. One genome-wide association study of 815 children found that certain genetic variants were linked to a 5% to 6% difference in energy burned during sleep.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of BELOW AVERAGE, NORMAL, or ABOVE AVERAGE reflects whether your genotypes included those that carried the likelihood of having a higher RMR and having a metabolism that is responsive to diet and exercise in terms of burning fat.

METABOLISM

Also consider using a standing desk if your job is particularly sedentary. While standing rather than sitting doesn't burn many additional calories—research finds that people who use a standing desk burned only 8 more calories an hour than when they worked sitting down—studies suggest that standing throughout the day is still better for blood sugar control and metabolic health.

Exercise daily, including some "higher gears." Remember, RMR, though important, is only one part of of your metabolism. The energy you use during activity is another—and one you can control. Aim for at least the minimum recommended 30 minutes a day (and yes, you can break it up into those 5 minute chunks) of aerobic activity, which Duke researchers have found burns fat best. Also include some short harder efforts, like sprints during studio cycling classes, which fire up your metabolism and keep it fired up longer than more moderate exercise. Regular exercise not only raises your daily calorie burn, but it may also move the needle on your RMR by making your fat tissue more metabolically active. A 2018 study on mice found that exercise made their white fat (which does little for your metabolism) behave more like metabolically active brown fat, which increases your daily calorie burn.

Build a stronger motor. Muscle tissue uses three times as much energy as fat tissue to sustain itself. That makes it a major driver of your metabolism. As you age, muscle decreases and fat increases, both of which dampen your metabolism. If left unchecked, you can expect to lose as much as 5% of your muscle mass per decade after age 30, according to Harvard Health. The solution is strength training. Practice progressive resistance training (where you make your workouts harder by lifting heavier weights or more sets and reps as you get stronger) two to three days a week. And it's never too late to see benefits. One meta analysis of 49 studies, representing 1,328 adults over the age of 50 found that the average exerciser was able to add 2.4 pounds of metabolism-raising lean body tissue through strength training. Research shows that resistance training also helps you maintain the muscle tissue you want while losing the fat you don't when you're dieting.

Keep the engine fueled. To keep your metabolism humming, you must eat, not starve yourself. Your body burns calories when you eat: it's called the ***thermic effect of feeding,*** which accounts for about 10% of your daily energy expenditure. Also, when you reduce your food intake too severely your body goes into starvation mode and slows down your metabolism to conserve energy. Eating regular meals and occasional healthy snacks prevents this.

Pump up your protein. Protein burns twice as many calories during digestion as fat or carbohydrates. Increasing your protein also helps change weight-regulating hormones such as GLP-1, peptide YY, cholecystokinin, and ghrelin in your favor, so you feel satisfied longer and have fewer cravings. The Recommended Daily Allowance for protein is 0.8 grams per kilogram (1 pound = 2.2 kg) of body weight. To maintain your metabolism and lose weight, Duke Diet and Fitness recommends doubling this amount.

Eat whole "active" foods. The more processed your food, the less work it is for your body to digest, the lower your thermic effect of feeding. Eating whole foods that are rich in fiber and protein can increase your calorie burn by nearly a third.

De-stress. You would think that being stressed out would raise your calorie burn. If we were only so lucky. Ohio State University researchers found that women who were dealing with stressful work or family situations before eating a high-fat meal burned 104 fewer calories afterwards than their non-stressed peers. They also had higher insulin levels, which encourages fat storage, and lower fat burning. Chronic stress could make your metabolism plummet and add up to 11 extra pounds a year, according to the

METABOLISM

researchers' estimates. Try yoga (you'll also get exercise) or another form of relaxation to quell stress.

Respect your sleep. Your metabolism goes into hibernation when you deprive it of sleep. Regularly shortchanging your sleep (especially if you get less than 6 hours a night) wreaks havoc on your energy storage and appetite-controlling hormones, leaving you hungrier and more likely to store rather than burn the calories you eat. Aim for a metabolically healthy 7 to 9 hours of shut eye a night, as recommended by The Sleep Foundation.

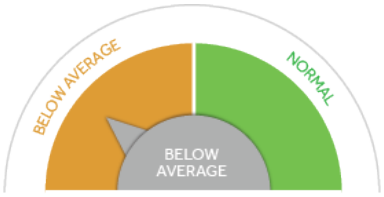
Stoke the flames. There are a few well-known metabolism boosters that you can use to turn up your daily calorie burn. Green tea is one. It contains antioxidant catechins that research suggests can increase your metabolism by about four percent. Caffeine is a natural stimulant, which also raises metabolism by 3 to 11% and promotes fat burning. Just don't overdo it. Four cups (400 milligrams of caffeine) a day is considered safe for most healthy adults, according to the Mayo Clinic.

Go easy on alcohol. Too much booze can throw a wet blanket on your metabolism because your body prioritizes metabolizing alcohol over food, which blunts your fat-burning ability by up to 73% according to some research. If you drink, keep your consumption moderate, which is one drink a day for women, two drinks a day for men.

WEIGHT LOSS TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile is rated BELOW AVERAGE for Weight Loss Tendency. This means that, compared to someone else with a more favorable genotype, you might lose less weight than someone else with a different genotype when you make lifestyle changes by cutting calories in your diet and by burning extra calories when you exercise. This result also suggests that you may be at a slightly higher risk of later regaining the weight you lose compared to someone else with a more favorable genotype.



Your genetic profile indicates that your weight loss tendency is BELOW AVERAGE.

This does not mean that you cannot lose weight for a diet and exercise program. It just means that, compared to other people with a different genotype, you may lose slightly less weight or body fat than those with a more favorable genotype who are following a similar program.

Does this result mean that you cannot lose weight? Absolutely not! Remember that these results only indicate your potential based on genetic factors, but many other factors also affect the outcome. Even if you have the genotypes that may decrease your tendency to lose weight, whether those genes are expressed or not depends upon diet, exercise and environmental influences. However, your results do suggest that it may be a good idea to employ strategies that will maximize your results.

SUCCESS STRATEGIES

Fat loss comes from reducing the number and types of calories you eat and increasing the number of calories that you burn from exercise. The most powerful—and permanent—weight loss comes when you do both. Choose a plan that is most likely to work for you. Following the suggestions from the genetic analysis of your Food and Exercise genes can help you

RELATED GENES / SNPs

FTO, TCF7L2, MTNR1B , PPARG, BDNF, ABCB11, PPARG

The genes and their associated SNPs that are included in this category have all been shown in scientifically sound studies to have statistically significant associations with a person's tendency to lose weight and keep it off. Several large studies have shown that people who participated in intensive and long-term diet and exercise programs exhibited significantly different weight loss responses based upon their genetic profile. Those people who carried the most 'unfavorable' pairs of these 7 genes lost weight with the diet and exercise program—but, on average, they tended to lose less weight compared to other participants who had fewer, or who did not carry the 'unfavorable' genotypes. Also, after completing the diet and exercise program, people with more of the 'unfavorable' genes were, on average, also likely to regain some

WEIGHT LOSS TENDENCY

identify foods and a fitness plan that may make it easier to lose weight. Different approaches work for different people. Here are some diet and exercise tips that may be helpful.

TIPS FOR EFFECTIVE DIETING:

- Choose a plan that you will enjoy and that you will be able to stick to. It should include foods that taste good to you and an approach that fits with your lifestyle.

- Pay attention to influences that make it hard for you to choose the right foods or stick to a diet. For example, if you travel frequently and find it hard to eat well on the road, identify foods you can carry with you and the healthiest fast-food choices you might need to rely on.

- Identify reasons why you didn't stick to past diets. Develop back-up plans so that you aren't derailed from your diet if the same, or similar, circumstances arise again. For example, if you know that you will eat an entire bag of chips or package of cookies if you keep them at home, then take them off your shopping list. But give yourself a back-up snack that you can go to when you are having an I-Need-A-Cookie moment. It might be a nutritious nut energy bar, or simply some fresh blueberries

TIPS TO GET THE GREATEST EXERCISE CALORIE BURN

- If you are trying to burn more calories through exercise, favor the kind of exercise that burns the most calories in the amount of time that you spend exercising. This tends to be cardio workouts like walking, running, cycling, swimming, aerobics, dancing and any of the cardio machines. You can also get a sizable calorie burn from a fast-paced, boot camp-style or circuit training with weights workout. Slower-paced workouts like yoga and Pilates do not burn as many calories, so if you are doing these types of workout on most days of the week, focus on doing more cardio workouts instead.

- Exercise intensity is key for most people: the harder you work during both cardio and muscle conditioning exercise, the more calories you can burn, and the fitter your muscles and heart will become. But if you are a new exerciser, or if you are trying a new type of workout, you'll need to start easy and, over time, work up to workouts that last longer and feel harder. Start with 10-20 minute walking sessions if you need to, and over weeks add more time to the sessions and work at a harder intensity. When lifting weights, start with light weights and as you learn correct form/biomechanics of the exercise, increase resistance, with the goal of using enough resistance that the last 2-3 repetitions of 15-20 reps are challenging.

- For the most effective results, you'll need to burn enough calories to affect your body weight: aim to get in a minimum of 150 minutes and up to 300 minutes per week—or more—of moderate-to-vigorous cardio exercise (e.g., jogging, walking, swimming, etc.). Ideally, you should incorporate some cardio every day, at least 5 days per week.

of the weight that they had lost. Keep in mind, however, that great individual variation is seen in research studies like these. The stated results are an average of all those within a group, but there can still be differences even among those with the same genotype.

Our analysis investigated which genotype for each of these 7 genes was present in your DNA. Your rating of either NORMAL or BELOW AVERAGE reflects whether your genotypes included those that carried a risk of reduced weight loss tendency.

WEIGHT LOSS TENDENCY

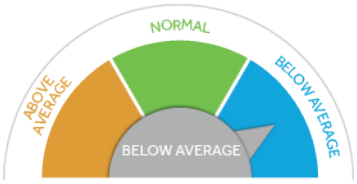
- Weight-training should be a part of your diet and exercise routine. Not only can weight training help you to become stronger, when you lift weights you can prevent or minimize the loss of muscle that occurs with dieting alone. You only need to lift weights 2 or more days per week, with a rest day in between. Sessions can be short: 20-40 minutes, as long as you target all your major muscle groups in the upper and lower body. Make sure that the resistance exercise you do challenges your muscles appropriately. Yoga and Pilates are good for flexibility, balance, muscle endurance, and for building minimal levels of strength. But you are more likely to build and preserve the muscle that you may lose with dieting with a progressive weight-training program.

- Reduce your sitting time! While standing more or moving around throughout the day is not considered 'exercise', the physical activity does add up and can help you burn more calories all day.

WEIGHT REGAIN

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a BELOW AVERAGE likelihood of regaining weight following a weight loss intervention. That's good news, as some researchers estimate that about 80 percent of people regain lost weight and that genetics plays a role. That does not mean you are immune from weight regain, of course. Your genotype is just one of a myriad of factors that influence weight regain. You will still need to have a diet, exercise, and lifestyle maintenance strategy in place to help prevent pounds from creeping back on after you've reached your weight loss goal.



Your genetic profile indicates you are likely to have a BELOW AVERAGE likelihood of regaining weight after experiencing weight loss through a lifestyle intervention

That's good news since keeping weight off is often harder than losing weight, but you should still practice weight maintenance behaviors

SUCCESS STRATEGIES

Weight regain can be the most confounding part of the weight loss process, as the vast majority of people who lose a substantial amount of weight will go on to regain most, if not all of it in the following years. Genetics play a role. As someone whose genotype gives you a below average likelihood of regaining weight, the odds are stacked more in your favor. Of course, genetics is just one factor in the weight regain picture, so you'll still need to take diet, exercise, and lifestyle steps to make sure your hard earned weight loss sticks. It may feel daunting at first, but it gets easier. Surveys find that if you can keep the weight off two to five years, your odds of keeping it off are much higher. The following strategies will help.

Adjust your mindset. The typical weight loss mindset is that you need to do the work to lose weight, and then once you lose weight, you can get back to

RELATED GENES / SNPs

FTO, PPARG, BDNF, NEGR1, TMEM18, KTCD15, GNPDA2

The genes and associated SNPs included in this category have been shown to have significant associations with a person's likelihood to regain weight after lifestyle induced weight loss.

Losing weight is a two-part process. First there's the hard work and dedication to drop the unwanted pounds; then there's what can sometimes be the even harder work and dedication to keep those pounds from coming back. Research shows that approximately 80 percent of people who lose weight will go on to regain it—a phenomenon scientists have been working hard to understand.

What's clear is that the regain isn't due to one singular factor, but rather a confluence of factors. People often slip back into old

WEIGHT LOSS

WEIGHT REGAIN

"normal." It's important to remember that much of what was "normal" is what resulted in the weight gain to begin with. To maintain lost weight, you need to adjust your mindset to embrace the "new normal." That means maintaining the eating, exercising, and lifestyle habits that allowed you to lose weight. That doesn't mean you have to avoid birthday cake for the rest of your life, but it does mean remembering that the new, lighter you is someone who watches portion sizes, eats healthfully most of the time, exercises regularly, and follows the same routines that got you to your weight loss goal.

Keep moving! Exercise is essential for weight maintenance. Based on a growing body of research, the American College of Sports Medicine recommends at least 200 to 300 minutes—about 30 to 45 minutes a day—of exercise a week to prevent regain after losing weight. In one weight loss review, researchers found that members of The National Weight Control Registry who had lost an average of more than 70 pounds and kept it off for more than five years exercised about an hour a day.

Regular exercise doesn't just burn calories, but also appears to help your body adjust your appetite according to your lower body weight. One study found that physical activity appears to make your body more sensitive to leptin, a hormone that helps regulate your body's energy balance by blunting hunger, so you don't have the urge to eat more than you need.

Eat to control your appetite. A groundbreaking study published in the journal Obesity confirmed what frustrated dieters have long suspected: weight loss makes you hungry—like really hungry. The study, which analyzed the relationship between weight loss and energy intake, found that weight loss leads to a proportional increase in appetite. Specifically, people ate about 100 calories more for every two pounds they lost. Exercise helps control your appetite. Smart dietary choices will also help tame your appetite.

eating habits and let their exercise routines slide. Your metabolism may slow following a significant weight loss, making it harder to keep pounds off. **Your appetite may increase as your body tries to find homeostasis**.

Research shows that your genes also play a significant role in weight regain. In one study of 3,234 overweight or obese adults where participants followed an exercise, medication, and/or lifestyle plan to lose 7% of their body weight, researchers identified three SNPs that were associated with weight regain, regardless of the weight loss method used. The researchers concluded that genetic screening could help identify people who require additional support to maintain weight loss after a treatment intervention.

Another large-scale study on nearly 3,900 overweight or obese adults identified SNPs associated with the FTO gene that were strongly related to weight regain. In fact, among those who had successfully lost weight after one year, those with specific risk alleles (variant forms of a gene) for the FTO gene regained about 3 pounds for every risk allele they carried at the four-year follow-up.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of BELOW AVERAGE, NORMAL, or ABOVE AVERAGE reflects whether your genotypes included those that carried the likelihood of regaining weight.

Aim to include fiber-rich veggies in every meal; drink plenty of water throughout the day; opt for complex carbs and healthy fats, and pump up your protein intake. Protein specifically helps control hunger by increasing hormones that help boost satiety and by reducing hormones that increase hunger, so it's easier to keep your food intake in check.

Make muscle. Strength training helps you maintain metabolism-revving muscle while you lose fat. It also helps you keep the weight off by keeping your metabolism humming along. Surveys show that weight lifting is also one of the habits of successful long-term weight loss maintainers. Lift two to three times a week, targeting all your major muscles, to help fend off weight regain.

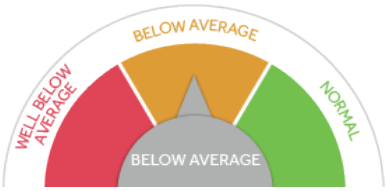
WEIGHT REGAIN

Keep yourself accountable. Nobody loves the bathroom scale, but it is one of your strongest allies for maintaining weight loss. Successful maintainers weigh themselves regularly to keep themselves accountable and prevent pounds from slowly slipping back on. It's one of the top habits of "successful losers" in The National Weight Control Registry. One study found that people who weighed in daily ate nearly 350 fewer calories a day, likely because the weigh-in made them more mindful of their behaviors the rest of the day, than those who stepped on the scale less frequently. Weigh yourself at least weekly, more frequently if you feel you need extra accountability to keep yourself on the right track.

SATIETY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a BELOW AVERAGE satiety response and an increased likelihood of experiencing food cravings. That means your hunger and appetite-regulating hormones ghrelin and leptin may not respond the way they should after you eat and you are less likely to feel full and satisfied following a meal. You also are likely to have higher food cravings. This can make it more challenging to maintain healthy portion sizes, resist second helpings, and to avoid the temptation to snack during the day, all of which can make it tougher to reach your weight loss goals. You may need to take extra steps to improve your satiety and counteract the effects of your genotype.



Your genetic profile indicates you are likely to have a BELOW AVERAGE satiety response and an increased likelihood of food cravings.

This makes it harder to watch your portion sizes and keep your snacking in check. You should take extra steps to improve your satiety and keep hunger and food cravings at bay.

All your life you've likely had people tell you that if you want to lose weight you should just eat when you're hungry and stop when you're full, maybe even before you are completely full. That feeling of fullness that suppresses hunger after a meal is called satiety. We now know that not everyone experiences it the same way, and that it is largely influenced by your genes.

Your genotype is less than favorable for having a normal feeling of fullness after a meal and you are likely to experience food cravings outside of meals and planned snacks. This makes it harder to stick to a nutrition plan and lose weight. You can counteract the effects of your genotype by taking extra measures to improve your satiety and quell cravings.

SUCCESS STRATEGIES

Pump up the protein. Even modest increases in protein can improve your

RELATED GENES / SNPs

FTO

The gene and its associated SNPs included in this category have been shown to have significant associations with a person's satiety, or how likely you are to have difficulty feeling "full" even after eating a meal, as well as how vulnerable you are to having food cravings.

Satiety is triggered by the expansion of your stomach and your "hunger hormones," including leptin, which decreases appetite (also sometimes called the satiety hormone) and ghrelin, which increases it, that are released during digestion and absorption of the food and beverages you take in. All these signals come together in the brain, which then tells you you've had enough to eat.

How well your body produces and responds to satiety signals is also determined by your genes. A number of genes, of which FTO

WEIGHT LOSS

SATIETY

satiety, as it takes longer to digest than other macronutrients and it may help suppress ghrelin after you eat. Aim to include protein in every meal and snack.

Fill up on fiber. Dietary fiber is good for your heart health and it also may help improve satiety by keeping you full longer. Recent animal research suggests that fiber also may act on your brain to suppress appetite. Make it a goal to eat between 25 and 30 grams of fiber a day.

Nosh on high volume, low calorie foods. If it takes more food to make you feel full, fill up on food that is high in nutrition, but low in calories like vegetables and fruits. Filling half your plate with these plant foods will help you feel more satisfied with fewer calories.

Choose your drinks wisely. You might want to skip that pre-dinner cocktail. Alcohol lowers your inhibitions and can act as an appetite stimulant, making it likely that you'll eat more than planned (as well as adds empty calories to your daily intake). Also limit sugary beverages, which are high in calories and less satiating than solid foods.

is most prominent, help regulate satiety. Numerous studies have linked SNPs in the FTO gene with higher food intake, decreased satiety response, and dysfunctional appetite regulation.

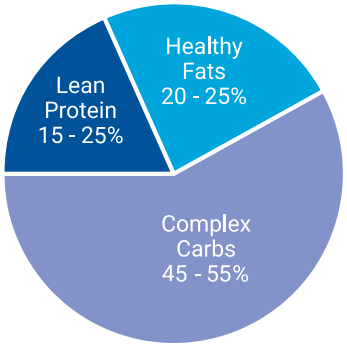
Specifically, research shows that people with one copy of the A allele for this gene have a higher chance of feeling less satiated, having higher ghrelin and lower leptin levels, and having food cravings. Those born with two copies of the A allele have even greater odds of having low satiety and increased cravings.

Unsurprisingly, there's a strong correlation between satiety and weight, and the impact starts early. One study of 2,258 children found that their satiety responsiveness was strongly linked to both BMI and waist circumference. Low satiety is an important avenue through which your genetic predisposition can lead to weight gain and make it harder to lose weight, especially in today's world, where food is everywhere you look.

Our analysis investigated which genotype for FTO was present in your DNA. Your rating of NORMAL, BELOW AVERAGE, or WELL BELOW AVERAGE reflects whether your genotype included those that carried the likelihood of having low satiety and increased food cravings.

SUMMARY

What foods do you need to eat?



Your genotype suggests that you may have a better response to a weight-loss diet if daily calories come from the following proportions of fat, carbohydrates, and protein. You can monitor this with a diet log.

Based on your gender, age, height, current weight and current activity level, we recommend a diet of approximately 1,485 calories per day to lose weight. This number was calculated estimating your total energy expenditure, or the number of calories your body needs each day. Since you are interested in losing weight, you will need to eat fewer calories than your total energy expenditure. We suggest a modest calorie reduction of 20 percent. We have calculated this reduction into our calorie recommendation for you, so if you eat around 1,485 calories per day, you can expect to lose weight. This is not a drastic calorie reduction, so you should not feel hungry or like you are denying yourself food if you eat this many calories.

The amount of exercise you get can change your energy requirements. Therefore, you may need to eat more calories than this is if you are performing 45 minutes or more of moderate-to-high intensity cardio exercise on a daily basis.

RECOMMENDATION	PERCENT	GRAMS	CALORIES
PROTEIN Choose a reduced-calorie diet that is between 15-25% protein. Get your protein from mostly plant food sources such as beans, legumes, nuts, seeds,whole grains and vegetables.	15% to 25%	56g to 93g	223 to 371
FAT Choose a diet low in fat and saturated fat. Get your fats mostly from plant foods, but avoid excess added oils.	20% to 25%	33g to 41g	297 to 371
CARBOHYDRATES You can lose weight on a reduced calorie diet that is either moderate or low in carbs. Choose complex carbs for more nutrients (veggies, beans, whole grains, etc.) and avoid simple or processed carbs (fries, chips, crackers, etc.).	45% to 55%	167g to 204g	668 to 817

The total number of calories or grams of each macronutrient shown represent a recommended amount to consume each day.

It's tough to keep track of this simply by reading food labels. That's because most foods contain a combination of the macronutrients. A food item usually contains either protein and fat (such as meat), carbohydrates and fat (such as oil-sauteed vegetables or French fries), or protein, carbohydrates and fat (beans, nuts and seeds, a chicken salad or a hamburger with a bun).

It’s not easy to know how much of any one macronutrient you are getting or if you are achieving your macronutrient goals simply

SUMMARY

by looking up the content of one food item. To determine your percentages of macronutrients, such as the fat or protein content of ALL the foods you eat in a day, you'll need to use a dietary app or online food log. You input what you eat and it will assess your overall macronutrient breakdown at the end of each day. We provide you with sample menus that can give you an idea of what a menu with your recommended macronutrient ranges will look like. But the only way to really know if you are reaching the suggested ranges for each macronutrient is to keep track by entering what you eat into a food log online or on an app.

PROTEIN UTILIZATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits an ENHANCED utilization of protein. Your score reflects the fact that your genotype does include the allele combination that resulted in greater weight loss when a higher percentage of protein was eaten on a diet. Studies that investigated this genotype found that a diet consisting of 25% or more of protein resulted in optimal weight loss. This suggests that the amount of weight or body fat that you lose from a diet is very likely to be affected by the percentage of protein you eat..

Your genetic profile indicates that your response is ENHANCED.

This indicates that you may lose more weight from dieting if you eat a moderate-to-high percentage of protein. Aim for 25% to 30% of your total calories to come from plant or animal-based protein.

This genotype also resulted in the loss of more lean body mass from dieting compared to those without this genotype. Lifting weights during dieting is an effective way to minimize or prevent the loss of muscle that can occur with weight loss.

SUCCESS STRATEGIES

Consuming a diet that is moderate-to-high in protein when you diet may help you to optimize your weight loss. Since you have a higher risk of losing muscle mass when you lose weight, it is important to include regular resistance training during your weight loss period.

RELATED GENES / SNPs

FTO, LCT

The gene and associated SNPs included in this category has consistently been shown to be associated with body fat mass and BMI. One large study found that people with the unfavorable genotype who dieted lost more weight, body fat and fat in the torso if they ate a moderate-to-high protein diet (25% or more of total daily calories) compared to a lower protein diet (15% of total daily calories), regardless of fat and carbohydrate distribution. However, they also lost more non-fat mass — which includes muscle — with the weight loss, even though they were eating a higher protein diet and exercising.

Our analysis of your genes investigated which genotype for this SNP was present in your DNA. Your rating of either NORMAL or ENHANCED reflects whether your genotype included those alleles that exhibited protein sensitivity because their presence resulted in increased weight and fat loss on a moderate-to-high protein, reduced calorie diet.

PROTEIN UTILIZATION

DIET

The body needs a certain minimum amount of protein to meet its needs to produce muscle, hormones, enzymes, skin and for other functions. The recommended daily allowance for protein is determined based on your body weight. On average, the recommendation is to obtain between 0.8 and 1 gram of protein per 1 kilogram of body weight. If you weigh 175 lbs, or 80 kg, it is recommended that you get between 64 and 80 grams of protein per day. That means if you eat 2,500 calories daily while on a normal food plan, you can get this amount by eating between 10% and 13% protein in your diet. But if you go on a calorie-reduced diet and consume only 1,500 calories, to reach your quota, you may need to eat a slightly higher percentage of protein, around 17% to 21% protein. Your genotype suggests that, while dieting, you may benefit from an even higher percentage of protein – from 25% to 30%.

Protein in your foods should contain all of the essential amino acids. Animal foods contain all of the essential amino acids in one food item, such as meat, fish or dairy products. You can also obtain all of the essential amino acids in many single plant foods, including grains such as quinoa, seeds such as shelled hemp hearts (hemp seeds), and beans such as edamame or tofu. Or you can consume several complementary plant foods in the same day and obtain the essential amino acids that your body needs (brown rice and black beans; nuts, grains and beans; veggies, beans and grains, etc.)

If your genetic profile suggests you should reduce your intake of total fat or saturated fat, choose leaner versions of animal foods or plant-based protein foods.

To track the percentage of protein you get, record your food intake for at least a week and enter it into a diet app or online nutrition log that can calculate the percentage of each of the macronutrients that you eat.

EXERCISE

Since this SNP is also associated with reduced non-fat mass from dieting, which can include the loss of muscle, it is recommended that you include progressive resistance training using heavier weights in the exercise plan that you follow while you are dieting. This may help minimize or prevent the loss of lean body *mass.*

Study your results from the genetic analysis for your exercise-related genes for a more specific exercise prescription. But for optimal muscle strengthening, you should perform exercises with weights targeting your major muscle groups.

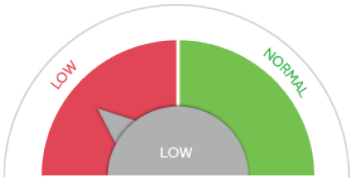
SUGGESTED PROTEINS

suggested servings contain listed grams of protein

Chicken Breast (3oz) - 25g
Ground Turkey (3oz) - 22.5g
Lean Beef (3oz) - 22g
Broiled Fish (3oz) - 20g
Lentils/Black Beans (1/2c) - 9g
Turkey (3oz) - 24g
Pork/Lean Ham (3oz) - 18g
Lamb (3oz) - 21g
Quinoa (1/2c) - 12g
Tofu (1/2c - 4.4oz) - 11g

FAT UTILIZATION

WHAT YOUR GENES SAY ABOUT YOU:



Our analysis indicates that your genetic profile exhibits a LOW utilization of fat. Your score reflects the fact that for the genes investigated, your genotype includes some of the unfavorable allele combinations. This means that you may be sensitive to the amount and type of fat in your diet. Research has shown that people with a similar genotype profile tend to have more body fat when they have more fat in their diet and they lose less weight when they are on a diet that contains a high amount of fat, especially saturated fat. This result also suggests that you may have a reduced level of fat oxidation, or fat-burning ability, when you eat a high fat diet.

Your genetic profile indicates that your utilization of fat is LOW.

You may be sensitive to too much total fat and/or too much saturated fat in your diet. If you are dieting, or reducing calories to create a negative energy balance, you may experience less weight loss with a higher fat diet. Aim for a low total fat and low saturated fat, reduced-calorie diet.

SUCCESS STRATEGIES

Since your genes suggest that you may be sensitive to the fat in your diet and that you may be less efficient at burning fat when you eat a high fat diet, following a low fat diet and keeping saturated fat to a minimum may help you to control your body weight and body fat, and to lose more weight when you diet.

RELATED GENES / SNPs

PPARG, TCF7L2, APOA5, CRY2, MTNR1B , PPM1K

The six genes and their associated SNPs that are included in this category all have been shown in scientifically sound studies to have statistically significant associations with how sensitive people are to eating a diet high in fat. In other words, these studies showed that the amount of fat in the diet affected how much weight individuals lost from a lifestyle intervention depending on the genotype at these genes. One study found that those people with an unfavorable genotype were more likely to have more body fat, a larger waist size and a higher BMI the more fat they ate, compared to others without the same genotypes. Another study found that people with a protective genotype appeared to be able to consume greater amounts of fat, but without exhibiting higher BMIs. Another study found that people who went on a low-calorie diet that was higher in fat lost less weight if they had an unfavorable

FAT UTILIZATION

genotype. Our analysis of your genes investigated which genotype for each of these 6 genes was present in your DNA. Your rating of either NORMAL or LOW reflects whether your genotypes included those that carried a risk of reduced weight loss ability from a diet that was high in fat.

SO HOW MUCH FAT SHOULD YOU EAT?

There are varying definitions of what is considered "low fat." Studies that look at dietary fat vary in how they quantify fat and there is no clear consensus on what constitutes a "high fat" vs. a "low fat" diet. The Acceptable Macronutrient Distribution Range (AMDR) for dietary fat that is recommended by the Institute of Medicine is a daily fat intake that is between 20% and 35% of total daily calories and it is recommended to eat less than 10% of calories from saturated fats.

A "high fat" diet is usually considered to be one consisting of a percentage of fat intake on the upper end of the AMDR range, so from 30% to 40% of the day's total calories. People who eat a lot of fast food and animal foods like meat and cheese can have fat intakes that are 50% or greater. However, some people who choose to eat a very low carb diet may consume up to 60% or 70% fat.

A "low fat" diet is usually considered to be one consisting of a percentage of fat intake that is on the lower end of the AMDR range, so from 15% to 25% of the day's total calories.

Since your genetic profile indicates that you might benefit from a lower-fat diet, it is suggested that you aim for the lower end of the fat intake range, so from 20% to 25% of total calories coming from fat, and very little saturated fat.

Although some media reports have recently reported that high amounts of saturated fat are not harmful, these opinions are based on only a few research studies that have been criticized for having major flaws. Among them is the fact that the "low fat" diets that were compared with higher fat diets weren't really "low fat" and there was, in fact, not much of a difference in the fat percentage of the diets. The overwhelming consensus from research to date is that saturated fat has deleterious health effects and should be consumed sparingly, less than 10% of total calories or lower.

Certain foods are labeled as high in certain kinds of fat, but what many people do not realize is that foods that contain fat tend to contain an array of all of the different types of fatty acids. One food item like cheese, chicken or a peanut will contain both saturated and the unsaturated types of fat (mono and poly.) But each food will be higher in a certain type over another, and ratios of the varying fats within a food will vary. Whichever fat is considered to be the most prevalent type is how a food is usually characterized. Even though all animal foods contain both saturated and unsaturated fats, since they are especially high in saturated fats, they are considered to be a major source of both total fat and especially saturated fat, even in the "leaner" versions of the food. This is why if you tend to eat meat and/or dairy foods at every meal, your diet is likely to not only be high in total fat, but high in saturated fat, as well. Diets high in either saturated fat or animal foods have been associated with higher risks of certain diseases such as heart disease.

It's tough to know how much fat you get unless you are actively tracking what you eat and entering it into a diet app or online nutrition log. You might find it helpful to first determine how much fat you are currently eating so that you can identify ways to decrease it to desired levels if it is too high.

FAT UTILIZATION

If you are eating more fat than is recommended, analyze what you eat and use the tips below to reduce the fat.

EASY WAYS TO REDUCE YOUR TOTAL FAT:

- Stick to a plant-based diet: Eat fewer animal foods (meat, poultry and dairy foods).
- If you eat animal foods, choose leaner or lower-fat versions.
- Substitute plant versions of animal foods: Try almond, soy or coconut-based yogurts, substitute plant milks (soy, almond, rice, etc.) for dairy milk.
- Identify foods you prepare that you normally add fat to (oil, butter, cream, cheese, meat) and try to find a non-fat substitute. For example, if you normally add oil and bacon to cooked beans, skip both and add red peppers and jalapenos for flavor instead. Or if you butter your toast, spread with a bean dip instead. Sauté vegetables in vegetable broth rather than in olive oil.
- Reduce the amount of oil you use, or omit it completely.

TO REDUCE SATURATED FAT:

- Try vegan cheeses (such as nut cheeses made from cashews, almonds or macadamia nuts), but control portions since they still contain unsaturated fats.
- Use healthy oils (sunflower, safflower, coconut) instead of butter or cream for cooking or seasoning, but control portions since they still contain unsaturated fats and can add to your daily total fat intake.
- Choose plant-based spreads instead of using butter. Use peanut butter, hummus, pesto sauce, avocado, etc. Watch portions, since the unsaturated fats can still add to your total fat intake.

SUGGESTED FATS

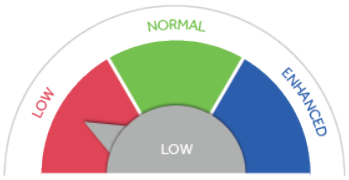
suggested servings contain listed grams of fat

Avocado (1/2 fruit) - 10g
Coconut Oil (1T) - 14g
Olive Oil (1T) - 14g
Nut Butters (1T) - 8g
Coconut (1 piece, 2" x 2" x 1/2") - 15g
Olives (1T) - .9g
Nuts/Seeds (1/4c) - 13g
Butter (1T) - 12g
Oils (1T) - 14g

CARB UTILIZATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a LOW utilization of complex carbohydrates. Your score reflects the fact that your genotype appears to favor a lower carbohydrate diet. You may experience better weight loss results from a diet that focuses on eating protein, healthy fats, and vegetables, while limiting foods high in carbohydrates.



Your genetic profile indicates that your utilization of complex carbohydrates is LOW.

This suggests that you may experience the best weight loss results if you follow a diet that is lower in carbohydrates. This means that you should focus on including more lean protein, healthy fats, and vegetables, while limiting carbohydrate-rich foods.

SUCCESS STRATEGIES

Eat more complex carbohydrates

You still need carbohydrates, but because your genetic profile indicates that your utilization of carbohydrates is low, it's important to not overdo them in your daily diet, as it will make it more difficult to lose weight. Skew your diet more heavily on lean protein and healthy fat.

Steer completely clear of processed, "junky" carbs like potato chips, crackers and snack foods, and limit other high-carb foods like fruit juices, breads, cereals, and baked goods. Strive to eat whole plant foods like vegetables as your primary source of complex carbohydrates.

Eat most of your complex carbohydrates from non-starchy vegetables like asparagus, broccoli, greens, peppers, and others on the Preferred Vegetable list. When eating carb-rich starchy vegetables and fruits, choose those that are high in fiber and nutrients such as beans, peas, squash, apples, berries,

RELATED GENES / SNPs

IRS1, FGF21

The gene and associated SNPs included in this category has been shown to be associated with a person's insulin sensitivity and the potential effects of the amount of carbohydrates and fat in the diet. Insulin is a hormone released by the body that helps cells take in glucose, or sugar, for energy. Glucose is present in the blood after the digestion of carbohydrates from foods like fruit, vegetables, legumes and grains. Insulin is also released in response to eating protein as it helps to shuttle amino acids into cells, as well.

Our body relies on glucose, and this is why blood sugar levels are maintained within a consistent range. In fact, brain cells and red blood cells use glucose as their primary source of energy. Cells also use fat as a fuel source, but to metabolize fat, there must be some glucose present to complete the process. Glucose is a very important nutrient.

But sometimes cells do not respond to the

CARB UTILIZATION

and other foods on the Preferred Legumes, Preferred Starchy Vegetables, and Preferred Fruits list. Limit most grains, choosing from protein and fiber rich varieties such as quinoa, kamut, and oats.

Use the glycemic index (GI) as a tool to help choose foods. The glycemic index is a rating assigned to foods that contain carbohydrates that reflects their potential effects on blood glucose levels. The higher the GI number, the faster a food may be digested and absorbed, potentially resulting in higher blood glucose levels and greater insulin release. However, there is great inter-individual variation in tested foods and in people's responses, so a food's stated GI value may vary. Also, other factors affect a GI number, including the other foods that will be eaten at the same meal.

Foods high in carbohydrates that are more processed may have higher GI numbers. So this tool may help you identify foods that may be more or less processed and this may help you make more nutritious food choices. Some people believe that choosing low glycemic foods can aid weight loss, but there is no evidence that glycemic index affects body weight. How many calories you consume, no matter the type, is the best predictor of weight loss: the fewer you eat, the more weight you will lose.

SUGGESTED CARBOHYDRATES

Preferred Vegetables - 1 1/2 cups raw or cooked contains 15g of carbohydrates

Artichoke
Asparagus
Bean sprouts
Beans (green, wax, Italian)
Beets
Broccoli
Brussels sprouts
Cabbage
Carrots
Cauliflower
Celery
Cucumber
Eggplant
Green onions or scallions
Greens (collard, kale, mustard, turnip)
Kohlrabi
Leeks
Mixed vegetables (no corn or peas)
Mushrooms
Okra
Onions
Pea pods
Peppers
Radishes
Salad greens
Sauerkraut
Spinach

insulin being released, a condition known as insulin resistance. The result is the bloodstream can be overloaded with glucose. Chronic high blood glucose levels can lead to diabetes, or uncontrolled high blood sugar. People who are overweight and/or physically inactive are at higher risk of insulin resistance.

Since carbohydrate intake triggers insulin release, many people assume that eating more carbs is not healthy and can lead to body fat and weight gain, as well as diabetes. But the relationship is not that simple: many people who eat a high carbohydrate diet are not overweight and do not have diabetes, and, in fact, may have much lower levels of blood glucose. Several large epidemiological studies have shown that increased carb intake actually leads to a lower risk of diabetes and that, surprisingly, increased protein intake, increases the diabetes risk.

The type of carbs you eat play a role: If you eat mostly processed carbs, you are likely to release greater amounts of insulin and this could affect your insulin resistance.

The IRS1 gene in this category seems to influence insulin resistance and the body's response to carbs in the diet. One long term study found that people with a variant of this gene who ate a high carbohydrate, lower fat diet that consisted of high fiber, whole plant foods, as opposed to processed, lower fiber carbs, had greater insulin sensitivity—and lower levels of insulin and insulin resistance—and experienced greater weight loss compared to eating a lower carb, higher fat diet.

Research also finds that variations of the FGF21 gene, which helps regulate carbohydrate intake and metabolism, influence how people lose weight in response to a high or low carbohydrate diet, with

CARB UTILIZATION

certain genotypes having a larger reduction in weight with a low carbohydrate diet and a lesser reduction in weight with a high carbohydrate diet.

Our analysis of your genes investigated which genotype for this gene was present in your DNA. Your rating of either LOW NORMAL or ENHANCED reflects whether your genotype included those genes that increase risk of reduced weight loss ability from a low carb, higher fat diet, , or if your genotype included those genes that responded more favorably to a lower carb diet.

SUGGESTED CARBOHYDRATES CONT.

Summer squash

Tomato (canned, sauce, juice)

Turnips

Water chestnuts

Watercress

Zucchini

Preferred Legumes (Beans) - 1/2 cup contains 15g of carbohydrates

Garbanzo/Chickpeas

Pinto beans

Northern beans

Fava/Broad beans

Kidney beans

White beans

Black beans

Split peas

Black-eyed peas

Lentils

Edamame beans

Navy beans

Mung

Preferred Starchy Vegetables - suggested serving size contains 15g of carbohydrates

Peas, green (1/2 c)

Red/New Potato, baked or boiled, 1 small (3 oz)

Yam, sweet potato, plain (1/2 c)

Squash, winter - acorn, butternut (1 c)

Preferred Fruits - suggested serving size contains 15g of carbohydrates

Apple, unpeeled, 1 small (4 oz)

Apricots, fresh, 4 whole (5 1/2 oz)

Banana, small 1 (4 oz) Blackberries (3/4 c)

Blueberries (3/4 c)

Cantaloupe, small (1/3 melon or 1 c cubes)

Cherries, sweet, 12 fresh (3 oz)

Grapefruit, 1/2 large (11 oz)

Grapes, 17 small (3 oz)

Honeydew, 1 slice (10 oz or 1 c cubes)

Kiwi, one (3 1/2 oz)

Mango, small, 1/2 fruit (5 1/2 oz or 1/2 c)

Nectarine, 1 small (5 oz.)

Orange, 1 small (6 1/2 oz)

Papaya, 1/2 fruit (8 oz or 1 c cubes)

Peach, fresh, 1 medium (6 oz)

Pear, fresh, 1/2 large (4 oz)

Pineapple, fresh 3/4 c

Plums, 2 small (5 oz)

Raisins (2 T)

Raspberries (1 c)

Strawberries, whole berries (1 1/4c)

Tangerines, 2 small (8 oz)

Watermelon, 1 slice (13 1/2 oz or 1 1/4 c cubes)

Preferred Grains - 1/2 cup contains listed grams of carbohydrates

Couscous - 15g

Kamut - 26g

Quinoa - 28g

Barley - 22g

Oats - 15g

Amaranth - 23g

PROCESSED/LESS DESIRABLE CARBOHYDRATES

Less Desirable Starchy Vegetables

Mixed vegetables with corn or peas

Corn on the cob

Corn

Less Desirable Grains

Bread

Bagel

Pancake/Waffle

Cereal

Crackers

Rice

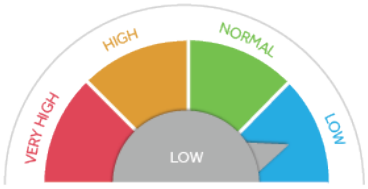
Pasta

FOOD SENSITIVITY

GLUTEN SENSITIVITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a LOW likelihood of having or developing gluten sensitivity. That means you're at a lower than average risk for becoming over-reactive to gluten, a protein found in rye, barley, and wheat. That overreaction can cause gas or bloating, joint inflammation, fatigue, mood changes, and in extreme cases an autoimmune inflammatory reaction that causes intestinal damage and nutritional deficiencies. Generally speaking, gluten sensitivity is fairly uncommon. About 1 percent of the population worldwide and 3 million Americans have celiac disease, the most extreme form of gluten sensitivity. About one in 20 people have a negative reaction, such as GI distress, to foods with gluten, but not an inflammatory response. Your LOW risk genotype means you are very unlikely to have or develop gluten sensitivity.



Your genetic profile indicates that you are likely to have a LOW risk for gluten sensitivity.

That means you are not at risk for having trouble digesting or tolerating gluten, a protein found in wheat, barley, or rye is low. If you do notice GI distress from eating these foods, your doctor can test for gluten sensitivity.

Gluten sensitivity is triggered in genetically susceptible individuals by exposure to dietary gluten from wheat, barley, or rye. Gluten is used in dough for bread, pasta, pastries, and other baked goods, as well as in less obvious food products like a thickener for soups and sauces. It is also found in many beers.

About 1 in 100 people have celiac disease, which is an autoimmune condition that triggers a harmful inflammatory reaction when gluten is consumed. Other, less severe gluten sensitivities, where people have a negative reaction, such as GI distress, but not an inflammatory response to foods with gluten, are somewhat more common.

RELATED GENES / SNPs

HLA-DQ

The genes and their associated SNPs that are included in this category have been shown in studies to have significant associations with developing problems with gluten.

Gluten sensitivity means you have trouble digesting gluten, the protein found in wheat, rye, and barley that acts like glue, providing the elastic texture to dough.

The most extreme form of gluten sensitivity is celiac disease, a heritable autoimmune disorder that triggers an inflammatory response that damages the intestines and causes GI distress, blistering rashes, and, overtime, can lead to nutritional deficiencies, fatigue, and depression when gluten is consumed.

FOOD SENSITIVITY

GLUTEN SENSITIVITY

SUCCESS STRATEGIES

As someone with a low-risk genotype, you are unlikely to develop gluten sensitivity, but it is a good idea to know the signs and the actions to take should it occur.

Know the symptoms. Some of the symptoms of gluten sensitivity are fairly straightforward: you get an upset stomach, gas, bloating, and diarrhea when you eat gluten-rich foods. The others are less obvious. Symptoms may include:

Diarrhea and/or constipation
Bloating and gas
Abdominal pain
Nausea/Vomiting
Itchy, blistery rash
Fatigue
Depression
Anemia
Joint and muscle pain
Headaches

See your doctor. If you suspect you have gluten sensitivity of any type, see your doctor for a definitive diagnosis. Blood tests and endoscopies can diagnose celiac disease, which is the most extreme form of sensitivity. There is no definitive test for other sensitivities, but your doctor will help you perform a trial and error elimination diet, where you remove and add-back certain foods to see which ones alleviate your symptoms and which ones make them worse.

Choose processed "gluten-free" foods wisely. There's no reason to go gluten-free if you do not have any gluten sensitivity. Some people choose to do so because gluten-free eating has become somewhat of a health food trend among people who believe it will help with weight loss and other issues. While eating more fresh, unprocessed foods, which are naturally gluten-free, is beneficial for your health, gluten-free foods by themselves are not necessarily better for you. In fact, many packaged gluten-free foods, especially baked goods, are higher in sugar, fat, and sodium to improve the flavor and texture after the gluten is removed. A gluten-free cookie is still a cookie. So if you choose to reduce or eliminate gluten, do so wisely.

People can also have varying degrees of gluten sensitivity, which can cause stomach upset, GI issues, rashes, and fatigue without intestinal damage. Though less understood, gluten sensitivity also appears to have a genetic connection.

Gluten sensitivity is linked to the human leukocyte antigen (HLA) genes, specifically the HLA-DQ family, which includes various types and subtypes ranging from HLA-DQ1 through HLA-DQ9. Everyone inherits two HLA-DQ genes, one from their mother and one from their father, so there are many possible inherited combinations.

Of all the types, HLA-DQ2 and HLA-DQ8 appear in about 30 percent of the population and are the most closely linked to gluten sensitivity. Carrying one or both increases your risk for celiac disease, but does not necessarily mean you will develop gluten sensitivity or the autoimmune disorder, though carrying neither dramatically lowers your risk.

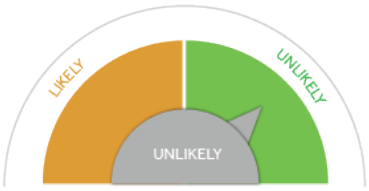
People possessing the haplotype (a group of alleles) DQ2.5 have significantly elevated risk for gluten sensitivity. Research on DNA from more than 10,100 people in the U.S. concluded that those carrying two DQ2.5 haplotypes had the highest risk.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of VERY HIGH, HIGH, NORMAL, or LOW reflects whether your genotype includes those that carry the likelihood of having or developing gluten sensitivity.

LACTOSE INTOLERANCE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you UNLIKELY to be or become lactose intolerant. That means you should be able to continue to consume dairy products and digest lactose. That's good news because your diet is less restricted and dairy products are a major source of bone and muscle maintaining calcium and vitamin D in the U.S. diet.



Our analysis indicates that your genetic profile exhibits characteristics that make you UNLIKELY to be or become lactose intolerant.

The National Osteoporosis Foundation says adults need 1,000 to 1,200 mg of calcium a day and 800 to 1,000 IUs of vitamin D a day to maintain good bone integrity. You can get those essential nutrients by eating the recommended 3 servings of dairy products a day. If you don't like milk or eat little dairy, you can maintain your bone, muscle and general health by getting these nutrients from alternative food sources.

SUCCESS STRATEGIES

Being able to tolerate lactose doesn't mean you love milk. You can get the dairy-based nutrients you need from yogurt (live cultured is best), cheese and fortified milk alternatives such as soy and almond milk (which is actually richer in calcium than dairy milk).

Eat a variety of calcium and vitamin D rich foods. Eating a wide variety of foods rich in vitamin D and calcium will not only ensure you get enough of those essential nutrients but also other antioxidants and healthy fats as well. Other good sources include canned sardines and wild caught salmon.

If you tan easily and have darker skin, you may need to consume higher levels

RELATED GENES / SNPs

MCM6

This gene and associated SNPs included in this category have been shown to have significant associations with a person's likelihood of being intolerant to the milk sugar lactose.

Lactose intolerance occurs when the small intestine does not make enough of an enzyme called lactase that you use to digest lactose. As lactose passes through the large intestine without being properly broken down and digested, it can cause a host of uncomfortable GI symptoms including gas, bloating, belly pain and diarrhea.

Lactose intolerance is one of the most common inherited conditions in the world, with about 65 percent of the human population experiencing a reduced ability to digest lactose during the course of their lives. It occurs far more often in people of Asian, African, South American and Native American descent than it does among Caucasians of European descent,

FOOD SENSITIVITY

LACTOSE INTOLERANCE

of vitamin D since darker skinned people become protected by the sun when they become tan, therefore are less likely to absorb the amount of vitamin D needed for optimal health.

among whom only about 15 percent of the population experiences the condition. Severity of symptoms varies from person to person. Some with lactose intolerance can take in small amounts, such as 12 grams of lactose (the amount in a cup of milk) with minimal symptoms, while others need to avoid it entirely.

If you currently have lactose intolerance, chances are you know it. If you do not, it doesn't mean you won't develop it sometime in your lifetime. The condition tends to develop over time as lactase activity declines and becomes obvious by teen or early adult years. Some people, however, develop late-onset lactose intolerance, which can show up during your 40s or beyond. In Caucasians (but not other races where lactose intolerance is more common), certain variations of MCM6 are strongly linked to either being lactase persistent, meaning your lactase activity is maintained and you can digest lactose throughout adulthood, or developing lactose intolerance. In one Finnish study, adults with a specific variation of this gene were more than twice as likely to become lactose intolerant as an adult compared to those of other genotypes.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of LIKELY or UNLIKELY reflects whether or not your genotype included those that carried a risk for becoming lactose intolerant.

CAFFEINE METABOLISM

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a SLOW rate of caffeine metabolism. That means you do not have the liver enzymes to breakdown and metabolize caffeine at a normal rate, but rather it stays in your system for a prolonged period of time. Using caffeine before training or sporting events may not be beneficial for you, and caffeine may have detrimental effects on your health. It also puts you at risk for more serious side effects from the stimulant, including elevated blood pressure and heart attack risk.

Your genetic profile indicates that you are likely to have a SLOW rate of caffeine metabolism.

This means you are not likely to benefit from the stimulant's ergogenic benefits as much as someone with a normal rate of caffeine metabolism and caffeine use may actually be detrimental to your health.

Research dating back to the '70s has consistently shown that caffeine can improve sports performance, particularly endurance performance, where the average improvement in exercise trials is about 24 percent in time to exhaustion and 3.1 percent in time to completion. It may also improve muscle power and endurance for power and sprint-based sports.

Caffeine primarily interacts with adenosine, a chemical in your central nervous system that regulates sleeping and waking. As adenosine accumulates, it inhibits nerve activity and causes drowsiness. Caffeine essentially blocks adenosine, preventing your nerve activity from slowing down, which increases alertness and brain activity and reduces tiredness, which benefits all sports performance. It also increases circulating epinephrine, the hormone responsible for your fight or flight response, which helps you feel physically and mentally keyed up to perform.

Caffeine use, however, does not benefit everyone equally. In one study of 35 trained male cyclists, caffeine decreased time on a 40 km time trial by nearly 4 minutes in those who had a favorable caffeine-metabolizing

RELATED GENES / SNPs

AHR, RP11-10017.3-001, ARID3B, CYP1A1

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's ability to metabolize caffeine.

Caffeine is well known and widely used as a legal stimulant. On the endurance front, caffeine increases the body's ability to use stored fat as fuel, which spares limited muscle glycogen (stored carbohydrate) stores. It also increases beta-endorphins to enhance feelings of wellness while also lowering your perceived exertion, so hard efforts feel easier. However, not everyone responds equally...or favorably. Some people suffer from negative caffeine side effects after one ill-timed cup of coffee, while others can drink several cups a day and feel fine.

We now know this disparity is largely hereditary. Caffeine is rapidly absorbed into the bloodstream, with levels peaking after

CAFFEINE METABOLISM

genotype, while those who were slow metabolizers improved their time by 1.3 minutes. Other exercise trials have reported that slow metabolizers saw no improvements, or in some case, had poorer outcomes than those of the same slow-metabolizing genotypes who didn't take caffeine.

More concerning is that caffeine can raise blood pressure and heart attack risk in slow caffeine metabolizers. Research published in the Journal of the American Medical Association (JAMA) has reported that for slow caffeine metabolizers, those who drank 2 to 3 cups of coffee a day had a 36 percent increased risk of heart attack, while those who drank 4 or more cups daily had a 64 percent increased risk.

As a slow caffeine metabolizer, you likely are already aware that you are sensitive to caffeine and are less likely to consume moderate to high amounts. If you choose to use caffeine as an ergogenic aid, keep the dose low—100 to 150 mg in the hours before training or competing—and be sure to keep tabs on your blood pressure if you use caffeine regularly.

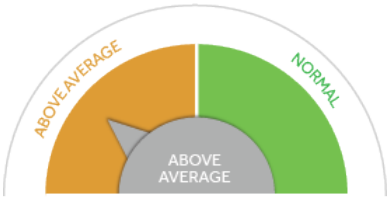
about 90 minutes and starting to drop off after about 3 to 4 hours. Caffeine eventually gets broken down in the liver by enzymes (Cytochrome P450 1A2, or CYP1A2) that metabolize the chemical. Depending on your genetic makeup, you will be able to metabolize caffeine at a normal rate, or your rate may be significantly slower. One study of 9,876 individuals found that variants in several genes were associated with slow caffeine metabolism (which was also associated with lower coffee consumption, indicating that people generally self regulate).

Being a slow caffeine metabolizer means the caffeine stays in your system longer, which can have adverse effects such as increasing blood pressure and may increase the risk of heart attack. Slow metabolizers also do not enjoy the same level of ergogenic improvement as people who metabolize the drug normally.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of NORMAL or SLOW reflects whether your genotype included those that carried a risk of adverse side effects in response to caffeine use or whether you are likely to benefit from using caffeine as an ergogenic aid.

SWEETS PREFERENCE

WHAT YOUR GENES SAY ABOUT YOU:



Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have an ABOVE AVERAGE sweet intake and your preference for sugary sweets is likely to be above the normal range. That makes you genetically inclined to have exceptionally strong sugar cravings and/or to eat sweets to excess. The good news is that people with your genotype appear to not convert sugar as easily to body fat and have less body fat. However, the fat they do store tends to be abdominal fat, which is more likely to contribute to cardiovascular problems and metabolic disease like diabetes. People with your genotype also may consume about 20 grams a day more sugar than those with other genetic variations. That's bad news because the average American already consumes about 66 pounds of added sugar per year. So it's important to manage your sweet tooth and added sugars.

Your genetic profile indicates you are likely to have a ABOVE AVERAGE sugar intake and that your preference and craving for sugary sweets is likely to be above normal.

Consuming too much sugar leads to weight gain and health problems so it is important to keep your cravings and sugar intake in check.

Eating too much sugar is a big public health problem. The American Heart Association (AHA) cautions that we should eat no more than about 6 ½ to 9 ½ teaspoons (25 to 38 grams or 100 to 150 calories) of added sugar a day depending on our size and gender. Yet, most of us consume two to three times the AHA's recommended amounts each day (about 20 teaspoons or 82 grams on average), often without even knowing it, because there's so much hidden sugar in our food supply we can exceed the recommended amount even if we're otherwise careful.

As someone with a genetic "sweet tooth," you're not only susceptible to hidden sugars, but also inclined to crave and eat more sweets in the form of cakes, candy, cookies, and sugary beverages, and may eat twice the amount of sugar that the typical American eats. Even if your sweet tooth doesn't cause excessive weight gain, it can still wreak metabolic havoc. Since too much

RELATED GENES / SNPs

FGF21, SLCA2

The genes and associated SNPs included in this category have been shown to have significant associations with a person's sweet taste perception and their preference for sugary foods, or what we commonly call a sweet tooth.

Your liver regulates your carbohydrate (especially sugar) intake through the production of a hormone known as fibroblast growth factor (FGF21). When you eat sugar, it pumps out FGF21, which in turn sends signals to your brain to let you know when you've had enough "sweets." Animal studies show that mice lacking the ability to produce this hormone eat about twice as much sugar as those who have a greater expression of FGF21, who not only take in less sugar but also less non-caloric sweetened food.

One study of more than 6,500 Danish

FOOD SENSITIVITY

SWEETS PREFERENCE

sugar can lead to insulin resistance, inflammation, heart disease, and diabetes. In your genotype it also can lead to increases in abdominal fat, which contributes to those metabolic and cardiovascular risks.

SUCCESS STRATEGIES

The following strategies can help you tame sugar cravings and help you avoid eating more than the recommended amount of sugar:

Reach for fruit and natural snacks. The health warnings are against added sugar, not the kind naturally found in healthful whole foods. You can't go wrong with a small bowl of berries or a handful of raisins or dates when you're craving something sweet. Plus, both berries and dried fruits are high in fiber, which helps fill you up and quells hunger.

Chew on this. Research suggests that chewing sugar-free gum can help reduce your craving for sugary snacks. In one study, men and women who chewed sugar-free gum throughout the afternoon hours reported significantly less hunger and cravings for something sweet than on days they didn't chew gum.

Skip juice and soda. Sugary drinks—and yes, that includes fruit juice—is a major source of sugar in the typical American diet. Soda, sports drinks, energy drinks, and fruit drinks account for 36% of the added sugar we consume. And it's one of the easiest ones to fix. Iced herbal or fruit teas, sparkling water with a squeeze of fresh citrus, and infused water are all great, flavorful options.

Go dark. Chocolate tops the charts for sweet cravings, particularly among women. An ounce or two of dark chocolate made with more than 70% cocoa will help satisfy those cravings with less sugar than milk chocolate, as well as provide some healthful antioxidants.

people found that those carrying one of two particular variants of the FGF21 gene were about 20 percent more likely to crave and consume sugary foods compared to those without that genetic makeup.

Interestingly, another study using health information on 450,000 people who have had their genomes sequenced and health and lifestyle information collected by UK Biobank reports that the same people who have the "sweet tooth" gene also appear to have naturally lower body fat, though when they do store fat it tends to be around their waists, which can have negative health consequences and is linked to heart disease and diabetes, rather than around their hips, where it presents less health risks.

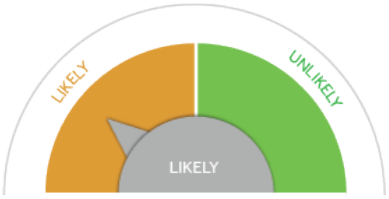
Other research shows that people who are carriers of the Ile allele for GLUT2, a gene associated with glucose sensing in the brain, eat about 20 grams a day more sugar than those with other genetic variations of GLUT2. That's a lot considering the recommended daily limit for added sugars is 25 grams for women and 36 grams for men.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of NORMAL or ABOVE AVERAGE reflects whether your genotypes included those that carried the likelihood of having a greater craving and consumption of sugar and sweets.

Check your labels. You already know the obvious sugar sweets. To avoid hidden sugars where you don't suspect them, check the labels, especially of common culprits like soups, sauces, crackers, and cereals (pretty much anything in a box, jar, or carton). Look for added sugar by all its names, including beet sugar, brown sugar, cane sugar, corn sugar, corn sweetener, corn syrup, fruit juice concentrates or purees, high-fructose corn syrup, honey, malt sugar, molasses, raw sugar, syrup, maple syrup, and of course, sugar. Ingredients ending in "ose" like dextrose, fructose, glucose, lactose, maltose and sucrose all mean sugar. If any of those ingredients are in the top three ingredients, put it back on the shelf.

BITTERNESS SENSITIVITY

WHAT YOUR GENES SAY ABOUT YOU:



Our analysis indicates that your genetic profile exhibits characteristics that make you LIKELY to taste the bitter compounds in foods, especially cruciferous vegetables like broccoli, kale, and Brussels sprouts. That makes you what scientists call a "super taster." Research shows that people with your genotype eat significantly fewer vegetables than those who are less sensitive to bitter, even after health and nutrition interventions. A higher vegetable intake isn't just good for your health, but also can help you lose and manage your weight. One 24-year prospective study found that intake of non-starchy vegetables, especially cruciferous veggies and leafy greens is inversely related to weight gain over time. That doesn't mean you need to choke down foods you don't like. But you can find ways to mask or minimize the bitterness in foods to make them more palatable to your taste buds and make it more enjoyable to get the recommended amounts of these healthful foods.

Your genetic profile indicates you are LIKELY to be a "super taster" and taste the bitter compounds in foods, especially cruciferous vegetables and dark leafy greens.

To eat and enjoy more vegetables, you'll want to find ways to mask and/or minimize the bitter taste in these foods.

SUCCESS STRATEGIES

The USDA recommends that adults eat two to three cups of vegetables every day. A meager 9 percent of adults meet that recommendation. If you're a super taster, you may be even less likely to meet that recommendation. Research shows that super tasters eat less vegetables overall while non-tasters eat the most.

As you know, vegetables are important for good health. A tall body of research has linked high vegetable intake with lower risk of heart disease, diabetes, some cancers, as well as weight gain. But it's hard to eat your veggies if you think they taste disgusting, and people with your genotype often find cruciferous vegetables and bitter greens like cabbage, broccoli, Brussels sprouts, cauliflower, and dark leafy greens like kale just too bitter to choke down, let alone enjoy.

RELATED GENES / SNPs

TAS2R38

The gene and associated SNPs included in this category have been shown to have significant associations with a person's likelihood of being sensitive to bitter flavors and hence more likely to not like and/or consume many vegetables.

Research has found that certain people are genetically inclined to have variants of the taste receptor gene TAS2R38 that cause them to be so-called "super tasters," meaning that they taste the bitter compounds in foods, especially glucosinolates found in dark leafy green and cruciferous vegetables like broccoli, kale, and Brussels sprouts more keenly, while others are essential "non-tasters," meaning they do not or barely pick up the bitterness in foods.

Some of the variation in taste is due to the small bumps on the tongue called papillae,

FOOD SENSITIVITY

BITTERNESS SENSITIVITY

The good news is that there are cooking and serving strategies that can actually make these vegetables taste good to you. Here's what to try.

Roast them. Place those veggies in a pan, drizzle them with olive oil and balsamic vinegar, add a little salt and pepper and roast the bitterness out of them. Roasting or caramelizing vegetables converts more of the carbohydrates to sugars, which brings out their natural sweetness. Just stop the cooking process before they blacken, which can intensify some of the bitterness.

Butter 'em up. A little fat can help block the bitter compounds from binding to your bitter receptors Fat also helps your body absorb the fat-soluble antioxidants found in many of these veggies. So don't be afraid to baste them with a bit of butter, olive oil, or a light layer of cheese sauce.

Use bitter-blocking seasonings. Various herbs and spices can help block or override the bitter taste in cruciferous veggies and leafy greens. A pinch of salt is one way. The heat in pepper and other hot spices like chili oil can distract you from the bitterness. Ginger, garlic, basil and vinegar can help override your bitter receptors by stimulating your other taste buds.

Stock up on alternative veggies. Remember, too, that there are many vegetables in the world and they're not all bitter. Stock up on peas, green and string beans, carrots, beets, zucchini, and sweeter varieties of lettuce to get your fill of healthful veggies without all the bitterness.

which house your taste buds. People with high sensitivity to bitter tastes have more than twice as many papillae as non-tasters. They also seem have greater expression of bitter receptor messenger RNA.

If you're a super taster, you're likely to have an aversion to many vegetables, especially the ones rich in glucosinolates. In one study where researchers conducted a six month dietary intervention designed to increase vegetable intake among a group of men and women, those with genotypes that related to low to non-bitter tasting increased their vegetable consumption more than those with the ability to perceive bitterness.

Another study found that people with the bitter tasting gene variant TAS2R38 ate about 200 fewer servings of vegetables a year than non-tasters. Super tasters may not only dramatically avoid vegetable consumption, but also choose more sweet and fatty foods instead.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of LIKELY or UNLIKELY reflects whether your genotypes included those that carried the likelihood of having a higher sensitivity to bitterness, and thereby a greater likelihood to have an aversion to vegetables.

SUMMARY

What nutrients do you need?

NUTRIENTS	TENDENCY	GOOD SOURCES INCLUDE
Vitamin A	LOW	Carrots, Kale, Tuna
Vitamin B6	LOW	Pistachios, Watermelon, Potatoes
Folate	LOW	Pinto Beans, Asparagus, Broccoli
Vitamin B12	NORMAL	Lean meat, Seafood, Fortified Dairy Product
Vitamin C	BELOW AVERAGE	Red Bell Peppers, Strawberries, and Oranges
Vitamin D	LOW	Salmon, Egg Yolks, Fortified Dairy Milk

HOW DO MICRONUTRIENTS AFFECT MY BODY WEIGHT?

Micronutrients have not been shown to have a direct effect on body weight or body fat. So why are they included in this genetic analysis?

The vitamins tested play important roles in a variety of functions in the body that may affect your body weight—or your ability to manage it.

Many micronutrients are involved in the body's metabolism of fat, carbohydrates and protein. When you are eating and exercising, you want your metabolism to function smoothly. The body does find ways to cope when some nutrients are not available. But for optimum performance and energy, you'll do best when your body has all it needs to work properly.

Some nutrients such as vitamin C and vitamin D may not affect body weight directly, but they play a role in bone health, inflammation and healing. The stresses you put your body under when exercising may be bolstered if you are well nourished in these nutrients.

DO MY RESULTS SHOW THAT I AM LOW IN NUTRIENTS?

If you scored LOW or BELOW AVERAGE, your genotype results show that you may have a higher risk for having blood levels of certain nutrients that may be in the lower end of the normal range. For a few nutrients, such as vitamin B12, it may be optimal to be in the mid range of normal, or higher. This genotype risk assessment is based on studies where study participants with certain genotypes for the various nutrients tested were shown to be more likely to be in the lower end of the normal range for a nutrient.

Be careful of assuming these results indicate you are low, or deficient in a certain nutrient. The only way to know for sure if you are in the low end of the normal range for a nutrient, or if you are actually deficient, is to consult with your physician and get a specific blood test designed to assess a specific nutrient. This genetic test can only assess your risk; the blood test is what can assess your actual levels.

SUMMARY

WHICH FOOD CHOICES FOR CERTAIN MACRONUTRIENTS ARE THE BEST FOR ME?

Our genetic testing analyzes your genotype and assesses your potential levels of macronutrients. This testing does not test your individual sensitivity or response to certain foods that may contain these macronutrients. You may have other individualized responses that are not detected in the genetic tests. For example, you may be allergic to the proteins in dairy foods. Or you may have a negative response to the lactose sugars in dairy products. This report cannot inform you about these reactions. Any food recommendations that are suggested to help you obtain certain nutrients should be modified based on other factors that you may already know about.

HOW CAN I MONITOR MY NUTRIENT INTAKE?

Your body absorbs a certain amount of nutrient as food or supplements are digested. Then your body uses or stores the nutrient as needed. There are many factors that affect how much of a nutrient you take in, how much of a nutrient is absorbed and used by your body, and whether your body stores are in the normal range.

Your genotype for certain nutrients can indicate that you may be at risk for having lower levels of certain nutrients. But since the genotype analysis is not measuring what you eat, the supplements you take, or actually measuring levels in your blood or tissues, the genotype analysis alone cannot relate your true status.

People who are low or deficient in a nutrient may absorb more from food than someone who is not deficient. A person who needs more of a certain nutrient may absorb more of it from a food than someone who has normal levels. There are also other factors that can affect absorption positively or negatively, and that can affect how your body uses what you take in.

How do you know what your true nutritional status is? A blood test is generally the only way to truly test your true nutritional status. What is in the blood when tested may not always reflect what is in the tissues or how much is being used by the body. But at present, this is the measure used for most nutrients. There may also be different blood tests that monitor the same nutrient.

Keep these factors in mind as you interpret your genotype results and the suggestions given. No one result is going to give you all the information you need. But taken together, the results of your genotype analysis, along with a blood test can help you spot potential areas where you can optimize your nutrition.

SHOULD YOU TAKE A SUPPLEMENT?

Most nutritionists recommend that nutrients be obtained first through food. Research studies have tended to show more favorable outcomes when research participants obtained nutrients from food sources rather than from supplements. Nutritional experts vary in their opinions about whether people should take supplements or not.

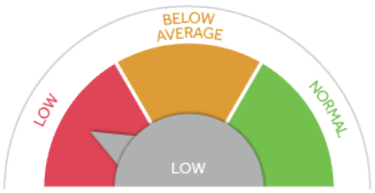
Most supplements are considered safe. But be cautious with dosing because research on appropriate levels has identified ranges for some nutrients beyond which toxic effects can occur. These ranges are known as the Upper Intake Level, or UL. It is difficult to reach the UL by getting the nutrients from food, but it is easy to reach these high risk levels from supplementation.

If you do choose to supplement, keep track of the nutrients you get from all foods. Read food labels since some foods that you eat may also be fortified in the supplements you are taking. Use dietary software to input what you eat and supplement with so you can keep an estimate of your total nutrient intake and will be less likely to overdose. Also consult with your doctor if needed. Some supplements, including vitamin A and vitamin B6, can interact with medications you may be taking.

VITAMIN A TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that for the gene investigated, your genotype showed the allele combinations that exhibit a LOW ability to convert high doses of betacarotene from a supplement into the active form of Vitamin A that is shown in a blood test. This means that if you take a beta-carotene supplement, your ability to convert the nutrient into an active form of Vitamin A is likely to be reduced. It is unclear how your body might respond to food sources of beta-carotene, but it might show a reduced conversion ability as well.



Your genetic profile indicates that your response is LOW.

This suggests that your ability to convert high doses of beta-carotene from a supplement into an active form of Vitamin A is reduced compared to others with a different genotype. You may want to get a blood test to assess your blood levels of Vitamin A, and then consume more beta-carotene and Vitamin A-rich foods, or possibly take low dose supplements if you are low or deficient.

SUCCESS STRATEGIES

- If you take supplemental forms of beta-carotene in fortified foods or supplements, or if you have any signs of poor vision, you may want to request a blood test assessing your levels of Vitamin A from your doctor. If your body is deficient, vision and other aspects of health can be affected, so you may want to increase your intake of beta-carotene and Vitamin A-rich foods, and perhaps take low-dose Vitamin A supplements if you are low or deficient.
- Vitamin A is needed for good vision and needs may increase in women who are pregnant or lactating.
- Make sure not to exceed recommended levels of supplemental betacarotene or Vitamin A, as toxicity can occur.

RELATED GENES / SNPs

BCMO1

The gene and its associated SNPs that are included in this category have been shown to have statistically significant associations with a person's blood levels of Vitamin A. Vitamin A promotes good vision, is involved in protein synthesis that affects skin and membrane tissues, and helps support reproduction and growth. The nutrient is found in plant foods in its precursor forms such as beta-carotene. Beta-carotene is converted by the body into different active forms of Vitamin A: retinol, retinal and retinoic acid. Animal foods, such as meat and dairy, provide the retinol form of Vitamin A.

It is rare to over-consume beta-carotene in plant foods to reach toxic levels. However, it is possible to consume toxic levels of Vitamin A from organ meats or fortified foods. Pregnant women are advised to eat liver no more than once every two weeks.

Vitamin A in the form of beta-carotene is found in foods such as vegetables, especially

NUTRIENTS

VITAMIN A TENDENCY

leafy greens like spinach and orange foods such as carrots, sweet potatoes, apricots, mango and cantaloupe, as well as in the retinol form in dairy and in organ meats like liver.

- Be aware that some medications, alcohol or health conditions may interact with Vitamin A supplements and cause adverse effects.

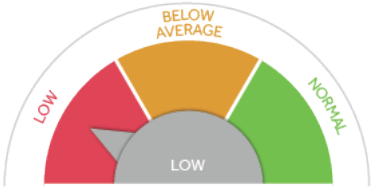
VITAMIN A-RICH FOODS TO INCLUDE IN YOUR DIET:

Broccoli, Swiss chard, collard greens, kale, carrots, butternut squash, apricots, goat's cheese, liver, tuna.

VITAMIN B6 TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic response is LOW. Your score reflects the fact that your genotype showed the most unfavorable allele combination. This means there is a risk that your blood levels of B6 may be lower than normal. Keep in mind that increased risk does not mean that your blood levels are low. You can only know this by requesting a blood test from your physician or other healthcare provider.



Your genetic profile indicates that your response is LOW.

indicating that you are at risk for having low levels of Vitamin B6. Check your status by asking your doctor for a blood test. Eat enough B6-rich foods and supplement if you are low.

SUCCESS STRATEGIES

Since you are at risk for having lower levels of Vitamin B6 in your blood, it is especially important that you get adequate amounts of this nutrient in your diet. Monitor your intake by keeping a food log and using a dietary app to obtain a nutrient analysis to see how much Vitamin B6 you consume. It's a good idea to keep a food log periodically, especially if you go through periods in life where you are aware that you may not be eating properly.

If your blood tests show low levels, you may wish to take a Vitamin B6 supplement. Be sure to avoid high doses, as they can cause nerve damage.

VITAMIN B6-RICH FOODS TO INCLUDE IN YOUR DIET:

Pistachios, pinto beans, wheat germ, bananas, watermelon, carrots, spinach, peas, squash, potatoes, avocados, yellowfin tuna, sunflower seeds

RELATED GENES / SNPs

NBPF3

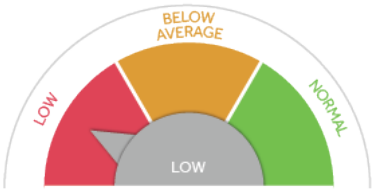
The gene and its associated SNPs included in this category have been shown to have statistically significant associations with a person's blood levels of Vitamin B6. In one large study, people who carried the most unfavorable pairs of genes, or alleles had lower levels of Vitamin B6.

Vitamin B6 is important for nerve cell function, energy metabolism and the production of hormones, such as serotonin and epinephrine. Low levels of B6 are also linked to higher levels of homocysteine, which increases heart disease risk. B6 is found in many foods including grains, legumes, vegetables, milk, eggs, fish, lean meat and flour products.

VITAMIN B9 – FOLATE TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic response is LOW. Your score reflects the fact that your genotype showed a higher risk allele combination. This means that your body may be at risk of having lower blood levels of folate. You may be at higher risk for anemia and for higher levels of homocysteine, which is a risk factor for heart disease.



Your genetic profile indicates that your response is LOW.

This suggests that you may have a high risk of having lower blood levels of folate. Getting enough by eating extra whole plant foods at every meal and supplementing with folate if your levels are found to be low in a blood test may be beneficial. Getting folate, Vitamin B12 and homocysteine levels checked in a blood test regularly is recommended.

SUCCESS STRATEGIES

- Since you appear to be at high risk to have lower levels of folate, it may be a good idea to get regular blood tests to check for anemia, as well as folate, Vitamin B12 and homocysteine status. Your genes only predict your risk, but a blood test can give you concrete information about your body levels of this nutrient.

- All women should ensure they get enough folate in their diet. Monitor your intake by keeping a food log using a dietary app. Because you are at risk of having lower levels, you may want to eat greater amounts of folate than the minimum recommended daily allowance. You will get folate that is added to whole grains in cereals and breads, but you should also eat food sources of folate. The foods highest in folate include legumes, fruits and vegetables, especially greens.

- Some of the folate in foods is lost with heat from cooking or oxidation during storage. To minimize potential losses, eat plant foods at every meal

RELATED GENES / SNPs

MTHFR

This gene and its associated SNPs have been shown to have significant associations with a person's folate, or vitamin B9, status. Folate plays many important roles in the body, including acting as a coenzyme in DNA creation and in energy metabolism reactions. Folate also plays a role in biochemical processes that affect the metabolism of an amino acid, homocysteine. One SNP associated with this gene is associated with enzyme activity that can lead to higher levels of homocysteine. Since homocysteine is a risk factor for heart disease, high levels may be of concern. In child-bearing women, getting sufficient amounts of folate is important because low levels can lead to neural tube birth defects. As a public health measure, grains are fortified with folate to ensure that women of childbearing age get enough. Low levels of folate can also lead to anemia.

In studies on this gene, people who carried the most unfavorable pairs of genes, or alleles, had only a 10%-20% efficiency

VITAMIN B9 – FOLATE TENDENCY

at processing folate. And those with the below average allele had a 60% efficiency at processing folate. People with more of the unfavorable alleles are more likely to have high homocysteine and low Vitamin B12 levels. Poor ability to process folate may be fairly common: Around 53% of women appear to have these unfavorable genotypes.

to make sure you get enough, eat fresh produce quickly after purchase, and incorporate some raw plant foods into your meals.

- You can also supplement your diet with folate. However, since low levels of Vitamin B12 can mask anemia if folate is taken, it is a good idea to supplement with both folate and Vitamin B12.
- Smoking can also decrease folate levels. You may need to consume more if you smoke — or better yet, quit smoking!

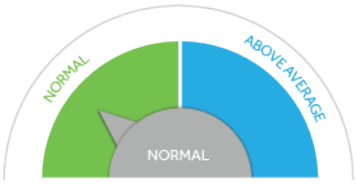
FOLATE-RICH FOODS TO INCLUDE IN YOUR DIET:

Lentils, pinto beans, asparagus and broccoli are excellent sources of folate.

VITAMIN B12 TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile is NORMAL. Your score reflects the fact that your genotype showed few, if any, of the unfavorable allele combinations. This suggests that, as long as you consume a healthy diet that includes Vitamin B12, you are likely to have normal blood levels of vitamin B12. Keep in mind, however, that vitamin B12 deficiencies can develop with some health conditions. Also, aging can result in poorer absorption of vitamin B12 from foods.



Your genetic profile indicates that your response is NORMAL.

This suggests that your blood levels of Vitamin B12 are likely to be normal.

If you follow a plant-based vegan diet that does not include fortified foods, levels also can become low.

SUCCESS STRATEGIES

Getting a nutrient analysis of what you eat can give you an indication of how much of a nutrient you are consuming. Do periodic checks of your estimated vitamin B12 intake with a food log using a dietary app.

To assess how well nutrients in your foods are absorbed, it is a good idea to get periodic testing of your blood levels of vitamin B12. If absorption is impaired, your blood levels may be low and you may wish to supplement with B12.

VITAMIN B12-RICH FOODS TO INCLUDE IN YOUR DIET:

Lean meat, seafood, dairy products, eggs, fortified breakfast cereals, certain brands of fortified nutritional yeast.

RELATED GENES / SNPs

FUT2

The gene and associated SNPs included in this category have been shown to have significant associations with a person's blood levels of Vitamin B12. In one large study, those women who carried the most unfavorable pairs of genes, or alleles, had slightly lower levels of Vitamin B12 compared to others with more favorable genotypes. However, they were not deficient: their levels were still in the normal range, just on the low end. Around 70% of people have genotypes that suggest they may be at risk for having blood levels of B12 that are at the lower end of the normal range. There are several reasons why blood levels of B12 can be low. Some people do not get enough in their diet and so they are simply not getting enough of the nutrient. Some other people get enough, but do not absorb it efficiently. A small percentage of people over 50 or those who have had gastrointestinal surgery or GI disorders such as Crohn's disease may also have reduced abilities to absorb it.

NUTRIENTS

VITAMIN B12 TENDENCY

Research also indicates that around 30% of people have genotypes that suggest they may be predisposed to having higher than normal levels of vitamin B12. Their levels are not excessive, just on the high end of the normal range.

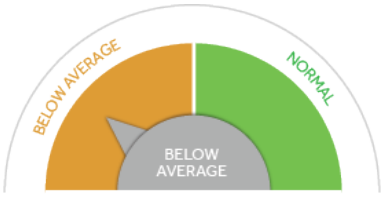
Vitamin B12 is important for many processes in the body, including red blood cell formation, neurological function and cognitive performance. Deficiencies of B12 can cause pernicious anemia, and is also associated with high levels of homocysteine, which may impair arteries and increase risk of heart disease. There is some evidence that subclinical symptoms may be associated with being in the low end of the normal range.

Vitamin B12 is produced by microorganisms found in soil and water, and in both the guts of animals and humans. In the modern world, highly-sanitized food processing systems have eliminated many naturally occurring sources of Vitamin B12-providing bacteria in plant products. Vitamin B12 is typically obtained from animal foods such as meat, or fortified foods such as dairy and plant milks. Certain mushrooms and seaweed may provide some Vitamin B12, but are not considered to be reliable sources.

VITAMIN C TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile suggests that you are likely to have BELOW AVERAGE levels of Vitamin C. This means that even if you consume enough Vitamin C in the foods you eat, blood levels of L-ascorbic acid may be lower than those who have a different genotype. This does not mean that even though they are low, you will be deficient in this nutrient. But it is a good idea to monitor your intake, because higher circulating levels of Vitamin C are considered to be beneficial.



Your genetic profile indicates that your response is BELOW AVERAGE.

You should make sure that you consume plenty of Vitamin C-rich foods and you may wish to supplement if your blood levels are low.

SUCCESS STRATEGIES

- To ensure your body gets the Vitamin C it needs, make sure to include a wide variety of plant foods, including citrus in your diet.
- Vitamin C can be destroyed by heat and oxygen, so include fresh, raw fruits and vegetables as often as you can.
- If you wish to supplement with Vitamin C, avoid very high doses because they can cause diarrhea and gastrointestinal distress.

VITAMIN C-RICH FOODS TO INCLUDE IN YOUR DIET:

Broccoli, red bell peppers, kiwi fruit, Brussels sprouts, strawberries, oranges, watermelon, pinto beans.

RELATED GENES / SNPs

SLC23A1

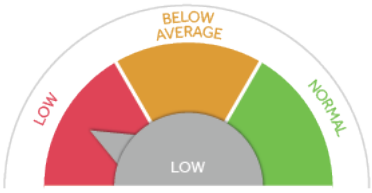
The gene and associated SNP included in this category has been shown to have statistically significant associations with a person's blood levels of L-ascorbic acid, or Vitamin C. Those people who carried more unfavorable pairs of genes, or alleles, were more likely to have lower blood levels of the nutrient.

Vitamin C is a nutrient that has many functions in the body, including acting as an antioxidant, and is needed for skin and membrane tissues. Low levels have also been associated with diseases such as heart disease and cancer. Vitamin C also helps with the absorption of iron. The nutrient must be obtained from foods since the human body cannot make its own, as some other animals can. Vitamin C can be found in citrus fruits, but is also in many fruits, vegetables and legumes.

VITAMIN D TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic response is LOW. Your score reflects the fact that for the genes investigated, your genotype showed many of the unfavorable allele combinations that increase your risk of having extremely low levels of Vitamin D. This does not mean you definitely are deficient. But you should speak to your doctor and get tested to monitor your status. If you get inadequate sun exposure, take in small amounts through natural or fortified foods, or have trouble with absorption of the Vitamin D you do get from foods, you could be at greater risk of being low.



Your genetic profile indicates that your response is LOW,

so your levels of Vitamin D may be extremely low or even deficient. Get your blood tested for Vitamin D on a regular basis. Increase your sun exposure and add more Vitamin D-rich foods or supplements, if your levels are low.

SUCCESS STRATEGIES

- Get tested regularly since you are at high risk of having low levels of Vitamin D.
- Getting outside on most days of the week for a few minutes is crucial to generate your body's production of Vitamin D. Most people do not get Vitamin D through food; sunlight is considered to be the best source.
- Expose yourself to the sun on most days of the week for at least 10 to 15 minutes (30 to 50 minutes if you have naturally dark skin). Spend more time outdoors in winter months, or if you live in northern latitudes

RELATED GENES / SNPs

GC, NADSYN1, CYP2R1

The genes and their associated SNPs that are included in this category have been shown to have statistically significant associations with a person's blood levels of Vitamin D (which is actually a hormone). One study found that several SNPs linked to low levels of Vitamin D were from genes that may play a role in the Vitamin D conversion and delivery process. Those people who carried unfavorable pairs of genes, or alleles, had a higher risk of low levels of Vitamin D, and those who carried several unfavorable SNPs had a much higher chance of being deficient in Vitamin D.

Vitamin D has been proven in research to be crucial for bone health. Low levels of Vitamin D have been associated with a variety of health conditions, including heart disease, diabetes, depression and cancer.

NUTRIENTS

VITAMIN D TENDENCY

- Sunscreen can block the rays that trigger your Vitamin D production. Spending a short amount of time outside without wearing sunscreen may be beneficial. If you have any doubts, discuss the best approach with a dermatologist.
- If you are deficient in Vitamin D, do a nutrient analysis to determine how much Vitamin D you consume, then eat more foods that contain Vitamin D, including natural foods or fortified foods, or take a supplement.
- If you take a Vitamin D supplement, avoid overly-high doses, unless by prescription through your doctor, as they may cause adverse effects.

VITAMIN D-RICH FOODS TO INCLUDE IN YOUR DIET:

Salmon, mackerel, sardines, egg yolks, fortified almond, soy or other plant milk, fortified dairy milk.

A blood test from your doctor can determine your blood levels of Vitamin D. Vitamin D is primarily produced by the body from exposure to ultraviolet rays from sunlight, and this is considered to be the optimal source since Vitamin D generated by the body lasts longer in the body than Vitamin D taken in supplement form. Your levels are likely to be higher if you live in the southern latitudes and during the summer. However, it is not uncommon for people with lots of exposure to the sun to still have low levels of Vitamin D. In general, only 10 to 15 minutes of sun exposure to bare skin per day during the summer months is needed for a Caucasian to produce the Vitamin D he or she needs. Darker skinned people will need to spend 2-5 times more time in the sun. Since Vitamin D is stored in the body, stores can be built up during warmer months and may compensate for less sun exposure during winter months.

Vitamin D can be obtained through foods such as oily fish and egg yolks, as well as fortified dairy and plant milks, and fortified cereals. Vitamin D can also be taken in supplements. If you test low and choose to take a Vitamin D supplement, be careful of taking higher doses because there can be adverse effects.

SUMMARY

How much should I exercise?

Your body weight and body fat levels are the direct result of how much you eat as well as how much and how you move. Certain genes can play a role in your response to what you eat and how you exercise.

Traditionally, most people focus on dieting to lose weight, but exercise is a key part of losing weight effectively and it's been proven in research to be crucial for keeping the weight you lose off.

There are two major things you should know about exercising to lose weight:

1. Any regular exercise can enhance weight loss from dieting. If you have a certain genotype, you may experience a greater or lesser response compared to others, but your response still depends on the type and amount of exercise that you do. For weight loss and fat loss, the more calories you burn through exercise, the better your results will be.

   Achieve a greater calorie burn by focusing on cardio exercise such as walking, running, cycling or cardio machines. When you move, you can increase your calorie burn in one of two ways. You can exercise harder at a higher intensity, or you can keep your intensity easier and exercise at a moderate pace, but for longer sessions. We'll explain how to monitor and manipulate your intensity in greater detail later in your report.

2. Muscle matters, too. It keeps you strong, it helps your body stay firm and shapely. You may have a certain genotype that makes you more or less muscular, or that makes you more or less strong, but your muscle response to both dieting and exercise will still be affected by the type and amount of exercise that you do.

   When you are dieting, it is very important to include exercise that helps to strengthen muscle. When a person loses weight by only dieting and not exercising, they are likely to lose more muscle mass along with the pounds of fat that are lost. If you exercise, especially if you do resistance training (lift weights), you can prevent or minimize the loss of muscle mass that can occur with weight loss.

EXERCISE

SUMMARY

CARDIO EXERCISE

FREQUENCY (days per week)

1 2 3 4 5 6 7

INTENSITY

LOW MODERATE HIGH

DURATION (minutes per week)

100 150 200 250 300 350 400

Do cardio for at least 200-300 minutes on at least 3-4 days per week at a moderate-to-vigorous intensity. You can experience greater results by exercising more and/or harder.

STRENGTH TRAINING

Lift weights 2 to 3 days per week using weights that are heavy enough to challenge you at the end of each of 2 to 3 sets of 8 to 15 reps. If by the end of each set of repetitions, you feel like you could keep performing the exercise, the weight you are using is too light to provide a sufficient muscle-strengthening stimulus. As you near the end of the exercise, you should feel like the last 2 to 3 reps are difficult to complete while maintaining good form.

FAT LOSS RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits an ENHANCED fat loss response to cardio. Your score reflects the fact that your genotype showed 'favorable' gene combinations. This means that, based on your genes, you likely would show a slightly higher fat loss response to a basic cardio exercise program than other genotypes. Thus you can expect to lose a usual to higher amount of body fat by participating in cardio exercise that is of a moderate-to-vigorous intensity.

Even though you may have an enhanced response to a lifestyle intervention, this doesn't mean that losing body fat and keeping it off will be effortless. Not everyone loses the same amount of body fat when they embark upon an exercise program. Genetic predisposition plays a role in fat loss, but other factors can also affect how much fat you lose. You can experience greater fat loss by exercising longer and/or at a higher intensity.

Your genetic profile indicates that your fat loss response to cardio is ENHANCED.

You should experience slightly more fat loss than other genotypes when performing cardio exercise 3-5 days per week for a total of 150-250 minutes. Examples of what this type of exercise plan would look like are either several exercise dance classes and an indoor cycling class per week, or 3-5 sessions in a week walking or climbing briskly on a treadmill or elliptical trainer for 50-60 minutes.

SUCCESS STRATEGIES

Your genetic profile predicts that you can expect a favorable fat-loss result from doing at least 150-250 minutes of cardio exercise 3-5 days per week, working out at a moderate-to-high intensity.

- If you want to see greater fat loss benefits from exercise, you should increase the length of time of your exercise session, and/or the intensity of your exercise session.

- Make sure to include muscle-strengthening moves such as squats, lunges and upper body exercises with weight on at least 2 days per week.

RELATED GENES / SNPs

ADRB2, LPL

The genes and their associated SNPs that are included in this category have been shown in a study to have significant associations with a person's ability to lose fat from a regular program of 3 days per week of cardio exercise. A large study investigating these genes put sedentary men and women on a 20-week cardio exercise program. The study volunteers exercised on a bike 3 times per week, starting at a moderate intensity for 30 minutes per session over the first few weeks. They built up to a longer, slightly harder workout that lasted 50 minutes for the last 6 of the 20 weeks.

Men in the study did not appear to have a different response based on their genotype. Women's fat loss was influenced by

FAT LOSS RESPONSE TO CARDIO

- Begin your cardiovascular exercise session in a semi-fasted state; First thing in the morning or 3-5 hours since your last meal/caloric drink.

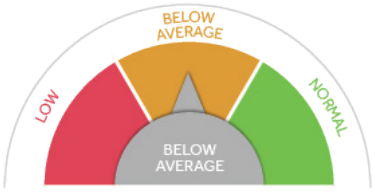
genotype, however. Women who carried the most 'favorable' genotypes lost slightly more fat in response to a cardio exercise program than those who did not carry these 'favorable' genotypes.

Our genetic analysis investigated which genotype for each of these genes was present in your DNA. Your rating of either NORMAL or ENHANCED reflects whether your genotypes included those that carried an enhanced fat loss response from a regular program of cardio exercise.

FITNESS RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a **BELOW AVERAGE** fitness response to high-intensity exercise. Your score reflects the fact that your genotype showed the 'unfavorable' gene combinations. This means you have the potential to not see the same improvements in fitness from high-intensity cardio workouts as someone else with a more favorable genotype would. The good news is that you might be able to attain the same cardiovascular benefits by working at lower intensities.



Your genetic profile indicates that your fitness response to moderate-to-high-intensity cardio is BELOW AVERAGE.

You may be less likely to experience optimal cardiovascular fitness improvements from high-intensity cardio compared to others with a more favorable genotype. This does not mean that you will not improve your fitness. You can. But you will likely see greater gains from longer, moderate-intensity workouts. Or you may benefit from endurance-based resistance workouts such as circuit training and power training.

SUCCESS STRATEGIES

Your genotype suggests you might benefit most from sticking to moderate intensity workouts. Therefore, you might see better fitness results from longer endurance workouts.

Aim for more moderate-intensity cardio workouts on four or more days per week that last longer over time. Start with 20 to 30 minute sessions and work up to 60 to 90 minutes. You may want to consider training for an endurance event like a charity bike race or a 10K, half-marathon, or even a full marathon.

RELATED GENES / SNPs

AMPD1, APOE

The genes and associated SNPs included in this category have been shown to have significant associations with a person's response to moderate-to-high intensity exercise.

Many factors play roles in being able to push hard without feeling overly fatigued when exercising. One reflection of fitness is oxygen capacity, also known as VO2 Max. As a person becomes fitter, their ability to take in more oxygen improves, which helps them to work out harder and longer. The greater one's VO2 Max, the more exercise they can handle since they can take in more oxygen that working muscles need during intense physical activity.

Several large studies investigating these genes had sedentary men and women do cardio exercise 3 to 4 days per week for 5 to 6 months. They used a variety of cardio machines (bike, treadmill, rowing machine, step-climber, etc.) for up to 50 minutes.

EXERCISE

FITNESS RESPONSE TO CARDIO

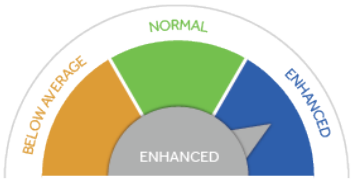
Those people with the 'unfavorable' genotype experienced smaller gains in their cardiovascular fitness from the training. They seemed to show a decreased ability to perform at higher effort levels, suggesting their optimal fitness response may be better achieved at a lower intensity of exercise.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either NORMAL, BELOW AVERAGE OR LOW reflects whether your genotypes included those that carried a risk of reduced cardiovascular fitness response from moderate-to-higher intensity exercise.

BODY COMPOSITION RESPONSE TO STRENGTH TRAINING

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits an **ENHANCED** body composition response to muscle-strengthening exercise. Your score reflects the fact that your genotype showed the 'favorable' gene combinations. This means that, in addition to improvements in strength and muscle mass, you are likely to experience weight loss and a reduction in your body fat percentage from weight training.



Your genetic profile indicates that your body composition response to strength training is ENHANCED.

In addition to strength improvements, you are more likely to see reductions in your body fat percentage from weight training. Make sure to include resistance exercise two to three times a week.

SUCCESS STRATEGIES

Make sure to lift weights that are heavy enough to work at a moderate-to-hard intensity, performing 2 to 3 sets of 15 to 20 repetitions of each exercise. When the exercises become easy, add more weight to continue to obtain the benefits.

Due to your enhanced genotype, you do get more accomplished with every strength training session than another genotype might, which suggests you may want to take advantage of your genotype by incorporating interval-style strength training into your cardiovascular exercise days to take full advantage of your genetic advantage.

RELATED GENES / SNPs

NRXN3, GNPDA2, LRRN6C, PRKD1, GPRC5B, SLC39A8, FTO, FLJ35779, MAP2K5, QPCTL-GIPR, NEGR1, LRP1B, MTCH2, MTIF3, RPL27A, SEC16B, FAIM2, FANCL, ETV5, TFAP2B

The genes and their associated SNPs that are included in this category all have been shown to have significant associations with a person's ability to improve their body composition and decrease their body fat percentage from resistance exercise. Resistance training, or weight training, improves strength and the amount of muscle a person has. Weight training can also reduce the percentage, and sometimes amounts, of body fat. An improved body composition, which is a higher proportion of muscle to body fat, contributes to a leaner look and, potentially, a greater number of calories burned each day.

Although resistance training alone has not

BODY COMPOSITION RESPONSE TO STRENGTH TRAINING

You will experience greater fat and weight loss by incorporating cardio workouts on most days of the week.

See What You Should Know About Exercise and find ideas on how to maximize your workouts in the Exercise section of this portal.

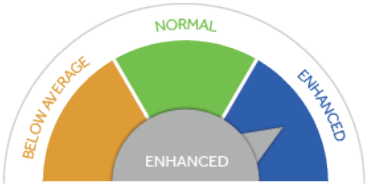
been shown to produce clinically significant weight loss (because weights workouts do not burn as many calories as cardio), people with the more 'favorable' genotype in a large study experienced an improved ability to lose weight and reduce their body fat percentage with resistance training. Those with the 'unfavorable' genotypes showed a decreased ability to lose weight and reduce body fat percentage from resistance training. When you are trying to lose weight, it is very important to include resistance training in your routine. Resistance training can minimize or prevent that loss of muscle mass that occurs with weight loss when you are dieting.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either ENHANCED, NORMAL or BELOW AVERAGE reflects whether your genotypes included those that carried a risk of an enhanced or reduced body composition response to strength training.

HDL RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits an **ENHANCED** HDL response to cardio exercise. Your score reflects the fact that your genotype showed the 'favorable' gene combinations. This suggests that you are likely to experience a substantial beneficial boost to your HDL levels from a regular cardio exercise program.



Your genetic profile indicates that your HDL response to cardio is ENHANCED.

For optimal results, do cardio five or more days per week.

SUCCESS STRATEGIES

Your genotype suggests that you can successfully raise your HDL levels with regular cardio. To obtain this benefit, the key is consistency. Every workout you do will boost HDL levels, but to maintain the effect you need to exercise on a regular basis.

- Higher intensities may give you a greater boost. Aim to push past your comfort zone by moving a little harder or faster during your cardio workouts.
- What you eat is crucial to help normalize all of your cholesterol levels. A diet high in fiber-filled plant foods and low in saturated animal fats will help lower your total cholesterol, LDL cholesterol and triglyceride values.

RELATED GENES / SNPs

APOE

The gene and associated SNPs included in this category have been shown to have significant associations with a person's HDL cholesterol response to cardio exercise. HDL is a protein particle in the blood that carries cholesterol to the liver, helping to clear it from the blood. Excess cholesterol lingering in the blood can contribute to plaque that causes heart disease. So having higher levels of HDL is beneficial—which is why it's considered "good" cholesterol. Even one session of cardio exercise can boost HDL, and regular exercisers tend to have higher HDL.

This gene plays a role in the HDL response to cardio. One large study had men and women exercise for 30 to 50 minutes, 3 times a week for 5 months. Those people with the more "favorable" genotype experienced greater than average boosts to their HDL levels. Those with the 'unfavorable' genotype showed a decreased response: smaller increases in HDL.

EXERCISE

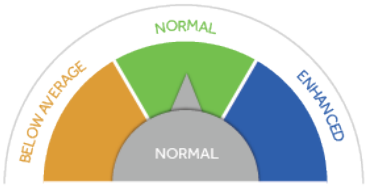
HDL RESPONSE TO CARDIO

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either ENHANCED, NORMAL or BELOW AVERAGE reflects whether your genotypes included those that carried a risk of an enhanced or reduced HDL response to cardio exercise.

INSULIN SENSITIVITY RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a **NORMAL** insulin sensitivity to cardio exercise. Your score reflects the fact that your genotype showed some of the 'unfavorable' gene combinations. This means that, while you may see improvements in insulin sensitivity from cardio, they are more likely to be small. But you should be able to improve your insulin response with workouts that are done more often and at a higher intensity.



Your genetic profile indicates that your insulin sensitivity response to cardio is NORMAL

Your improvement from 3 days a week of cardio exercise is likely to be small. You can maximize the effects by working out more often. Aim to exercise most days of the week and include both resistance training and higher-intensity cardio work during your workouts.

SUCCESS STRATEGIES

- Exercise frequently. The effects of exercise on glucose uptake are short-lived and the effects of a workout may wear off within two days of your last workout. Once or twice-a-week workouts aren't enough to reap this benefit from exercise. Do cardio on at least four to five days per week, but preferably on most, or all, days of the week for optimal results.

- The more in shape you are, the better your insulin response will be. That means if you stick to regular cardio exercise, you will fine tune your body's response and are likely to see long term improvements over time. It's important to identify habits you can adopt that help you to stick to your weekly workouts. Identify triggers that cause you to skip workouts and figure out how to overcome these obstacles.

RELATED GENES / SNPs

LIPC

The gene and associated SNPs included in this category have been shown to have significant associations with a person's insulin sensitivity in response to cardio exercise. Insulin is a hormone that plays a crucial role in delivering glucose, a form of sugar, in the blood to cells in the body that use it for energy. In a healthy person, cells are sensitive to this action of insulin and blood glucose levels are kept in their optimal range. If insulin sensitivity declines, a person may become insulin resistant. This keeps blood glucose levels high and diabetes can develop.

Even one session of exercise can improve insulin sensitivity. Exercise also helps keep blood glucose levels low because exercising muscles can absorb glucose without needing insulin to do so. Exercise over time can prevent diabetes—and it can help those who already have it.

INSULIN SENSITIVITY RESPONSE TO CARDIO

- Resistance training has been shown to improve insulin sensitivity. Include some form of resistance training two to three times per week, targeting all the major muscle groups as part of your weekly routine.
- Weight and/or fat loss from exercise can also enhance insulin sensitivity. Follow the nutrition suggestions in the other areas of this report and enhance weight loss from exercise by getting at least 200 to 300 minutes of moderate-to-high intensity cardio exercise per week.

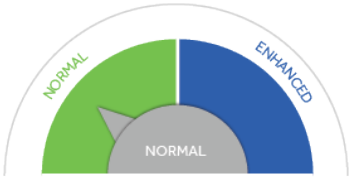
This gene seems to play a role in the insulin sensitivity response to cardio. One large study had men and women perform cardio exercise at a moderate- to- high intensity for 30 to 50 minutes, 3 times a week. Those people with the more 'favorable' genotype experienced greater than average improvements in their insulin sensitivity. Those with the 'unfavorable' genotype were less likely to improve their insulin sensitivity by exercise.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either ENHANCED, NORMAL or BELOW AVERAGE reflects whether your genotypes included those that carried a risk of an enhanced or reduced insulin sensitivity response to cardio exercise.

GLUCOSE RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a NORMAL glucose response to cardio exercise. Your score reflects the fact that your genotype showed the 'unfavorable' gene combinations. This means that you are likely to experience smaller decreases in glucose from doing cardio exercise at least 2 to 3 times per week.



Your genetic profile indicates that your glucose response to cardio is NORMAL.

You are likely to experience minimal decreases in blood glucose from cardio exercise. However, you can boost your response by exercising 4 or more days per week, by working out at higher intensities and by adding resistance training to your routine.

SUCCESS STRATEGIES

Increasing the amount and intensity of exercise you do will help to improve your glucose regulation. Perform cardio on five or more days a week.

And rather than just performing moderate-intensity workouts, after you are fit enough to push a little harder, include more high-intensity minutes into your cardio workouts. Aim to work at an intensity level that leaves you slightly breathless and that feels 'hard.' After a few minutes, recover by continuing to move at an easier pace. Then pick up the intensity for a harder interval, again followed by an easier recovery interval.

- Incorporate resistance training to enhance your blood glucose response.

RELATED GENES / SNPs

PPARG

The gene and associated SNPs included in this category have been shown to have significant associations with a person's glucose response to cardio exercise. Glucose is one of the body's main sources of energy and it comes from the breakdown of carbohydrates in the diet. Brain and nerve cells, as well as red blood cells, exclusively use glucose for energy. That's why blood glucose is maintained at constant levels—so that all the cells in the body that need it can access it. If blood glucose levels rise and stay high, eventually insulin resistance and diabetes can develop. Exercise helps regulate blood glucose levels because every session of exercise uses glucose in the muscle for energy, and the blood glucose supply is then tapped into to replenish the muscle reserves.

GLUCOSE RESPONSE TO CARDIO

- What you eat also affects your blood glucose level. Increase the amount of fiber you eat by eating more whole plant foods at every meal. But make sure that these foods are unprocessed so that you obtain more nutrients and experience a lower glycemic response from the food.

This gene seems to play a role in the glucose response to cardio and appears to be a reliable indicator of whether exercise will have beneficial effects on insulin resistance. Several studies involved a variety of individuals, both diabetics and non-diabetics, performing regular cardio for 2 to 3 days per week for up to 5 months. Those people with the more 'favorable' genotype experienced greater-than- average clearance of blood glucose. Those with the 'unfavorable' genotype showed a decreased response, or smaller drop in glucose levels. People with this genotype also had a decreased weight-loss ability—they loss less weight compared to people with different genotypes.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either ENHANCED or NORMAL reflects whether your genotypes included those that carried a risk of an enhanced or reduced glucose response to cardio exercise.

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