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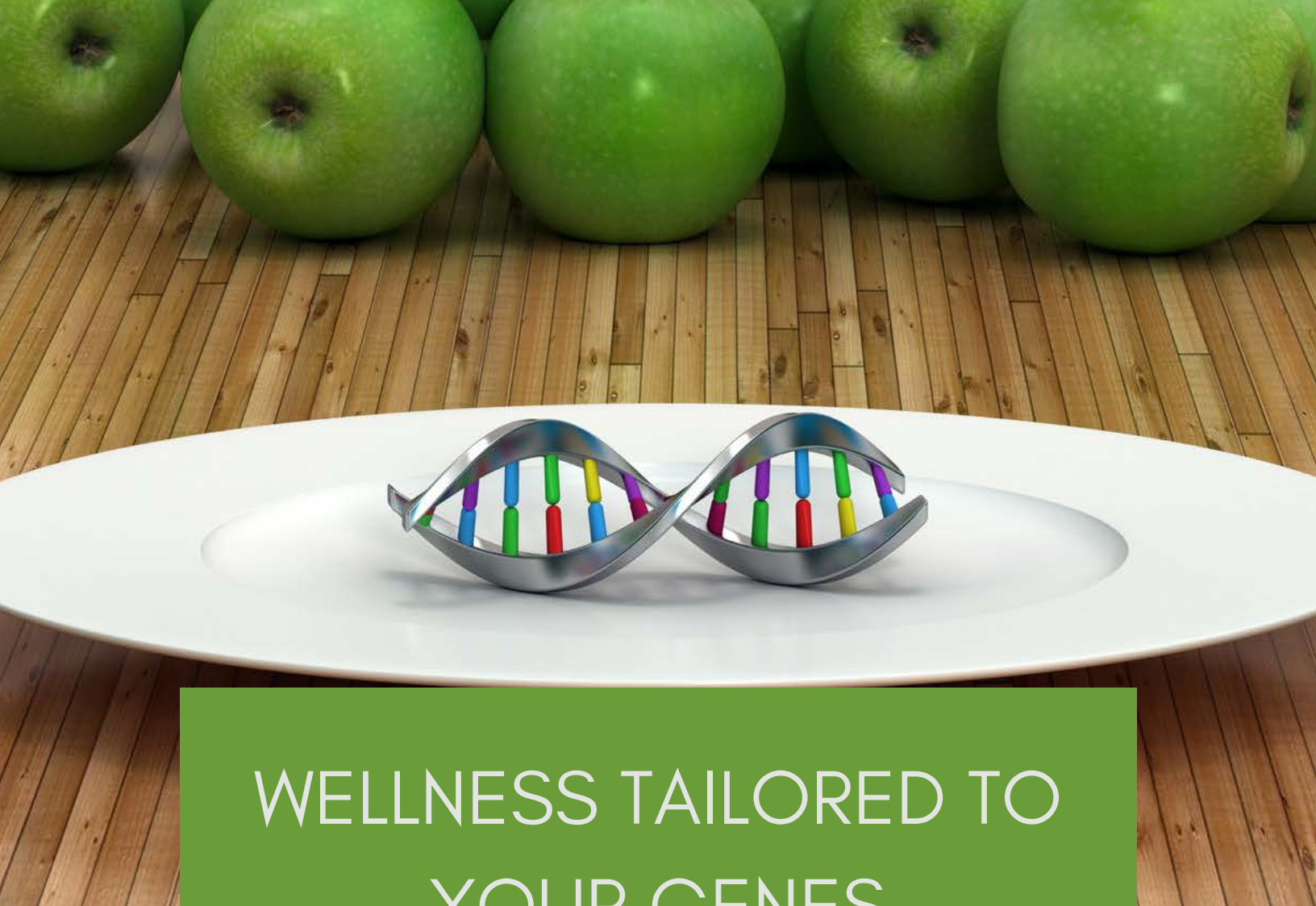
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WELLNESS TAILORED TO YOUR GENES



Prepared for: John Doe

Welcome to Your McDaniel Nutrition DNA Personal Report

McDaniel Nutrition DNA Personal Report

June 12, 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



FOOD



FOOD SENSITIVITY



NUTRIENTS



FUNCTION



EXERCISE

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
Testosterone Levels	LESS LIKELY	SHBG
Overweight Risk	NORMAL	FTO



FOOD

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



FOOD SENSITIVITY

Caffeine Metabolism	SLOW	AHR, RP11-10017.3-001, ARID3B, CYP1A1
Gluten Sensitivity	LOW	HLA-DQ
Lactose Intolerance	LIKELY	MCM6



NUTRIENTS

Vitamin B9 – Folate Tendency	LOW	MTHFR
Vitamin B12 Tendency	NORMAL	FUT2
Vitamin D Tendency	LOW	GC, NADSYN1, CYP2R1
Calcium Tendency	NORMAL	CASR, DGKD, GCKR, LINC00709, CARS, LOC105370176, CYP24A1
Iron Tendency	NORMAL	TRF2, HFE, HFE, TMPRSS6
Omega Levels	NORMAL	FADS1, ELVOL2

REPORT SUMMARY



FUNCTION

Cholesterol Response To Dietary Fat	NORMAL	LIPC
Mental Acuity	ABOVE AVERAGE	APOE, BDNF
Longevity	NORMAL	FOXO3, APOC1 (APOE-CI-CII)
Polyunsaturated Fatty Acid Tendency	NORMAL	FADS1-2
Insulin Response To Dietary Fat	NOT SENSITIVE	FTO, PPM1K
Sensitivity to Saturated Fat	NORMAL	TCF7L2, APOA2, FTO
Systemic Inflammation	NORMAL	CRP, APOC1 (APOE-CI-CII), HNF1A



EXERCISE

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
Power and Endurance Potential	HIGHER POWER	ACTN3, AGT, IL-6, NOS3, ACE, FTO, IGF1, GNB3, IL6-174

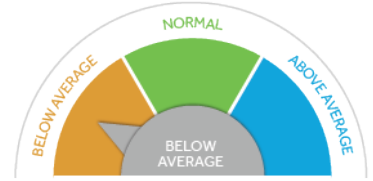


WEIGHT LOSS

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.

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

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.



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	$BMR = 88.362 + (13.397 \times \text{weight in kg}) + (4.799 \times \text{height in cm}) - (5.677 \times \text{age in years})$
Women	$BMR = 447.593 + (9.247 \times \text{weight in kg}) + (3.098 \times \text{height in cm}) - (4.330 \times \text{age in years})$

* 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.



WEIGHT LOSS

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 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



WEIGHT LOSS

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.

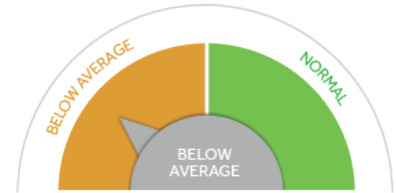


WEIGHT LOSS

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, ABCB1, 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

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

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.

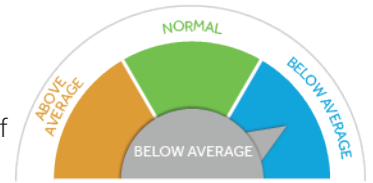


WEIGHT LOSS

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

RELATED GENES / SNPs

FTO, PPARG, BDNF, NEGR1, TMEM18, KTCDD15, 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

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



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.

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.

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.



WEIGHT LOSS

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.

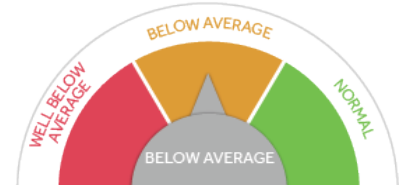


WEIGHT LOSS

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.

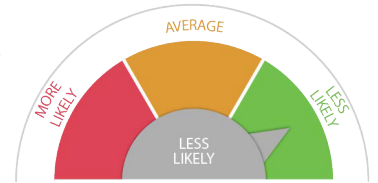


WEIGHT LOSS

TESTOSTERONE LEVELS

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you **LESS LIKELY** to have low testosterone levels, which can cause a sweeping range of negative symptoms including abdominal fat, muscle loss, anxiety, low mood, depression, erectile dysfunction, low libido, fatigue, and sleep disturbances. You are genetically predisposed to have normal or above normal testosterone levels, which will help you gain and maintain muscle size, strength, and function, as well as overall health and vitality.



Your genetic profile indicates that you are at **LESS LIKELY** risk for having low testosterone levels.

That's good news because the anabolic steroid hormone testosterone has been shown to improve muscle size, strength, and function and body composition and helps maintain overall quality of life and health.

Increasing age is one of the main "risk factors" for low testosterone. The hormone levels naturally decline with age, so having a favorable genotype may help protect you from slipping to detrimentally low levels.

That said, historically, testosterone levels appear to be lower today than in previous generations. A 2007 study published in The Journal of Clinical Endocrinology and Metabolism reported that levels of testosterone in men had fallen 17 percent from levels of men 20 years prior. So a 50-year-old man in 2004 had substantially lower testosterone levels than a 50-year-old man from 1987. Because testosterone plays such a pivotal role in vitality, performance, recovery, and health, it's important to stem your losses and take measures including nutrition, physical activity, and lifestyle strategies to maintain optimum levels.

RELATED GENES / SNPs

SHBG

The genes and associated SNPs included in this category have been shown to have significant associations with testosterone levels in men, which in turn may impact your stamina, body composition, strength, mood, and ability to make and maintain lean muscle mass.

Testosterone is a steroid hormone that is secreted by the testes and adrenal glands. It is instrumental in determining muscle size, strength, and function and also plays a role in maintaining lower levels of body fat. Low testosterone levels (defined as less than 300 ng/dl) not only hinder your ability to make gains in the gym, but also can be harmful to your health, as it's been associated with heart disease, metabolic syndrome, type II diabetes, osteoporosis, muscle loss, and increased mortality risk.



WEIGHT LOSS

TESTOSTERONE LEVELS

SUCCESS STRATEGIES

Being genetically inclined to have average to above average testosterone levels will help you maintain your ability to build lean muscle, burn fat, and maintain good health and well being. Testosterone levels are not solely determined by your genotype, however. So it's important to maintain nutrition, exercise, and lifestyle habits that optimize your advantageous genotype and help you maintain healthy hormone levels throughout your life.

First and foremost, maintain a healthy weight. As an active athlete, this is likely already a priority, but hormonal health is another reason to keep your weight in check even during "off season" times when you may not be training as rigorously. The 2011 National Health and Nutrition Examination Survey of 1,265 men ages 20 to 90 reports that increases in BMI, waist circumference, and body fat were linked to relative decreases in testosterone levels.

Also, be sure to include total body strength training, including compound moves like squats, kettlebell swings, and deadlifts in your resistance training repertoire. Research shows this type of training is superior for boosting your body's testosterone production. Likewise, include sprint-type, high intensity interval training as part of your cardio workouts, which stimulate your testosterone response better than steady-state or moderate intensity cardio sessions.

Testosterone gradually declines after age 40 (a phenomenon sometimes referred to as "andropause").

Being overweight also lowers testosterone as does smoking, and excess alcohol consumption.

Testosterone levels are also largely hereditary. Studies in male twins indicate that genetic factors account for about 65 percent of the variation in serum testosterone. A recent genome-wide association study that included a combined sample of 14,429 men identified genotypes that were associated with serum testosterone levels. One specific genetic variation was associated with a 6.5 fold higher risk of having low serum testosterone, or a 30 percent prevalence of low testosterone in men with that genotype compared to only a 4.6 percent prevalence of low testosterone among men with a more favorable genotype for serum testosterone levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **MORE LIKELY**, **AVERAGE**, or **LESS LIKELY**, or reflects whether your genotypes included those that carried the likelihood of having below average testosterone levels, average serum testosterone levels, or above average serum testosterone levels.

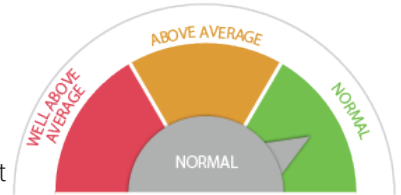


WEIGHT LOSS

OVERWEIGHT RISK

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a **NORMAL** likelihood becoming overweight as an adult. That's good news, since genetics play a significant role in overweight risk, but that does not make you immune to the condition. It is still important to take diet, exercise, and lifestyle measures to avoid excessive weight gain, because overweight is a common condition in the US. Currently more than two-thirds of the adult US population is overweight or obese, which can lead to heart disease, stroke, type 2 diabetes, and certain cancers. .



Your genetic profile indicates you are likely to have a **NORMAL** likelihood of becoming overweight during adulthood

That's good news, as overweight is a very common condition and can be hard to reverse. Take advantage of your favorable genotype and protect yourself further through healthful diet, exercise, and lifestyle habits.

SUCCESS STRATEGIES

Overweight is defined as having a BMI of over 25. As someone with a normal risk for overweight based on your genotype, you can take steps to avoid excessive weight gain by following healthful eating, exercise, and lifestyle behaviors.

Exercise is important for maintaining a healthy weight. Aim to get at least 30 to 45 minutes of physical activity most days a week, which is the amount research suggests can help avoid weight gain. Exercise alone, however, is not enough to prevent weight gain in adulthood. Research shows that what you eat plays a far more significant role in avoiding weight gain.

Following a healthy diet can be a challenge, but it is your best defense against becoming overweight. Portion control is key, as is eating nutritious, filling

RELATED GENES / SNPs

FTO

The gene and associated SNP included in this category have been shown to have significant associations with a person's likelihood of being overweight in adulthood.

The genetics of weight gain are complex. However, when it comes to overweight, the FTO or "obesity gene" as it became known after its discovery in 2007, has by far the strongest association with the risk of becoming overweight as an adult. In one genome wide study involving 38,759 participants, researchers found that those carrying two copies of a variant in the FTO gene—about 16% of the population—were about 1.7 times likely to be obese.

The gene also appears to increase risk across various ethnic populations, according to a meta-analysis including 59 studies and more than 111,500 people of a variety of



WEIGHT LOSS

OVERWEIGHT RISK

foods that will help you control your appetite, such as plenty of vegetables, fruits, lean proteins, healthy fats, and whole grains.

Take extra care to avoid foods that are closely associated with weight gain, specifically soda and sugar-sweetened beverages. A recent study found that the calories from sugar-sweetened drinks cause more weight gain and increase your risk for disease than white bread or potatoes.

ethnic backgrounds.

How the “obesity gene” triggers weight gain is still not entirely known, but it appears to impact the functioning of the hypothalamus of the brain, which is the area responsible for regulating appetite and satiety. Simply, those with the risk-associated FTO allele are genetically prone to have higher circulating levels of ghrelin, otherwise known as the “hunger hormone,” in their blood, have a greater appetite for high calorie foods, and feel less full and satisfied after eating.

Also, while it's clear that FTO plays a significant role in gaining weight, research shows that the gene doesn't appear to interfere with losing weight. In a study of more than 9,500 overweight or obese adults, researchers found that even people carrying the most high-risk variant of the FTO gene lost weight at the same rate, regardless of weight loss method they used, as those with more favorable genotypes.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **NORMAL**, **ABOVE AVERAGE**, or **WELL ABOVE AVERAGE** reflects whether your genotypes included those that carried the likelihood of becoming overweight or obese.



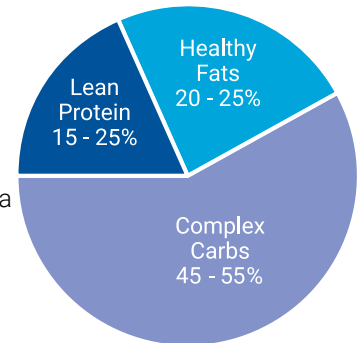
SUMMARY

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



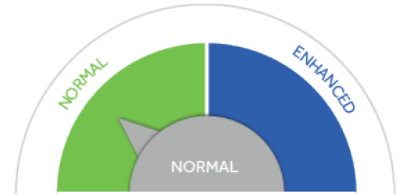
SUMMARY

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 a **NORMAL** utilization of protein. Your score reflects the fact that your genotype did not carry the allele combinations that seem to influence weight loss and lean body mass loss in response to the percentage of protein in the diet. This suggests that the amount of weight or body fat that you lose from a diet is not likely to be affected by the percentage of protein that you eat.



Your genetic profile indicates that your response is **NORMAL**

This indicates that the amount of weight you lose from a diet is not likely to be affected by the percentage of protein that you eat. Choose a diet that is 10 to 30% protein from plant or animal food sources.

SUCCESS STRATEGIES

Your genotype suggests that you are not likely to be affected in terms of greater or lesser amounts of weight loss from eating either a lower or a higher protein diet. However, it is important to note that the percentage of protein that you should eat is relative to the total amount of daily calories you take in, and so what is a “low” vs “high” amount can vary depending upon how many calories you ingest overall.

The body must get a certain minimum amount of protein for normal functioning, and that is considered to be around 10% of total daily calories when you are eating enough food to meet your daily energy needs. This minimum amount of protein must be eaten to support processes such as enzyme and hormone production, cell repair and synthesis of skin and hair cells. But this means that when you cut calories by dieting, you may need to opt for a slightly higher percentage of protein because you are eating less food overall.

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

On the other hand, eating a high percentage of protein is not necessarily beneficial, especially if you are not dieting. This is because excess protein is not stored in the body. If you consume more calories than you burn, the insulin release that is triggered by dietary protein (as well as by carbohydrates) spurs any excess amino acids from protein to be converted to body fat.

If you are dieting and therefore eating a reduced-calorie diet, consuming a “high” percentage of protein is recommended so that you make sure to obtain the minimum amount your body needs. The recommended daily allowance for protein is determined based on your body weight.

It's a good idea to get a sense of how much you are getting by recording your food intake for at least a week and entering it into a diet app or online nutrition log that can calculate the percentage of each of the macronutrients you eat.

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

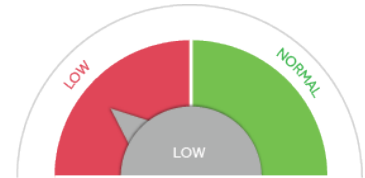
Tofu (1/2c - 4.4oz) - 11g



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.



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

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.



FAT UTILIZATION

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.

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.



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

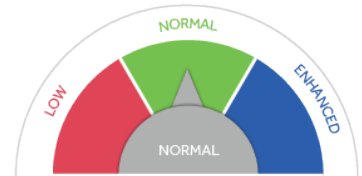
Butter (1T) - 12g

Oils (1T) - 14g

CARB UTILIZATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a **NORMAL** utilization of complex carbohydrates. Your score reflects the fact that your genotype does not appear to produce greater weight loss with a higher complex carbohydrate diet, and you can expect to lose around the same amount of weight with either a low, moderate or higher complex carb diet. Complex carbs provide the most nutrients and fiber and, if you exercise, can provide you with longer-lasting energy.



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

This suggests that the percentage of complex carbohydrates in a reduced-calorie diet may not affect your weight loss results – you can expect to lose a similar amount of weight with either a low, moderate or high complex carbohydrate diet. Complex carbs provide the most nutrients and fiber and, if you exercise, can provide you with longer lasting energy.

SUCCESS STRATEGIES

To lose weight, your genotype suggests that you can lose weight with any reduced calorie diet, regardless of proportions of the macronutrients (fat, protein and carbs) as long as you reduce overall calories to less than you burn each day.

Study your results from the other Macronutrient genetic analyses for more guidance on the best type of diet to choose. Also, if you have certain health conditions, it may be optimal to adapt your eating choices based on established dietary recommendations for specific issues. For example, if you have health conditions like poor cholesterol or hypertension, a lower carb and higher fat diet may not be beneficial. You may experience more health benefits from a plant-based diet that is very low in fat from foods

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

(such as meat, cheese and even avocado) or added fats (like oils and butter).

But remember, to achieve success with any approach, and to keep the weight you lose off for the long term, you must choose a plan that is easy to stick to. It's the long term adherence that will make a difference in how lean you are over time. Choose the type of plan that will help you maintain the healthier lifestyle changes that you make.

SUGGESTED CARBOHYDRATES

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

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

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

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

Garbanzo/Chickpeas	Split peas
Pinto beans	Black-eyed peas
Northern beans	Lentils
Fava/Broad beans	Edamame beans
Kidney beans	Navy beans
White beans	Mung
Black beans	

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

Peas, green (1/2 c)	Yam, sweet potato, plain (1/2 c)
Red/New Potato, baked or boiled, 1 small (3 oz)	Squash, winter - acorn, butternut (1 c)

Preferred Fruits - suggested serving size contains 15g of carbohydrates

Apple, unpeeled, 1 small (4 oz)	Grapes, 17 small (3 oz)	Pear, fresh, 1/2 large (4 oz)
Apricots, fresh, 4 whole (5 1/2 oz)	Honeydew, 1 slice (10 oz or 1 c cubes)	Pineapple, fresh 3/4 c
Banana, small 1 (4 oz)	Kiwi, one (3 1/2 oz)	Plums, 2 small (5 oz)
Blackberries (3/4 c)	Mango, small, 1/2 fruit (5 1/2 oz or 1/2 c)	Raisins (2 T)
Blueberries (3/4 c)	Nectarine, 1 small (5 oz.)	Raspberries (1 c)
Cantaloupe, small (1/3 melon or 1 c cubes)	Orange, 1 small (6 1/2 oz)	Strawberries, whole berries (1 1/4c)
Cherries, sweet, 12 fresh (3 oz)	Papaya, 1/2 fruit (8 oz or 1 c cubes)	Tangerines, 2 small (8 oz)
Grapefruit, 1/2 large (11 oz)	Peach, fresh, 1 medium (6 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	Quinoa - 28g	Oats - 15g
Kamut - 26g	Barley - 22g	Amaranth - 23g

PROCESSED/LESS DESIRABLE CARBOHYDRATES

Less Desirable Starchy Vegetables

Mixed vegetables with corn or peas	Corn on the cob	Corn
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Less Desirable Grains

Bread	Cereal	Rice
Bagel	Crackers	Pasta
Pancake/Waffle		

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.



FOOD SENSITIVITY

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.

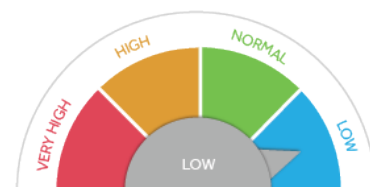


FOOD SENSITIVITY

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, blistering 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.

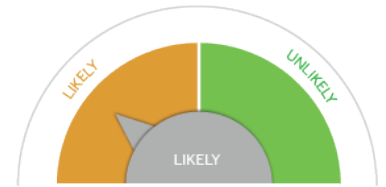


FOOD SENSITIVITY

LACTOSE INTOLERANCE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you **LIKELY** to be or become lactose intolerant. That means you are likely to have or develop difficulty digesting lactose, the sugar found in milk, and suffer GI distress from consuming dairy products. Since dairy products are a major source of calcium and vitamin D in the US diet, it's important to get enough of those essential nutrients elsewhere in your diet.



Your genetic profile indicates that you are **LIKELY** to develop lactose intolerance (if indeed you haven't already).

You can manage your condition by limiting dairy products and other foods that contain lactose. Realize that limiting dairy may also mean shortchanging essential nutrients calcium and vitamin D. 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 bone integrity. You can maintain your bone, muscle and general health by getting these nutrients from alternative food sources.

SUCCESS STRATEGIES

Lactose intolerance doesn't necessarily mean zero tolerance to all dairy products. Whether you're at risk or have started to develop lactose intolerance symptoms, you may be able to take in a small amount of dairy—about a cup a day—without problems. Some people who are lactose intolerant can eat yogurt with live cultures without suffering GI symptoms. Experiment with small doses. It's a matter of getting to know your own body to know what you can and can't tolerate. If you believe you have lactose intolerance, it's a good idea to also consult with your doctor to be sure your symptoms are not being caused by another problem. Once you know for certain, there are many ways to manage it comfortably and healthfully.

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

Buy lactose free. You can buy nearly all dairy products in a lactose-free form. These products have added lactase in them to help you break down the lactose and have similar nutritional profiles to traditional dairy products.

Supplement the enzyme. You can take lactase capsules or tablets before eating or drinking dairy products or milk that may eliminate or ease symptoms.

Try milk alternatives. There is no shortage of alternative “milk” products on the market today. Some, like almond milk, may have more calcium than dairy milk, but not all offer as much calcium and/or vitamin D as milk, so read the labels to be sure that what you’re buying is fortified.

Eat alternative calcium sources. Dairy isn’t the only source of calcium. You can get healthful doses from canned sardines and salmon, fortified juices and cereals, fortified soy products, almonds and dark leafy greens like kale and collards.

Check pre-packaged foods. If you’re particularly sensitive to lactose, get in the habit of reading your labels carefully. Food manufacturers often add milk and milk products to a variety of foods including breakfast foods like waffles and pancakes, bread and baked goods, soups and even salad dressings and snacks.

Get your D. Sunlight is the main source of vitamin D, but we need it from our diet, too. If you don’t eat dairy, get your vitamin D from fatty fish like wild-caught salmon, mackerel and tuna and/or fortified foods like soy milk, juice and cereals.

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.



SUMMARY

What nutrients do you need?

NUTRIENTS	TENDENCY	GOOD SOURCES INCLUDE
Folate	LOW	Pinto Beans, Asparagus, Broccoli
Vitamin B12	NORMAL	Lean meat, Seafood, Fortified Dairy Product
Vitamin D	LOW	Salmon, Egg Yolks, Fortified Dairy Milk
Calcium	NORMAL	Raw Milk, Yogurt, Kale
Iron	NORMAL	Spirulina, Grass Fed Beef, Lentils
Omega Levels	NORMAL	Salmon, Flax Seeds, Walnuts

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.

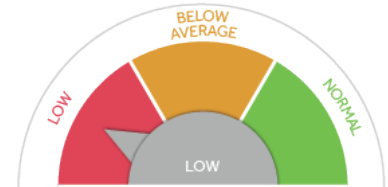


NUTRIENTS

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.



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

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



NUTRIENTS

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.

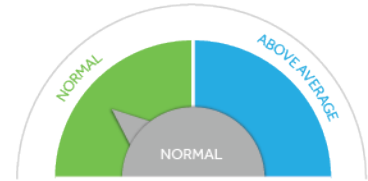


NUTRIENTS

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.

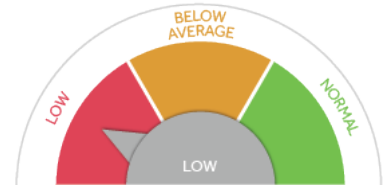


NUTRIENTS

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.



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.

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



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.

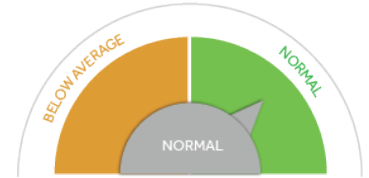


NUTRIENTS

CALCIUM TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have **NORMAL** blood levels of calcium. That means you likely have adequate circulating calcium in your bloodstream so your body doesn't have to leech it from your bones to maintain healthy cellular function. You should continue getting 1,000 mg (men) to 1,200 mg (women) of calcium a day through a vitamin and mineral-rich diet.



Your genetic profile indicates that you are inclined to have **NORMAL** blood levels of calcium.

Continue eating a healthy diet and maximize your skeletal health with bone-building lifestyle and exercise habits.



RELATED GENES / SNPs

CASR, DGKD, GCKR, LINC00709, CARS, LOC105370176, CYP24A1

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

Calcium is the most plentiful mineral in the human body and is used by nearly every cell in the body. It's well known that the mineral is essential for maintaining skeletal and dental health, as your bones and teeth are where the lion's share of calcium is stored. Calcium also is required for nerve function, muscle contraction, hormone release and heart health.

Your body keeps the amount of calcium circulating in your bloodstream within a certain range to allow all your specific cells to have what they need to perform their jobs. When those levels dip below that range, your body pulls what it needs from your skeleton. Over time that leads to weakened bones.

Your calcium levels are influenced by your diet, how well your intestines absorb the

SUCCESS STRATEGIES

Our bodies become less adept at absorbing calcium as we age, so it's important to continue eating a diet that is rich in this essential mineral as well as to perform healthy lifestyle practices to keep your skeleton strong.

Consume more calcium. Some food sources of calcium are dairy, canned fish like salmon and sardines, tofu, almonds and fortified alternative milk products, as well as collard greens, kale and spinach.

Skip supplements. Calcium supplements have been the topic of considerable controversy in recent years. Some research finds that they are not useful for preventing fractures and may be linked to increase risk for heart disease. You can get plenty of calcium in your diet and your genotype does not call for additional amounts.

Stay active. Be sure to get regular "impact" exercise like jogging, tennis, or strength training. Your bones need some stress to get the signal to grow. Every time you load or add resistance to your bones, they release calcium into your blood. That calcium is then circulated and sent back to your bones which



NUTRIENTS

CALCIUM TENDENCY

then grow and become stronger. So these activities help keep them strong. Strength training two or three days a week has also been shown in studies to help build and maintain bone density.



CALCIUM-RICH FOODS TO INCLUDE IN YOUR DIET:

Raw milk, almonds, okra, broccoli, cheese, kale, yogurt

calcium you take in, levels of phosphate in the body, your vitamin D levels and by levels of certain hormones like parathyroid hormone, calcitonin and estrogen. Emerging research also shows that your genotype may influence blood calcium levels. In one very large study of 39,400 men and women, researchers found variations in these genes had a significant impact on blood calcium levels, which echoes findings from previous animal research as well as a study of 1,747 twins that estimated heritability to be 33 percent for blood serum calcium levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **NORMAL** or **BELOW AVERAGE** reflects whether or not your genotypes included those that increased your risk for low blood calcium levels.

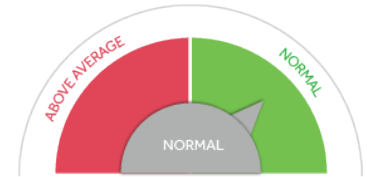


NUTRIENTS

IRON TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have **NORMAL** blood iron levels. That's good because without enough iron, your blood can't carry the oxygen your cells need to function. You should continue eating a healthy diet that includes iron-rich foods such as lean meat, poultry and fish as well as dried beans, lentils, whole grains and fortified cereals to ensure you get the amount you need each day (8 milligrams a day for adult men and women over 50; 18 milligrams a day for women 19 to 50). This is especially important if you are a premenopausal woman and/or follow vegan diet, as these raise your risk for becoming iron deficient.



Your genetic profile indicates that you are likely to have **NORMAL** blood levels of iron.

That does not mean that you are not at risk for running low or developing iron-deficiency anemia, so it's important to maintain healthy mineral levels by eating an iron-rich diet.



RELATED GENES / SNPs

TRF2, HFE, HFE, TMPRSS6

The genes and their associated SNPs included in this category have been shown to have significant associations with a person's blood iron levels.

Iron is a well-known essential nutrient that most of us associate with energy. That's because along with regulating cell growth and other metabolic functions, iron is vital for producing hemoglobin, a protein your red blood cells use to deliver oxygen throughout your body. Without enough oxygen, all your metabolic functions suffer. On the flip side, too much iron is toxic and can be equally, if not more damaging than having too little and may cause organ damage and raise your risk for diabetes, heart attack, neurodegenerative conditions like Alzheimer's and cancer. Many factors influence your iron levels including diet, gender, age, and activity level. In premenopausal women, the primary cause of iron deficiency is heavy menstrual bleeding

SUCCESS STRATEGIES

The majority of adults in the US get ample amounts of iron through their usual daily diet. There are some exceptions, however. Premenopausal women, especially those with heavy menstrual cycles, and vegetarians, particularly vegans, run higher risks of becoming iron deficient and developing anemia. The human body is good at storing iron and too much can be toxic, so it's not a good idea to supplement iron without consulting your doctor. But you can follow some iron-smart strategies to be sure you're getting optimum amounts.

Boost your iron absorption. When it comes to your body's absorption, not all iron is created equal. Your body absorbs heme iron, which is found in animal foods such as meat, poultry and fish is up to three times more efficiently than it does non-heme iron, which is found in plant-based foods such as leafy greens, beans, nuts, vegetables, whole grains and cereals.



NUTRIENTS

IRON TENDENCY

However, you can absorb greater amounts of iron from the non heme iron foods you eat by pairing them with vitamin C-rich foods, as the antioxidant can nearly triple non-heme iron absorption. Try adding bell peppers, red cabbage, and tomatoes to grain dishes and berries to cereals.

Cook with cast iron. Cooking with cast-iron skillets and other cookware can increase your iron levels, as iron is released into your foods as they're being cooked. One study found that foods cooked in iron pots contained more than 16 percent more iron than those cooked in non-stick Teflon pots.

Limit iron blockers. If you avoid meat and low iron is a concern, take extra steps to limit your intake of foods and beverages that interfere with non-heme iron absorption. The biggest offenders appear to be tea, coffee and red wine, all of which contain tannins that bind with iron and carry it out of the body. In one study people who drank tea with a meal reduced their non heme iron absorption by 62 percent; coffee reduced it by 35 percent.



IRON-RICH FOODS TO INCLUDE IN YOUR DIET:

Spirulina, liver, grass-fed beef, lentils, dark chocolate, sardines, black beans, pistachios, raisins

as blood loss means iron loss. High levels of physical activity— especially if it's particularly long and/or strenuous also may lead to a decline in iron levels, especially in women. Vegans and vegetarians also may be at risk for low iron levels, as the iron in plant-based foods (non-heme iron) is harder for the body to absorb than iron from animal sources (heme iron). Older adults, again especially women, generally need less iron to maintain healthy stores than men.

Your genes also may play a role, particularly in the tendency for above normal iron levels. Research has found that certain gene mutations may impact how much iron your body absorbs and recycles, creating borderline or high levels of iron in circulation. At the extreme end is a genetic disorder called hemochromatosis, which occurs in about 10 percent of white people of Northern European ancestry. People with this condition absorb three to four times as much iron from food as those without these genetic mutations. Other mutations can leave you susceptible to a more mild form of hemochromatosis, leading to accumulating slightly higher than average stores of iron.

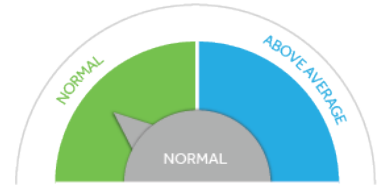
Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **NORMAL** or **ABOVE AVERAGE** reflects whether your genotype included those alleles that were found to lead to a tendency of having normal or high levels of this essential mineral.



OMEGA LEVELS

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have **NORMAL** levels of omega-3 and omega-6 fatty acids. Because your body cannot make these essential fatty acids and many adults do not meet their dietary intake of them, especially omega-3 fatty acids, which are found in fatty fish, walnuts, flaxseeds, it's important that someone with your genotype consumes adequate amounts of foods with the right essential fatty acids to ensure you have optimum plasma levels for good health and to maintain a healthy weight, as these fats are essential for both.



Your genetic profile indicates you are likely to have **NORMAL** levels of omega-3 and omega-6 fatty acids

You should choose foods that provide healthful amounts of these essential fatty acids to ensure you have adequate amounts for good health and weight loss or maintenance.



Both omega-3 and omega-6 fatty acids are essential for good health and wellness. Because your body cannot make them itself, you need to consume adequate amounts through your diet to maintain the plasma levels you need for them to do their job.

Omega-3 fatty acids, found in fatty fish, flaxseeds, and walnuts are essential for brain development and heart health. Research also suggests that not only does eating foods rich in omega-3s help you feel fuller, so you're likely to eat less, but also omega-3s may help you lose weight by reducing your appetite and increasing your body's fat burning metabolism.

Omega-6 fatty acids, found in vegetable oils like soybean, safflower, and corn are also essential, but can increase inflammation and be harmful to your health when eaten in excess, especially if you also consume low doses of omega-3 fatty acids, both of which are common in the typical American diet.

RELATED GENES / SNPs

FADS1, ELVOL2

The genes and associated SNPs included in this category have been shown to have significant associations with the levels of omega-6 and omega-3 fatty acids found in your body.

Omega-3 and omega-6 are called essential fatty acids (EFA), meaning your body cannot synthesize them on its own; you need to consume them, and then your body converts them into usable forms in your tissues. These essential fatty acids make up important parts of your cell membranes, assist with tissue growth and repair, and help regulate blood pressure and inflammation in the body. Omega-3 fatty acids, in particular, are important anti-inflammatories and are associated with better metabolic and cardiovascular health.

Diet is an obvious determinant of EFA levels. Your DNA also plays a role in the metabolism and subsequent tissue levels of



NUTRIENTS

OMEGA LEVELS

Some research also finds that risk for obesity rises with excess levels of omega-6 as compared to omega-3 fatty acid levels. As someone genetically inclined to have average levels, you should take extra steps to consume the essential fatty acids you need.

SUCCESS STRATEGIES

Because omega-6 fatty acids are found in common cooking and baking oils like corn, safflower, peanut, and vegetable oil as well as mayonnaise and many salad dressings, most Americans eat adequate amounts of this type of EFA. To be sure you have a healthy balance of EFAs and adequate amounts of omega-3s, which most Americans fall short on, prioritize omega-3 fatty acid rich foods over those rich in omega-6 fatty acids in your diet. Here's how.

Eat more fish. The American Heart Association and USDA both recommend consuming at least two 3.5-ounce servings of fatty fish each week. The majority of Americans eat a fraction of that amount. Your best choices for high amounts of omega-3s are mackerel, salmon, herring, oysters, and sardines.

Snack on walnuts. Walnuts are an excellent source of omega-3s. They're also rich in fiber, so make a filling snack and a nice substitute for peanuts in trail mix.

Change salad dressings and condiments. Salad dressings and condiments generally skew heavily toward omega-6 fatty acids. Make yours more omega-3 rich by making your own with walnut, flaxseed, or rapeseed oil. Sprinkle chia seeds on your salads and sides for added omega-3s.

these fatty acids. Genome-wide association studies indicate that your genes, particularly FADS1 and ELVOL2, influence the activity of enzymes that convert these essential fatty acids in your body, and as a result variants of these genes have been associated with plasma levels of omega-3 and omega-6 in adult populations. That means that your dietary needs may be higher or lower to achieve optimum essential fatty acid levels, depending upon your particular variants of these genes.

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 normal omega-3 and omega-6 levels or higher than normal omega-3 and omega-6 levels.

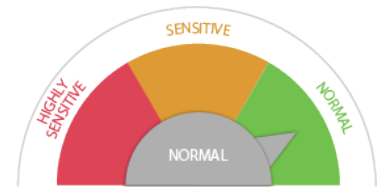


FUNCTION

CHOLESTEROL RESPONSE TO DIETARY FAT

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a **NORMAL** blood lipid response to eating dietary fat. That means you may be less inclined to see significant changes in your cholesterol levels in response to a moderate or higher fat diet, which is in keeping with landmark studies, such as the Nurse's Health Study and the Health Professionals Follow Up Study, which found no link between overall percentage of calories from fat and heart disease. That said, not all fats are created equal, and it's still wise to choose the healthiest types and minimize those that research shows may have negative health effects.



Your genetic profile indicates that you have a **NORMAL** cholesterol response to eating dietary fat.

You can maximize the health benefits from the fats you eat by focusing on eating beneficial good fats and avoiding or minimizing harmful fats.



RELATED GENES / SNPs

LIPC

The gene and associated SNPs included in this category have been shown to have significant associations with a person's blood lipid response to eating dietary fat.

Little in the nutrition landscape has been as rife with controversy and confusion as dietary fat. For decades, the brightest brains in medical science have debated, studied and scrutinized the impact the fat we eat has on our health, specifically our cholesterol levels and subsequent cardiovascular health. The results are mixed and consensus is very hard to come by. It's possible that the situation is so confounded because individual responses are just that, individual. A growing body of gene research indicates that variations in your genetic code may impact how your body responds to a host of dietary factors, including fat.

In one study, researchers measured the total cholesterol, triglycerides, LDL cholesterol, HDL cholesterol levels, and genotype of 743

SUCCESS STRATEGIES

Research indicates that people with higher blood levels of PUFAs tend to live longer, healthier lives, especially with regard to heart disease, than those with the lowest. The American Heart Association, along with PUFA research, supports a diet that gets about 5 to 10 percent of its energy from PUFAs like linoleic acid (LA), one of the PUFAs that your genotype shows you are inclined to have higher than average levels of in your bloodstream.

You can maximize your favorable genetic profile and maintain high levels of these protective essential fatty acids by taking cues from the Mediterranean and Japanese diets—both of which are high in PUFAs and linked to longevity and good heart health—and include more fish, nuts, seeds, olive and plant oils, vegetables and soy foods in your diet while eating fewer meals based around meat and simple carbohydrates.



FUNCTION

CHOLESTEROL RESPONSE TO DIETARY FAT

Even though some processed foods are made with PUFA-rich vegetable oils, they still aren't healthy and you should continue to avoid them. PUFAs can be oxidized during processing, which may make them more harmful than healthful.

overweight men and women and then asked them to eat either a high fat (40 percent of daily calories) or a low-fat (20 percent of daily calories) diet for two years, when they would retest their lipid levels.

At the end of the study, the men and women who carried the A allele form of this gene were particularly sensitive to dietary fat in that when they ate a low fat diet, their total and LDL cholesterol levels dropped compared to their peers with other genotypes. Conversely, when they ate a higher fat diet, their total and LDL cholesterol levels rose. Other studies have pinned increases in protective HDL cholesterol with other variations of the LIPC gene.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of **NORMAL**, **SENSITIVE** or **HIGHLY SENSITIVE** reflects whether or not your genotypes included those that increased your blood lipid sensitivity to dietary fat.

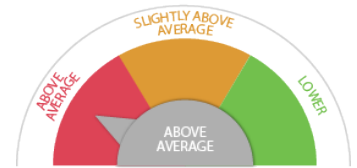


FUNCTION

MENTAL ACUITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your gene profile exhibits characteristics that make you at an **ABOVE AVERAGE** risk for mental acuity decline with age. That means you are more likely to experience age-related problems with memory and brain function. The good news is that there are many lifestyle and behavioral factors that impact your brain health and cognitive ability. You can take steps right now to minimize decline and build and protect your brain's health and sharpen your mind with a healthy diet and regular physical and mental exercise.



Your genetic profile indicates that you are at **ABOVE AVERAGE** risk for mental acuity decline with age.

You can start right now to minimize the impact of those genes and protect and build your brain with physical and mental exercises that will help you maintain healthy cognitive function as you get older.

SUCCESS STRATEGIES

It's normal to worry about declining mental sharpness with age because it is essential to our independence, physical well being and simple joy of life. Adopting a lifestyle that includes regular physical exercise, continual learning and cognitive stimulation, and a diet that is high in essential nutrients has been shown to be the most effective means for preserving and even enhancing your cognitive function at any age.

Adopt a Mediterranean diet. The food you eat can protect your brain. Research finds that a traditional Mediterranean diet that is rich in olive oil, fish, vegetables, beans, nuts, fruits, whole grains, and is low in refined sugars and meat, may be the best for brain health because it is high in anti-inflammatory monounsaturated fats, which protect your arteries (your brain needs good circulation) and your general health. One Columbia University study that tracked the eating habits of nearly 2,000 men and women for

RELATED GENES / SNPs

APOE, BDNF

The genes and their associated SNPs that are included in this category have been shown to have significant associations with age-related mental acuity decline.

Brain-derived neurotrophic factor (BDNF) is a protein that helps you grow new brain cells and helps keep your existing neurons alive. It's vital for learning, short and long term memory and higher thinking. It is encoded by the BDNF gene. It also appears to be an important marker of cognitive health and memory in women (though for reasons not yet clear, the association is not strong in men).

One study of 369 older adults, average age of about 73, found that women who had one of two minor variations of this gene had an increased risk of poorer cognitive performance (memory and perceptual speed, how quickly your brain interprets and



FUNCTION

MENTAL ACUITY

close to five years found that those who most closely followed a Mediterranean style diet showed a 28 percent lower risk of mild cognitive impairment compared to those who did not follow Mediterranean eating patterns. Moderate consumption of alcohol, particularly wine, that is a hallmark of this diet may have its own protective effect against mental acuity decline.

Eat at least 8 ounces of fish a week. Fatty fish, like wild salmon, herring, sardines, and anchovies are especially rich in the omega-3 fatty acid DHA, which is highly concentrated in the brain. Eat at least two 4 ounce servings of fatty fish each week to boost your omega-3 levels and protect your cognitive health.

Exercise at least 30 minutes a day. When you exercise, you dramatically increase the production of neurotrophins such as BDNF, which promotes stem cell division and new brain cell formation, effectively doubling or tripling the production of neurons. In one study, researchers had 59 sedentary adults either start an aerobic exercise (brisk walking) program or remain sedentary for 6 months. After just three months, scans showed that the exercisers had built their brains so that they had the volume of people three years younger. One meta analysis of 15 studies that included more than 33,000 men and women followed for up to 12 years showed that people with the highest levels of physical activity were 38 percent less likely to show signs of mental acuity decline over time compared to their peers who did very little activity. It only takes 30 minutes a day to reap potent brain benefits. Make it a priority.

Exercise your brain with brain training. Your brain thrives on challenge. Every task you perform stimulates a vast network of billions of neurons connected by trillions of synapses. When you perform novel or challenging tasks such as learning a new language, playing chess, solving puzzles and even intricate physical tasks like ballroom dancing, you engage new pathways, stimulate neurogenesis and build what you could call a cognitive reserve. Challenge and exercise your brain daily to delay the onset of and/or reduce the impact of age related mental acuity decline.

Get 7 to 8 hours of sleep each night. Adequate sleep is essential for brain health. When you sleep your glymphatic system—a network of water channels in the brain—become active and shuttles waste, which would otherwise build up and damage brain cells, out of your brain. Too little sleep long term is bad for brain health.

organizes information) as compared with their peers who carried major forms of the gene. The more minor variations of these genes they carried, the greater their risk of decreased cognitive function, especially regarding memory and perceptual speed. Other research shows that the interaction of BDNF with another genotype (APOE4) increases the likelihood and magnitude of mental acuity decline.

It can be scary to hear that you're at a higher risk for mental acuity decline. Remember, however, that gene science is still relatively very young and there are a great many factors that impact your brain health and cognitive functioning beyond genetic predisposition. Likewise, there are myriad steps you can take to help maintain healthy brain function as you age. Knowing that you may be at above average risk genetically gives you time to take those steps early to protect your brain later in life.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **LOWER**, **SLIGHTLY ABOVE AVERAGE**, or **ABOVE AVERAGE** reflects whether your genotypes included those that carried a risk for more or less mental acuity decline with age.

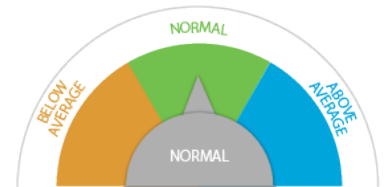


FUNCTION

LONGEVITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a **NORMAL** likelihood of extreme longevity. That means you may be more likely to live into your 90s and 100s. It's important to remember, however, that genes are only one of many factors that contribute to a long lifespan. Your lifestyle, diet, exercise habits and other behaviors have been shown in numerous studies to have a major impact on lifespan and longevity.



Your genetic profile indicates that you have a **NORMAL** likelihood of extreme longevity.

You can make the most of your advantageous genetic profile by adopting healthy lifestyle behaviors that will help you avoid the common chronic diseases that can shorten your lifespan regardless of genetic profile.

SUCCESS STRATEGIES

"Good genes" contribute to longevity, but lifestyle plays a major role. You still need to take care of your health and practice lifestyle, diet and exercise behaviors that will maximize your genetic potential.

Eat well & exercise. Exercising two to four times a week increases the likelihood you will live to 90, regardless of your genes. Likewise, it is important to maintain a healthy weight, which means complementing regular physical activity with a balanced diet.

Watch your "sugars." Blood sugar and insulin sensitivity appear to be inexorably linked to longevity. The FOXO gene is a key component of the insulin pathway, as well as human longevity. Research shows that long-lived men exhibit several biological markers that indicate greater insulin sensitivity along with a favorable FOXO3A GG genotype. Other studies suggest that

RELATED GENES / SNPs

FOXO3, APOC1 (APOE-CI-CII)

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's likelihood of extreme longevity—living into one's 90s or 100s.

To live a long, healthy life is a very common human goal. Life expectancy from birth hovers in the mid- to late- 70s for men and the early to mid-80s for women around the world. For those who reach age 65, life expectancy is above average. For decades, scientists have studied human lifespan and why some people live 100 years and beyond while others fall short. The answers are, of course, complex and multifactorial, including geography, culture, lifestyle and much more.

Genetics are also known to play a key role, especially in our later years. The genetic contribution to longevity in humans overall has been widely estimated to be about 25



FUNCTION

LONGEVITY

consuming high amounts of sugar and the subsequent insulin response “turns off” genes associated with longevity. Having diabetes resulted in an 86 percent increase in the risk of dying before 90 in a study published in the Archives of Internal Medicine study.

Eliminate processed, white flour, high sugar foods from your diet as much as possible. Instead eat a balanced, high fiber, primarily plant food diet that is known to help maintain healthy blood sugar levels.

Keep your heart healthy. High blood pressure is a major health risk and can shorten your lifespan. Know your numbers and maintain a healthy blood pressure level of 120/80.

Don't smoke. Nobody has to tell you that. But don't.

percent. The older you get, the more genes come into play. Scientists now know that genetic factors have an increasing impact, particularly after 60 and profoundly from age 85 onwards.

A growing body of research on thousands of the “oldest of the old,” those in their 90s and 100s, show that these two genes and their alleles are strongly associated with one's likelihood for extreme longevity, while other gene mutations appear to reduce that likelihood by up to 50 percent. Interestingly, previous research has shown that long-lived families carry as many genetic mutations that put them at risk for disease as the general population. These other gene variants just appear to promote healthy aging and protect them from disease.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of **BELOW AVERAGE**, **NORMAL** or **ABOVE AVERAGE** reflects whether or not your genotype included that those increase your likelihood to live into your 90s or 100s.

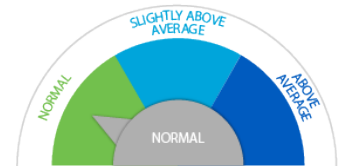


FUNCTION

POLYUNSATURATED FATTY ACID TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you the likelihood of having **NORMAL** PUFA blood levels. That's okay news, but may not be great news. Blood levels of PUFA vary by geography and dietary habits. The average PUFA levels among Japanese people living in Japan where fish is a daily staple of the diet, for instance, are quite higher than the average American consuming the average American diet. Also, your genes may make you somewhat less efficient at converting and metabolizing the fatty acids you need. So even if your levels are average, there is likely room for improvement to increase circulating levels of these protective essential fatty acids.



Your genetic profile indicates that you are likely to have **NORMAL** blood levels of PUFAs.

We recommend swapping some of the saturated fat and/or simple carbohydrate rich foods with those rich in unsaturated fats to raise your PUFA levels, lower cholesterol and reduce your risk for coronary artery and heart disease.

SUCCESS STRATEGIES

A recent study published in the British Medical Journal found that a close adherence to Japanese dietary guidelines is associated with a lower risk of death from all causes, particularly heart disease and stroke. The men and women who followed it most closely had a 15% lower mortality rate over the span of the 15-year study. That's not surprising when you consider that the recommended Japanese diet is rich in fish, soy and vegetables, all of which are good sources of PUFAs.

The American Heart Association, along with PUFA research, supports a diet that gets about 5 to 10 percent of its energy from PUFAs like linoleic acid (LA) to reduce cardiovascular disease risk. You can increase your intake of PUFAs by eating more nuts (just 7 shelled walnuts provide 11 grams of linoleic acid), seeds and fish. Instead of using butter and cream as your primary source of dietary fat, try olive, canola or walnut oil. Go meatless one

RELATED GENES / SNPs

FADS1-2

The gene and its associated SNP that is included in this category has been shown in studies to have significant associations with a person's blood levels of polyunsaturated fatty acids (PUFAs).

Your body needs a certain amount of fat to perform all of its vital biological functions including produce certain hormones, absorb fat-soluble nutrients like vitamins A, D, E and K, and maintain your body temperature. Though your body is very good at storing fat, there are essential fatty acids, such as PUFAs, that need to be eaten in your diet to maintain healthy levels.

Polyunsaturated fats include omega-3 fatty acids and omega-6 fatty acids, are found in plants like nuts, seeds, and vegetable oils and seafood, and are generally considered heart healthy. Research shows a strong association between the levels of PUFAs in



FUNCTION

POLYUNSATURATED FATTY ACID TENDENCY

or two days a week and substitute soybeans and/or tofu for animal sources of protein.

Take note, it's still important for your health to minimize your intake of processed foods, even those that are made with or cooked in vegetable oils. Those oils may be healthy when drizzled over your steamed vegetables, but they don't stand up to processing and can oxidize in ways that make them harmful rather than healthful.

the blood and the status of a person's health. In a 16-year analysis of 2,700 older men and women, those with the highest omega-3 PUFA levels had a mortality rate 27 percent lower than those with the lowest levels. After age 65, those with the highest levels lived an average of 2.2 years longer than those with the lowest.

The level of these essential PUFAs in your bloodstream is largely determined by what you eat because your body cannot make its own. There is also some genetic influence to blood PUFA levels. Large scale meta-analysis gene studies have found a strong link between variations of the FADS1-2 genes and concentrations of PUFAs, particularly omega-3 fatty acid alpha-linolenic acid (ALA) and omega-6 fatty acid linoleic acid (LA), both of which have been linked to lower cholesterol levels and reduced risk for coronary artery and heart disease.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of **NORMAL**, **SLIGHTLY ABOVE AVERAGE** or **ABOVE AVERAGE** reflects the level of circulating PUFAs that are likely to be present in your blood.

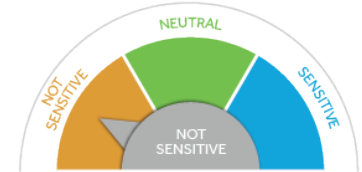


FUNCTION

INSULIN RESPONSE TO DIETARY FAT

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a **NOT SENSITIVE** insulin response to consuming dietary fat. That means you can expect to have a positive insulin response to following a lower fat (about 20%) diet and may experience less insulin sensitivity following a high fat diet. It's important to note, however, that not all fats are created equal and there is good evidence that including healthy fats in your diet can positively rather than negatively impact insulin resistance. The carbohydrates you choose still play a very important role, as well.



Your genetic profile indicates that you have a **NOT SENSITIVE** insulin response to consuming dietary fat

Following a lower fat diet will help you maintain healthy insulin sensitivity and blood sugar levels. It's also important to choose carbohydrates wisely and to not entirely cut out fat, but rather to choose your fats wisely, as fat is essential for good health and beneficial fats can positively impact insulin sensitivity.

RELATED GENES / SNPs

FTO, PPM1K

The gene and associated SNPs included in this category have been shown to have significant associations with a person's insulin response to eating dietary fat.

When most of us think insulin, we think sugar and carbs. However, dietary fat also drives insulin response and has long been vilified as contributing to insulin resistance and subsequent fat storage—especially deep in the abdomen where it wreaks havoc on metabolic health—and chronic conditions like diabetes and heart disease.

Low fat diets have been shown to help some people maintain healthy insulin sensitivity. As with many dietary interventions, however, they didn't and don't work for everyone. There are many reasons why, of course. The type of carbohydrates you replace fats with, how much protein you eat, how much you eat, how much you exercise and the type of fat

SUCCESS STRATEGIES

Aim for a diet that is low fat, which means getting about 20 percent of your total calories in the form of healthy fat. Also, swap saturated fats for unsaturated fats, which have a favorable influence on insulin response, when possible (see Types of Fat in Blood Lipid Response to Dietary Fat section for more on types of fats). To reduce the fat in your diet and eat more beneficial fats overall:

- Choose plant-based proteins such as beans and meat substitutes over meat several meals a week.
- When eating meat, choose lean cuts and skinless poultry, since even lean



FUNCTION

INSULIN RESPONSE TO DIETARY FAT

meats still contain saturated fat.

- Eat fish at least twice a week.
- Reduce the amount of butter, cream or cheese you use when cooking. Substitute small amounts of olive oil instead.

Choose complex carbs Carbohydrates play a key role in insulin response regardless of fat intake. If you're eating a lower fat diet, you also will likely be eating more carbohydrates, which makes the ones you choose even more important. Sugary and starchy, refined carbs spike your insulin and set the stage for insulin resistance, so it's important to pair your healthy fat intake with complex carbs. Strive to eat whole plant foods such as fruits, vegetables, legumes, whole grains (such as brown rice, quinoa and oats), nuts and seeds.

Use a tracking app. Most of us have no idea what percentage of calories we are eating from fat without assistance. Enter your daily food intake to a diet app or an online nutrition log for a few days to determine how much fat you are currently eating so you can use the tips above to decrease it to your goal levels if it is too high.

you eat all factor into your insulin response. Research shows that there is a genetic component as well.

In a study published in The Journal of Nutrition, Boston-based researchers genotyped FTO (the gene associated with fat mass and obesity) variants among 743 overweight or obese men and women who were following either a high fat (40% of total calories) or a low fat (20% of total calories) diet for two years. In the end, regardless of how much weight they lost, those who carried certain FTO variations had less improvement in insulin sensitivity/resistance following a low fat diet than following a high fat diet—a finding that echoed an earlier European study, which also found risk allele carriers of FTO benefitted more from a high fat diet when it came to improving insulin resistance.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of **NEUTRAL**, **NOT SENSITIVE** or **SENSITIVE** reflects how your insulin sensitivity (a good thing, as it prevents/improves insulin resistance) responds when you consume dietary fat.

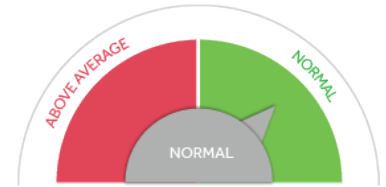


FUNCTION

SENSITIVITY TO SATURATED FAT

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a **NORMAL** sensitivity to dietary saturated fat and its association with increased weight and elevated metabolic and cardiovascular health risk factors. That's good news, because research shows that saturated fat, especially from whole, unprocessed foods, doesn't appear to carry the metabolic and cardiovascular risk once feared, and your genotype doesn't put you at increased risk for weight and health problems other, more sensitive genotypes may encounter on a diet higher in saturated fat. That's not to say you can break out the butter and bacon with abandon. You may not need to be especially vigilant about saturated fat, but you'll still want to follow a sensible, well-rounded diet that keeps saturated fat to reasonable levels in order to meet your health and body composition goals.



Your genetic profile indicates you are likely to have a **NORMAL** sensitivity to dietary saturated fat.

You are likely not at an increased risk for weight gain and elevated metabolic and cardiovascular risk factors in response to a diet that is higher in saturated fat. Limiting these fats may still help you meet your weight loss goals.

RELATED GENES / SNPs

TCF7L2, APOA2, FTO

The genes and associated SNPs included in this category have been shown to have significant associations with a person's likelihood of being sensitive to saturated fat in their diet. Though it's wise for everyone to generally limit their saturated fat intake, scientists know that some people have a greater risk for weight gain and poorer metabolic and cardiovascular health in response to eating higher levels of saturated fat. That risk is largely genetic.

Research finds that people with specific variations of the APOA2 gene don't break down saturated fats as well as other genotypes, making them more susceptible to weight gain in response to a diet that is higher in saturated fat. In one study of 3,462 adults, researchers found that those

SUCCESS STRATEGIES

Saturated fats are those that are found in many meats, poultry with skin, lard and cream, butter, cheese, and dairy products, as well as some plant based oils, such as palm oil, palm kernel oil, and coconut oil. They are also found in many baked goods and fried foods.

There are many types of saturated fats and research isn't conclusive about how they all impact weight and cardiovascular health. Though your genotype is favorable in response to saturated fat and eating a diet that is higher in saturated fat may not put you at an elevated risk for weight gain, belly fat, and/or cardiovascular and metabolic health risks, it's still a good idea to keep your intake in check as part of a balanced diet. The 2015-2020 Dietary



FUNCTION

SENSITIVITY TO SATURATED FAT

Guidelines for Americans recommends eating no more than 10% of your daily diet from saturated fat. That works out to 22 grams or about 200 calories worth if you're eating a 2,000-calorie a day diet.

For reference, a cheeseburger delivers about 12 grams of saturated fat and an ounce of cheese by itself contains about 6 to 7 grams. In fact, cheese is the number one source of saturated fat in the American diet, followed by pizza and desserts, according to the National Cancer Institute. The healthiest way to keep your saturated fat intake in check is to limit processed, fried, and fast foods, as well as baked goods like cakes and cookies that you already know you should eat in moderation, and substitute them with whole food sources of healthy fats like nuts, seeds, lean meats, fish, lean poultry, and healthy oils like olive oil.

with genotypes that responded poorly to saturated fat intake had 6.2% higher BMI and greater risk for obesity in response to eating a high saturated fat diet (more than 10% of daily intake or above 22 grams per day based on a 2,000 calorie diet) compared to those with more favorably responding genotypes.

Other research shows that eating a diet high in saturated fat (15% or more of daily intake) is a key factor that increases the risk for having a BMI in the overweight range and for having high levels of harmful belly fat in people who carry risk alleles for the obesity gene FTO.

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 higher sensitivity to dietary saturated fat and its association with increased weight and elevated metabolic and cardiovascular health risk factors.

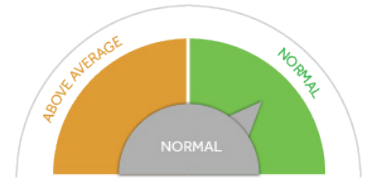


FUNCTION

SYSTEMIC INFLAMMATION

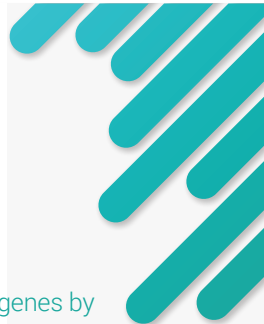
WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a likelihood of having **NORMAL** systemic inflammation levels. That means your CRP levels are likely to fall in a normal range. That's good news because chronically elevated inflammation levels take a toll on your organs and pave the way for diseases like diabetes and heart disease. Of course, genes are only one factor in systemic inflammation. You still need to follow a balanced diet, train intelligently, and maintain a healthy weight.



Your genetic profile indicates that you are inclined to have **NORMAL** systemic inflammation levels.

You can maximize the beneficial effects of your genes by eating an anti-inflammatory diet and training consistently, including rest and recovery days after strenuous workouts, competitions and races, and training blocks.



RELATED GENES / SNPs

CRP, APOC1 (APOE-CI-CII), HNF1A

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's systemic inflammation levels. That's low-level inflammation we don't see, which left unchecked, can damage our blood vessels and lead to many serious chronic diseases like heart disease, diabetes, stroke, neurodegenerative diseases like Alzheimer's, and some cancers. Chronic inflammation also hinders recovery from exercise and training and harms performance.

Doctors use C-reactive protein (CRP) levels as a general marker of systemic inflammation. CRP is a protein found in your blood plasma that binds to the surface of dead or dying cells and certain bacteria to clear them from your body. When there's a lot of cellular damage to clean up, CRP levels rise. Unsurprisingly, high CRP levels have been linked to a higher risk of mortality.

SUCCESS STRATEGIES

Normal CRP levels vary from laboratory to laboratory, but generally there are no or very low levels of CRP detectable in the blood. According to the American Heart Association, you are at a low risk for developing heart disease if your CRP levels are less than 1.0 mg/L; your risk is considered average if your levels are between 1.0 mg/L and 3.0 mg/L, and your risk is high if your levels are higher than 3.0mg/L. Simple, healthy lifestyle practices go a long way in keeping systemic inflammation levels in a low, healthy range. Maintaining a healthy weight is one of the best ways to keep systemic inflammation in check, since carrying excess fat, especially metabolically active abdominal fat, can induce chronic low-grade inflammation.

The good news for you as an active person is that regular physical activity, which can help you maintain a healthy weight, is one of the best "anti-inflammatories" there is. Regular exercise has been shown to reduce inflammation by up to 60 percent. In a 10-year study of nearly 4,300 men and



FUNCTION

SYSTEMIC INFLAMMATION

women, British researchers found that those who got 2 ½ hours of moderate exercise a week had significantly lower CRP levels than those who were less physically active. Those who began exercising regularly during the study had lower inflammation levels by the end.

It's important to note that exercise often causes some degree of inflammation. A long, hard and/or intense training session is a form of stress that initiates an inflammatory response, which is part of the adaptation process that generates muscle and makes you stronger and fitter as your body rebuilds. If you constantly train hard without adequate rest, such as doing high intensity CrossFit workouts every single day or training for long endurance events like marathons, ultras, and long distance triathlons, you raise your risk for chronic inflammation. Also, research suggests that sporadic intense exercising, such as being a “weekend warrior,” can increase inflammation and weaken immunity, rather than bolster it.

Your favorable genotype may help protect you from chronic inflammation that can result from too much intense exercise without adequate rest and inconsistent training, but you should still aim to follow healthy, consistent training practices that include a mix of high intensity training days interspersed with adequate recovery days. Avoid slogging through workouts when you're feeling fatigued.

Eating a Mediterranean-style diet that is rich in inflammation-lowering polyunsaturated omega-3 fatty acids also helps keep CRP levels low. Build your diet around plant foods and eat lots of vegetables and fruits with moderate amounts of lean protein and healthy fats. Avoid eating fried foods, fast foods, and foods that are high in sugar, as they can raise inflammation. If you drink, do so in moderation. Too much is bad for you, but research shows that moderate amounts, such as a drink a day, lowers your CRP levels more than totally abstaining. It's not a reason to start drinking, of course. But good news for those who enjoy alcohol in moderation.

There are many culprits behind systemic inflammation, including autoimmune diseases, being overweight (especially if you carry your excess fat in your abdomen, where it is most metabolically active), poor fitness, a diet that is high in sugar and other inflammatory foods, sleep deprivation, as well as exposure to secondhand smoke and other pollutants.

CRP is also significantly influenced by genetics. Researchers estimate that the heritability of CRP levels is up to 40 percent. In a recent genome wide association analysis of more than 82,700 men and women, scientists identified a half a dozen genetic variations that were significantly associated with CRP levels. When they ranked the study participants according to their at-risk CRP genetic makeup, those in the highest gene score group had an average CRP level that was more than double the average level of those in the lowest gene score group.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of **NORMAL** or **ABOVE AVERAGE** reflect whether or not your genotype include those that increase your risk for elevated systemic inflammation levels.



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

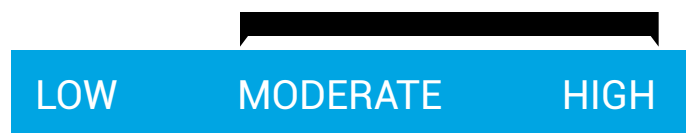
SUMMARY

CARDIO EXERCISE

FREQUENCY (days per week)



INTENSITY



DURATION (minutes per week)



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



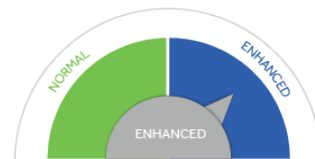
Lift weights 2 to 3 days per week using weights that are heavy enough to challenge you at the end of each of 2 to 3 sets of 8 to 15 reps. If by the end of each set of repetitions, you feel like you could keep performing the exercise, the weight you are using is too light to provide a sufficient muscle-strengthening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



EXERCISE

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.

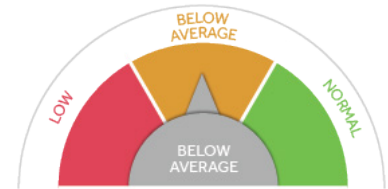
Our genetic analysis investigated which genotype for each of these genes was present in your DNA. Your rating of either **NORMAL** or **ENHANCED** reflects whether your genotypes included those that carried an enhanced fat loss response from a regular program of cardio exercise.



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.

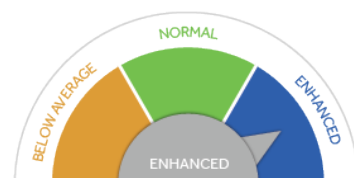
Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either **NORMAL**, **BELOW AVERAGE** OR **LOW** reflects whether your genotypes included those that carried a risk of reduced cardiovascular fitness response from moderate-to-higher intensity exercise.



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.



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

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.



EXERCISE

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.

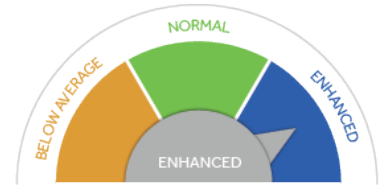


EXERCISE

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.



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.

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.



EXERCISE

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.

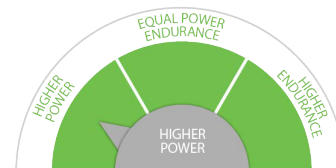
Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either **ENHANCED**, **NORMAL** or **BELOW AVERAGE** reflects whether your genotypes included those that carried a risk of an enhanced or reduced insulin sensitivity response to cardio exercise.



POWER / ENDURANCE POTENTIAL

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have **HIGHER POWER** response to strength and power training.. You are likely to enjoy significant power gains in response to strength training. Your genes may help you exceed in sports where power plays a pivotal role, such as sprinting; ball sports such as baseball, football, tennis, and golf; track racing, competitive lifting, and CrossFit types of activities. You can capitalize on your genotype by prioritizing strength and power workouts in your exercise regimen.



Your genetic profile indicates that you are likely to have **HIGHER POWER** response to strength training than other genotypes

That means you are more likely to improve your power in response to strength training and excel in sports that are power based.



Power related sports involve faster, more forceful bursts of activity for a shorter time. Typical power sports are mixed martial arts, hockey, football, baseball, and CrossFit.

Whether you tend to be power or endurance oriented largely depends on your muscle fiber composition. Generally speaking, muscle fibers can be broken into two types: type I (slow twitch) and type II (fast twitch). Type I use oxygen for fuel, fire slowly, provide continuous energy, and have high endurance. Type II rely on anaerobic metabolism for fuel, fire rapidly, and are quicker to fatigue. Fast twitch fibers can further be broken down into type IIa, which are intermediate or hybrid fast twitch fibers in that they use both aerobic and anaerobic metabolism almost equally and type IIb, which are purely anaerobic and produce the highest rate of contraction for quick, powerful bursts of activity. They also fatigue very quickly.

RELATED GENES / SNPs

ACTN3, AGT, IL-6, NOS3, ACE, FTO, IGF1, GNB3, IL6-174

The genes and associated SNPs included in this category have been shown to have significant associations with a person's endurance and/or power potential, or how likely you are to have a positive response to aerobic endurance and/or power training, which in turn may help determine the activities at which you will be most successful.

A meta-analysis of 35 articles published between 2008 and 2016 that analyzed the DNA of 19,852 people identified nine genetic variations that have significant associations with being a power athlete. Other research has found that a specific allele of the ACE gene is heavily represented in endurance athletes like elite long distance cyclists and is beneficial for endurance, rather than power-related sports.



EXERCISE

POWER / ENDURANCE POTENTIAL

Literature shows that healthy, sedentary people tend to have a 50/50 split of type I and type II fibers. Power athletes are estimated to have up to 80 percent type II fibers. Likewise, elite marathoners may have 80 percent type I fibers. Your DNA largely determines your personal combination. While you can train and make adaptations to muscle fiber size and shape and, to a small extent type, research shows genetic predisposition accounts for greater than 60 percent with only about a third being influenced by training and nutrition.

SUCCESS STRATEGIES

Your genetic inclination to be positively responsive to power training gives you an advantage for using training to get strong and fast for power-oriented sports and activities. That also means, of course, that you're less likely to excel in endurance-based sports like distance running, long distance cycling, and 70.3 or Ironman level triathlon. Which isn't to say you won't be successful in those endeavors, but may be less likely than other endurance-oriented genotypes to compete at an elite level.

Do some heavy lifting. Research indicates that athletes with your genotype see optimal gains in response to high intensity, low repetition type strength training. Try performing multiple sets of low weight such as 5 sets of 3 to 4 reps of close to your max weight with generous amounts of recovery (about 4 minutes) between sets. When you're comfortable with that, shake it up and lift closer to your max by performing 10 sets of 2 repetitions. This type of lifting stimulates your neural drive, improves your intramuscular coordination (so the fibers in any given muscle work better in concert to generate force), stimulates growth hormone production, and generates myofibrillar hypertrophy, which means your muscle fibers become denser and stronger—all of which plays to the strengths of your genotype and will help you excel in power-based athletic endeavors.

Be explosive. The definition of power is work divided by time. The more work you can do in a short amount of time, the more powerful you are. You can think of it as taking your strength and applying speed, such as what you do when you sprint, swing a bat to knock a ball out of the park, and clean and jerk a heavy bar. To maximize your genetic tendency to build power, include explosive types of training like Olympic style lifts and CrossFit into your training. Explosive workouts train your fast-twitch muscles to fire powerfully and quickly.

HIIT it. It may be tempting to forgo cardiovascular exercise completely, and if you're training for power-based sports, you don't need much. (Obviously if you're looking to do a mud run or Spartan challenge type of event, you'll need to increase your cardio training to build endurance to complete the distance of the event). By practicing high intensity interval training (HIIT), you can take advantage

Knowledge of your genetic makeup can help you hone your training for the optimum outcome. In a study published in *Biology of Sport*, researchers tested the power and endurance levels of 28 athletes from different sports and 39 soccer players. All the athletes underwent genetic testing and then were assigned to a training protocol that either matched their DNA analysis or did not match their DNA analysis. After 8 weeks, they retested the athletes' aerobic fitness and explosive power. Those who were in the DNAmatched training group performed significantly better than those who were not.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of **HIGHER ENDURANCE, EQUAL ENDURANCE/POWER**, or **HIGHER POWER**, reflects whether your genotypes included those that carried the likelihood of being more responsive to endurance training; equally responsive to endurance and power training, or more responsive to power training.



POWER / ENDURANCE POTENTIAL

of your genotype and get the best of both worlds. Intense intervals tap into and condition your type II, turbo fibers, which you have in abundance. Because your heart rate stays elevated you get cardiovascular fitness benefits.

In one head-to-head comparison, Canadian researchers found that cyclists who performed 30-minute sprint sessions three days a week that included six 30-second max efforts with 4 minutes rest reaped nearly identical fitness gains to a group who pedaled moderately 90 minutes to two hours three days a week. In a similar study, the same research team found that high-intensity sprint training also doubled time to exhaustion during a threshold test. Since your genotype is one that is more responsive to power-based exercise, HIIT is an efficient way to improve your cardiovascular fitness.

A good example of HIIT is tabatas. They're super short, but very demanding. You can do them while running, cycling, or on exercise equipment like an elliptical. To do them, warm up for 5 to 10 minutes. Then go as hard as possible (you're going for maximum power output) for 20 seconds. Recover at an easy pace for 10 seconds. Repeat 6 to 8 times. Rest 4 to 5 minutes. If you are accustomed to interval training repeat for another set or two. If you're new to intervals, stick to one set. Cool down for 5 to 10 minutes.

Rest and recover. Because your genotype rewards high intensity training it can be tempting to hit it hard every time you hit the gym or perform your activity of choice. Resist the urge. Remember that your body repairs and makes its metabolic adaptations when you rest and recover. Take a couple of days off from hard training each week. Support your training and recovery with a healthful diet, good lifestyle habits, and quality sleep. Consider incorporating yoga into your routine for cross training and recovery. It will help you maintain muscle and joint mobility, which improves performance and helps prevent injury.