NutriPATH

PATHWAY*FIT*®

DIET, NUTRITION & EXERCISE

PERSONAL GENETIC REPORT

Protected Health Information

Dear SAMPLE,

This report will present you with your personalized metabolism, diet, nutrition and exercise report. This report is based on a DNA test and the lifestyle information that you recently submitted. It is well-documented that genetics accounts for 40 to 70% of a person's predisposition to obesity[1]. If you are thinking about starting a weight loss program or just maintaining a healthy diet, the goal of this test is to give you information about yourself that may help you modify your behavior.

In this report we have tested over 75 genetic markers to provide you with the latest, most comprehensive, and scientifically-advanced recommendations on diet, nutrition, exercise, addictive behaviors and weight-related health conditions. This report provides personalized information, based on your genetics and lifestyle, to help you meet the following goals:

- Understand your metabolism and behavior traits
- Reach and maintain a healthy weight
- Get the most benefit from physical activity and exercise
- Optimize the nutritional balance of your diet

Personal Details
Name: SAMPLE PATIENT
DOB: Jan 1, 19XX
Gender: Female
Ethnicity: Caucasian
Report Date: Nov 12, 2015
Received Date: Nov 2, 2015

Test Performed / Method
Genotyping by array-based evaluation of multiple molecular probes

SCIENTIFIC STRENGTH RATING SYSTEM	
The genetic markers and studies selected for this report represent the best and most recent genetic research in diet, nutrition, exercise and weight-related health conditions. Some research can be described as stronger than others based on the size of the population studied and whether the outcome has been replicated. Due to the current state of scientific research on the genetics of diet, exercise and nutrition, most of the studies referenced in your report are based on individuals of Caucasian ethnicity. While we all have the same genes, there are genetic and non-genetic factors in different ethnicities that might yield different outcomes for non-Caucasian populations. Your report includes a star system, described below, to rate the strength of the research evidence for the genetic marker and the associated result.	
★★★★	Results derived from a large study of approximately 2,000 or more people, with at least one additional study showing the same results (replication study).
★★★☆	Results derived from a moderately-sized study of at least 400 people, with or without a replication study.
★★☆☆	Small study of less than 400 people in some cases, with other small replicated studies. Results in this category are preliminary, but pass our criteria for statistical significance.
★☆☆☆	Results in this category should be considered extremely preliminary.

DIET

71 Genetic Markers Tested

Eat a diet low in carbohydrates, particularly refined carbohydrates, instead of a low fat, Mediterranean or other diet.

As someone who has enhanced bitter taste perception, you may not like the taste of certain healthy vegetables, such as broccoli or leafy greens. Try recipes that mask the bitter flavors without adding too many calories.

You may tend to feel hungry throughout the day more than other people do. You should keep healthy snacks available to satisfy your hunger, and be sure to eat slowly in order to allow time for your body to sense satisfaction from eating.

You are less likely to be lactose intolerant, which means you may consume dairy products and not have gastrointestinal side effects. Choose dairy products that are lower in calories, fat and added sugar.

You have a higher than average genetic risk for elevated LDL (bad) cholesterol. You should limit your saturated fat intake and avoid foods containing trans or hydrogenated fats to help reduce this risk.

NUTRITIONAL NEEDS

9 Genetic Markers Tested

You have a genetic variant associated with lower levels of folic acid. Good sources of folate include vegetables, fruits, whole grains, legumes, as well as fortified foods and vitamin supplements.

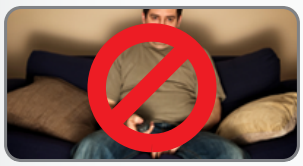
You have a genetic variant associated with lower vitamin B6 levels. Be sure your diet includes foods rich in vitamin B6, such as dark green leafy vegetables, whole grains, legumes, poultry, fish and eggs.

You have a genetic variant associated with lower vitamin B12 levels. Be sure your diet includes foods rich in vitamin B12, such as meat, fish, poultry and milk products. You can also obtain B12 from fortified foods and vitamin supplements.

EXERCISE

12 Genetic Markers Tested

Your genetics are associated with enhanced health benefits from endurance exercises, such as mid-long distance walking, jogging and bicycling. Weight resistance exercises may be less beneficial.



You have a genetic variant associated with being overweight. You can lower your chances by leading a physically active lifestyle.

You have a genetic variant associated with elevated blood pressure if you are not physically active. Exercise may help you manage your blood pressure.

You have a genetic variant some call the "sprinter gene" that most elite power athletes also have. Thus, you may have an increased ability for sports or exercise that require fast bursts of muscle power, such as sprinting or weightlifting.

METABOLIC HEALTH

53 Genetic Markers Tested

You have a higher than average genetic likelihood for elevated LDL cholesterol levels. Regular monitoring of your cholesterol by your physician is recommended.

Your genetic profile shows a higher than average likelihood for decreased HDL (good) cholesterol. HDL levels can sometimes be improved through aerobic exercise and a healthy diet.

You have a higher than average genetic likelihood for elevated triglyceride levels. Therefore, regular monitoring by your physician is recommended. You can help manage triglyceride levels by maintaining a healthy weight, reducing saturated fat and sugar intake, and increasing your consumption of omega-3 fatty acids (fish or seafood).

YOUR MATCHING DIET

EATING BEHAVIOR TRAITS

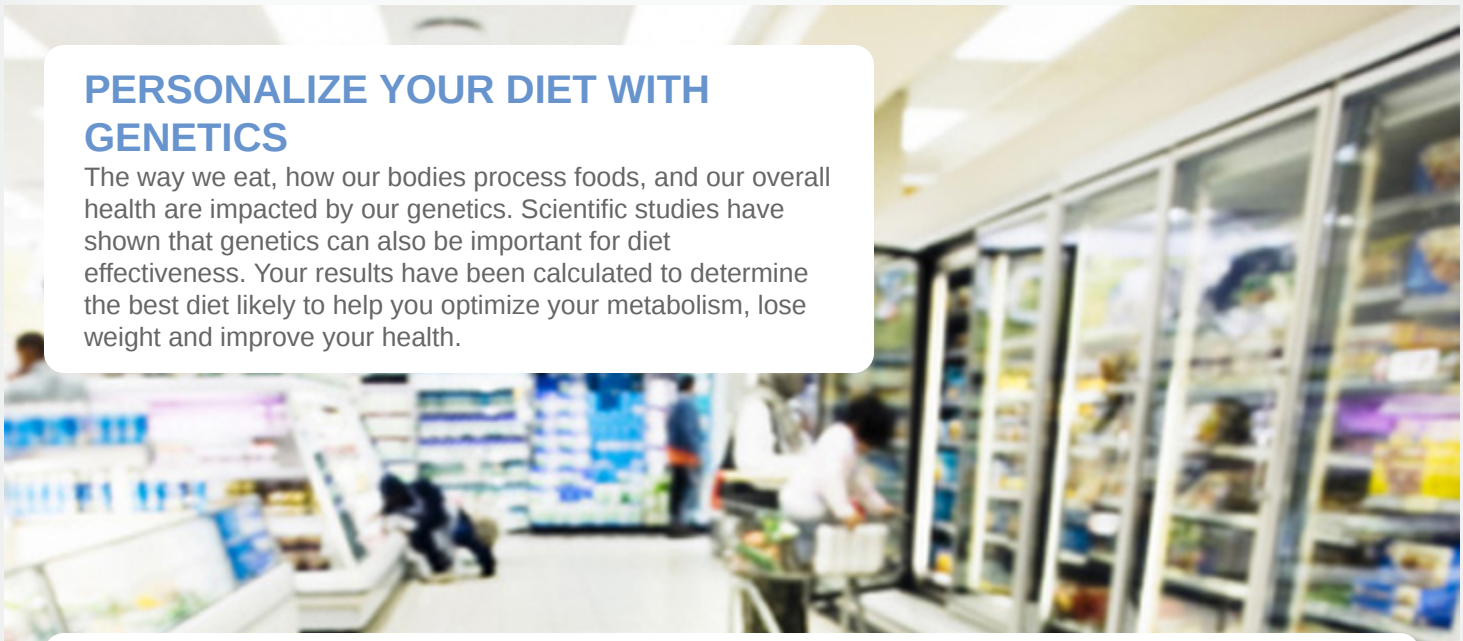
FOOD REACTIONS

NUTRITIONAL NEEDS

EXERCISE

YOUR BODY AND WEIGHT

METABOLIC HEALTH FACTORS



PERSONALIZE YOUR DIET WITH GENETICS

The way we eat, how our bodies process foods, and our overall health are impacted by our genetics. Scientific studies have shown that genetics can also be important for diet effectiveness. Your results have been calculated to determine the best diet likely to help you optimize your metabolism, lose weight and improve your health.

YOUR RESULTS

MATCHING DIET TYPE	page:8	LOW CARB DIET
RESPONSE TO MONOUNSATURATED FATS	page:11	NEUTRAL
RESPONSE TO POLYUNSATURATED FATS	page:11	INCREASED BENEFIT
OMEGA-6 AND OMEGA-3 LEVELS	page:12	TYPICAL

DIET
MATCHING DIET TYPE

Your diet has been selected by looking at many genetic variants associated with how people respond to the different macronutrients (proteins, fats and carbohydrates) in their food[2,3,4,5,6,7]. Your genetic risk profiles for metabolic health factors were also evaluated to determine your recommended diet[8,9]. Together, your genetic results suggest which one of the following diets may be best for you: "Low Fat," "Low Carb," "Mediterranean" or a "Balanced Diet." It is highly recommended to discuss any change in your diet plan with your health care provider.

YOUR DIET RECOMMENDATIONS

- ✓ Eat a diet low in carbohydrates, particularly refined carbohydrates, instead of a low fat, Mediterranean or other diet.
- ✓ As someone who has enhanced bitter taste perception, you may not like the taste of certain healthy vegetables, such as broccoli or leafy greens. Try recipes that mask the bitter flavors without adding too many calories.
- ✓ You may tend to feel hungry throughout the day more than other people do. You should keep healthy snacks available to satisfy your hunger, and be sure to eat slowly in order to allow time for your body to sense satisfaction from eating.
- ✓ You are less likely to be lactose intolerant, which means you may consume dairy products and not have gastrointestinal side effects. Choose dairy products that are lower in calories, fat and added sugar.
- ✓ You have a higher than average genetic risk for elevated LDL (bad) cholesterol. You should limit your saturated fat intake and avoid foods containing trans or hydrogenated fats to help reduce this risk.

YOUR RESULT

LOW CARB DIET

Your genotype is associated with weight loss or other health benefits from a diet lower in carbohydrates.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ADIPOQ-rs17300539	G/G	★★★☆
APOA2-rs5082	T/T	★★★★
FTO-rs9939609	T/A	★★★☆
KCTD10-rs10850219	G/G	★★★☆
LIPC-rs1800588	C/C	★★★☆
MMAB-rs2241201	C/C	★★★☆
PPARG-rs1801282	C/C	★★★☆

AND MORE...

YOUR RESULT

LOW CARB

Non-starchy vegetables, high-quality proteins and healthy fats

LOW FAT

Lean proteins, fiber-rich vegetables, grains and fruits, and healthy fats

BALANCED

Balance of healthy fats, carbohydrates and proteins

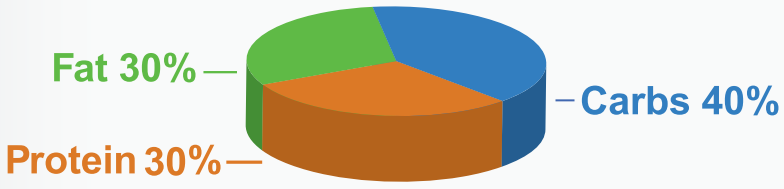
MEDITERRANEAN

Fish, monounsaturated fats, and low glycemic, high fiber vegetables, fruits, grains and legumes

DIET

LOW CARB DIET

A carbohydrate-controlled diet limits the amount of carbohydrates you consume. Foods rich in carbohydrates include breads, cereals, grains, rice, starchy vegetables, fruit, as well as milk and yogurt. More importantly, a carbohydrate-controlled diet plan focuses on non-starchy vegetables, healthy fats, as well as high-quality protein foods. Although this diet plan limits carbohydrates, it does not completely exclude them. Refined and processed foods should be avoided in order for healthier, nutrient-dense carbohydrates to fit into your daily intake. Concentrate on strongly colored fruits and vegetables with bold flavors. For your protein intake, incorporate legumes, fish (and other seafood), lean chicken, and limit your red meat consumption to about 3 ounces or less, 2 to 3 times per week. Regarding fats and oils, it's best to choose vegetable fats and to minimize your intake of animal fats. Processed and highly refined foods, trans fats, as well as added sugars, should be avoided. Most popular low-carbohydrate diets consist of a weight loss phase, which is very low in carbohydrates and is followed by a maintenance phase that manages carbohydrates.



Low Carb Diet: Key Aspects

Fruits and Vegetables

- Bright colors, bold flavor.
- Consume a variety of colors.
- Try to eat 9 servings of fruits and vegetables per day.
- Leafy green veggies are optimal.
- Limit store-bought fruit juice to 1/2 cup per day (no sugar or sweetener).
- Limit starchy vegetables.

Grains and Starchy Vegetables

- Avoid all refined grains.
- Use satisfying alternatives to grain, such as sweet potato, squash, mushrooms, and eggplant in moderation.
- Try quinoa.

Protein Foods

- Eat at least a 1/4 to 1/2 cup of legumes per day.
- Limit red meats.
- Eat fish or other seafood at least 2 to 3 times per week.
- Remove all visible fat and skin from meat, fish and poultry.
- Prepare meat by baking, broiling, steaming or poaching.
- Avoid frying meat.

Milk Products

- Plain Greek-style yogurt is optimal.
- Avoid milk products with added sugar.
- Limit cheese.

Fats and Oils

- Avoid hydrogenated and trans fats.
- Limit saturated fats.

General

- Minimize or avoid added sugars and foods with added sugar. This is especially important if you are trying to lose weight or control your blood sugar levels, or if your triglyceride levels are elevated.

DIET

TYPES OF FAT IN YOUR DIET

Acting as an important part of any diet and a source of energy, fat provides flavor to your diet, but more importantly, it is a vital element in the absorption of fat-soluble vitamins such as vitamins A, D, E and K. The two major types of fat include saturated and unsaturated (polyunsaturated and monounsaturated) fats. In order for your body to function normally, you need to maintain a consistent and balanced supply of saturated and unsaturated fats. A third type of fats consists of hydrogenated fats, which are processed fats that are not found naturally, such as in margarine and fried fast foods. Hydrogenated fats may also contain trans fatty acids and are generally unhealthy and should be avoided.

SATURATED FAT

- Beef
- Lamb
- Lard
- Milk
- Cream
- Poultry (dark meat)
- Veal
- Pork
- Butter
- Cheeses
- Coconut oil

UNSATURATED FAT

Polyunsaturated

- Cold water fish (e.g., salmon, herring, halibut, sardines, mackerel)
- Walnuts
- Almonds
- Flaxseed
- Chia seed
- Pumpkin Seed
- Evening primrose oil
- Borage seed oil
- Nuts and seeds
- Poultry and eggs

Monounsaturated

- Avocados
- Nuts
- Olives
- Extra virgin olive oil

HYDROGENATED FAT

- Margarine (stick)
- Most fast foods
- Fried foods
- Highly processed foods
- Shortening
- Foods containing trans fats

DIET

RESPONSE TO MONOUNSATURATED FATS

Fat is an important part of any diet, and not all fats are bad. Monounsaturated fat is considered a healthy dietary fat found in avocados, olives, and some nuts, as well as oils, such as olive oil. The two possible outcomes for this test are "Increased Benefit" or "Neutral." Having an "Increased Benefit" from monounsaturated fat suggests you could benefit from eating foods containing monounsaturated fats. In general, it is best to avoid trans fats and limit saturated fat intake.

Genetic variants in two genes, ADIPOQ and PPARG, have been associated with a lower body weight in individuals when more than 13% of their calories come from monounsaturated fats[6,7]. This would be equivalent to a person on an 1,800-calorie diet consuming about 1 to 2 tablespoons of olive oil and a quarter cup of nuts each day as part of their total caloric intake. While the ADIPOQ study was done in a population of both men and women, the PPARG study was done only in women. There is not enough scientific evidence to support if the PPARG association is also true in men.

YOUR RESULT

NEUTRAL

For people with your genotype, the amount of dietary monounsaturated fat you eat is not likely to affect your body weight. However, avoiding trans fats and substituting some saturated fats with monounsaturated fats is still recommended, as it has several health benefits.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ADIPOQ-rs17300539	G/G	★★★☆
PPARG-rs1801282	C/C	★★★☆

DIET

RESPONSE TO POLYUNSATURATED FATS

Polyunsaturated fat is considered a healthy fat and is important for heart and brain function, as well as growth and development. Two types of polyunsaturated fats are omega-6 and omega-3 fats. Good sources of omega-6 fats include evening primrose and borage oils, as well as olives, nuts and poultry. Additionally, good sources of omega-3 fats include fish and seafood, as well as flaxseed, walnuts, hemp seeds, and dark green leafy vegetables.

The two possible outcomes in this report are "Increased Benefit" or "Neutral." Having an "Increased Benefit" from polyunsaturated fat means you should try to eat foods containing polyunsaturated fats. In general, it is best to avoid trans fats and minimize saturated fats. One study in women has shown that those with a certain genetic variant in the PPARG gene tend to have a lower body weight when they consume more polyunsaturated fats than saturated fats[7]. This association has not been studied in men.

YOUR RESULT

INCREASED BENEFIT

People with your genotype who have a diet that includes more polyunsaturated fats, rather than saturated fats, tend to have a lower body weight, compared to those who do not.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
PPARG-rs1801282	C/C	★★★☆

DIET

OMEGA-6 AND OMEGA-3 LEVELS

Polyunsaturated fats (PUFAs) in our diet are composed of omega-3 and omega-6 fatty acids, both of which are recommended by the American Heart Association (AHA) for good heart health. Long-chain PUFAs are provided by our diet, but can also be synthesized in our bodies starting from the precursor essential fatty acids, linoleic acid (LA, omega-6) and alpha-linolenic acid (ALA, omega-3). Both omega-3 and omega-6 fats are processed in the body by the same enzyme complex[10]. The major dietary sources of omega-3 fatty acids include foods, such as flaxseed and walnuts, as well as fish oils and fish such as salmon. Processed foods often contain high levels of omega-6, while healthy sources of omega-6 include evening primrose and borage oils, as well as olives, nuts and poultry. Historically, the ratio of omega-6 to omega-3 fats in the diet was maintained close to a healthy 1:1, while in the current Western diet it is estimated to be about 15:1[11].

In recent genome-wide association studies that included over 10,000 people, it was found that those with the C/C or C/T genotypes at a variant in the FADS1 gene, which codes for one of the enzymes involved in processing omega-3 and omega-6 fats, had "Decreased" blood levels of arachidonic acid (AA), a long-chain omega-6 fat, as well as eicosapentaenoic acid (EPA), a long-chain omega-3 fat. On the other hand, those with a T/T genotype had "Typical" levels of these two omega-fats[12,13]. Since both AA and EPA are precursors of biologically important metabolites, those with a "Decreased" outcome should increase their dietary intake of both omega-3 and omega-6 fatty acids. However, considering the current skewed ratio of omega-6:omega-3 fats, it is recommended that people monitor the intake of omega-6 fats from processed foods, while increasing their intake of omega-3 fats.

YOUR RESULT

TYPICAL

People with your genotype were found to have typical blood levels of an important omega-6 fat and an important omega-3 fat.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
FADS1-rs174547	T/T	★★★★

EATING BEHAVIORS CAN BE INFLUENCED BY GENES

There are certain genes that have the potential to impact how we perceive and desire particular foods, and influence our eating behaviors, such as excessive snacking and difficulty feeling full. For example, variants in the ANKK1 and DRD2 genes, which result in a reduced density of dopamine receptors in your brain, have been associated with eating and addictive behaviors[14,15,16]. This type of information, generated from testing genetic markers in a number of genes, is included in your report, and can be used to understand how to modify your lifestyle and behaviors for optimum wellness.

YOUR RESULTS

SNACKING	*page:14*	TYPICAL
HUNGER	*page:14*	INCREASED
SATIETY - FEELING FULL	*page:14*	TYPICAL
EATING DISINHIBITION	*page:15*	LESS LIKELY
FOOD DESIRE	*page:15*	TYPICAL
SWEET TOOTH	*page:16*	TYPICAL

EATING BEHAVIOR TRAITS
SNACKING

Snacking can be a healthy or unhealthy behavior. Snacking on balanced foods, containing healthy fats, lean protein, fiber and low glycemic index carbohydrates, in small portions, throughout the day can help control hunger cravings and reduce total caloric intake, while snacking on junk food can have negative health effects. Genetic markers associated with snacking behavior include variants in the receptor for leptin, an essential hormone for the regulation of food intake. The possible results in this report are "Typical" and "Increased." If you receive the "Increased" result, you may want to curtail the negative effects of snacking by choosing healthy snacks, eating slowly and reducing the size or calories of snacks. People with the G/G genotype in a leptin receptor (LEPR) genetic marker were more likely to show "Increased" snacking behavior[17]. "Typical" genotypes were not associated with "Increased" snacking behavior in the same study. This association has not been studied in men.

YOUR RESULT

TYPICAL

Your genotype is not associated with extreme snacking behavior.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
LEPR-rs2025804	A/G	★★☆☆

EATING BEHAVIOR TRAITS
HUNGER

While most of us know the feeling of hunger, some people feel hunger more intensely and more often than others. Susceptibility to hunger can now be partially explained by genetics. A variation in the NMB gene has been associated with increased feelings of hunger[18]. When asked about their own eating behaviors on a questionnaire, people with a T/T genotype were more likely to report an "Increased" susceptibility to hunger, while others were likely to have a "Typical" hunger response. This preliminary information is based on a study rated with one star of scientific strength.

YOUR RESULT

INCREASED

People with your genotype are more likely to exhibit high levels of susceptibility to hunger.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
NMB-rs1051168	T/T	★☆☆☆

EATING BEHAVIOR TRAITS
SATIETY - FEELING FULL

Satiety can be described as the feeling of fullness after you eat. The FTO (fat mass and obesity-associated) gene is known to be an important factor that predisposes a person to a healthy or unhealthy level of body weight[19]. The two possible outcomes in this report are "Difficulty in Feeling Full" and "Typical." People who experience "Difficulty in Feeling Full" tend to eat more without feeling satisfied. To help manage this outcome, you could increase the amount of fiber in your diet and balance meals and snacks throughout the day. Examples of foods high in fiber include whole wheat bread, oatmeal, barley, lentils, black beans, artichokes, raspberries, and peas. In a 2008 study, the A/A genotype at rs9939609 in the FTO gene was associated with "Difficulty in Feeling Full"[20]. Although this study was done in children, there is preliminary data to support that the association also holds true in adults[21].

YOUR RESULT

TYPICAL

People with your genotype tend to feel full after a meal.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
FTO-rs9939609	A/T	★★★☆

EATING BEHAVIOR TRAITS

EATING DISINHIBITION

Eating disinhibition describes the tendency to eat more than normal in response to a stimulus, such as a tasty food or in situations that trigger overeating (e.g., emotional stress or specific social situations). In a 2010 study, the T allele of rs1726866 was "More Likely" to be associated with eating disinhibition in women[22]. The C/C genotype at the same marker was "Less Likely" to be associated with eating disinhibition. There is not enough scientific evidence yet to determine if this association also holds for men.

YOUR RESULT

LESS LIKELY

Your genotype is not associated with an increase in susceptibility for eating disinhibition.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
TAS2R38-rs1726866	C/C	★★☆☆

EATING BEHAVIOR TRAITS

FOOD DESIRE

Although there is no objective method to quantify someone's feeling of hunger or liking for a particular type of food, behavioral scientists have devised techniques to measure an individual's motivation to consume food and compare it with that of others. This measurement, called the reinforcing value of food[23], describes how much effort an individual is willing to put forth to get access to food. The reinforcing value can be determined through a series of tests in a laboratory setting. In each of those tests, the individual being tested is asked to complete a task in exchange for a small portion of his or her favorite foods. The task of the initial test is easy, so the food is not difficult to win. As the tests continue, the task gets more and more difficult until, at some point, the participant feels that the food is no longer worth the effort and decides to quit. This experiment tells us that early quitters, when compared with late quitters, are low in food reinforcement. Using this technique, a 2007 study[14] identified a genetic component in food reinforcement. Among people who were considered obese, those who had a specific variant (T allele) of the genetic marker rs1800497 had an "Increased" likelihood to make more effort to obtain their favorite foods and eat more of them. In contrast, the C/C genotype was associated with "Typical" levels of food reinforcement.

YOUR RESULT

TYPICAL

Your genotype is not associated with an increased desire or willingness to put forth additional effort to obtain your favorite foods.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ANKK1/ DRD2-rs1800497	C/C	★★☆☆

EATING BEHAVIOR TRAITS

SWEET TOOTH

Craving sweet foods is sometimes described as having a "sweet tooth." The possible outcomes in this report are "Increased" or "Typical." If your genotype shows an "Increased" likelihood to eat lots of sweets, try choosing fruit as a healthy sweet alternative to sugary foods or soda. Be sure to follow your diet as some diet plans, such as the low carbohydrate diets, significantly limit the amount of sugar you can eat. Sweet foods can include healthy foods, such as fruits, or unhealthy foods like candy and sweetened beverages. People with the C/T and T/T genotypes showed an "Increased" likelihood to eat more sweets and sugary foods, while people with the C/C genotype were more likely to have a "Typical" intake of sugary foods[24].

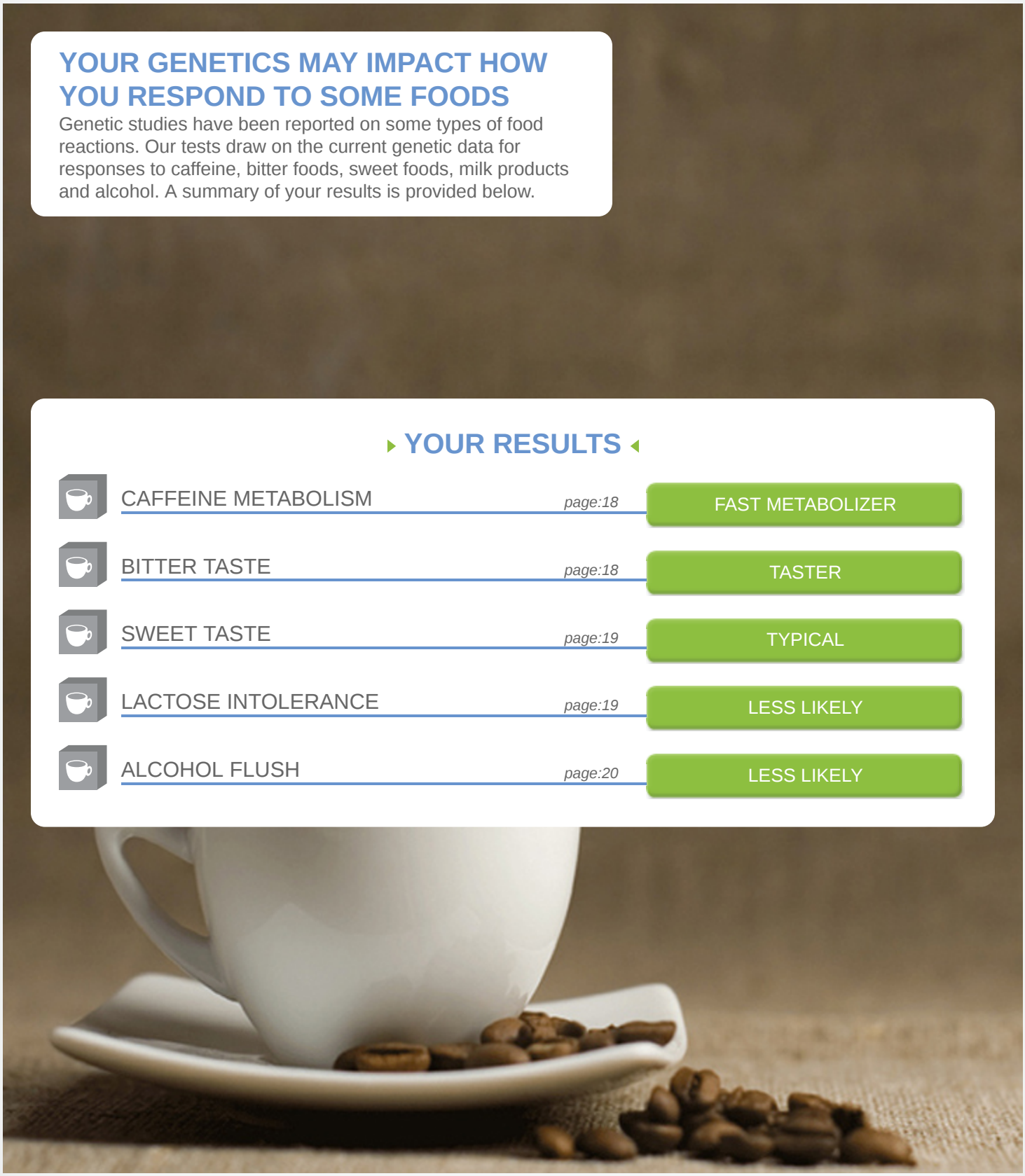
YOUR RESULT

TYPICAL

People with your genotype tend to eat an average amount of sugary foods.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
SLC2A2-rs5400	C/C	★★★☆



YOUR GENETICS MAY IMPACT HOW YOU RESPOND TO SOME FOODS

Genetic studies have been reported on some types of food reactions. Our tests draw on the current genetic data for responses to caffeine, bitter foods, sweet foods, milk products and alcohol. A summary of your results is provided below.

YOUR RESULTS

CAFFEINE METABOLISM	page:18	FAST METABOLIZER
BITTER TASTE	page:18	TASTER
SWEET TASTE	page:19	TYPICAL
LACTOSE INTOLERANCE	page:19	LESS LIKELY
ALCOHOL FLUSH	page:20	LESS LIKELY

FOOD REACTIONS
CAFFEINE METABOLISM

Caffeine is one of the most widely consumed stimulants in the world, and it is found in the leaves and seeds of many plants. It is also produced artificially and added to some foods. Caffeine is found in tea, coffee, chocolate, many soft drinks and energy drinks, as well as in some pain relievers and other over-the-counter medications. Caffeine is metabolized by a liver enzyme, which is encoded by the CYP1A2 gene. Variation at a marker in the CYP1A2 gene results in different levels of enzyme activity, and thus, different metabolism rates for caffeine[25,26,27]. Therefore, the two possible genetic results in this report are “Fast Metabolizer” and “Slow Metabolizer." If you are a "Slow Metabolizer," then caffeine may have longer lasting stimulant effects for you. In addition to genetics, your body’s ability to metabolize caffeine also depends on other lifestyle factors[28,29]. For example, how much coffee you drink, whether you smoke or whether you take hormonal birth control, may also affect your ability to metabolize caffeine. Because these and other lifestyle factors may both increase or decrease your caffeine metabolism, the most sensible advice is to make lifestyle choices that have the maximum benefit for your overall health.

YOUR RESULT

FAST METABOLIZER

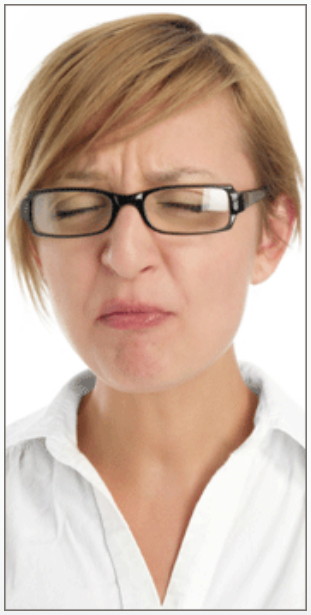
You are likely to rapidly metabolize caffeine.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
CYP1A2-rs762551	A/A	★★☆☆

FOOD REACTIONS
BITTER TASTE

People taste things differently. Variations in the TAS2R38 gene are associated with different levels of sensitivity to a chemical called PTC [30,31], which produces a strong bitter taste. The possible results for bitter taste are "Taster," "Non-Taster," or "Inconclusive." A person described as a "Taster" may be more sensitive to bitter flavors found in foods, such as grapefruit, coffee, dark chocolate and cruciferous vegetables, such as Brussels sprouts, cabbage and kale. Being a "Taster" does not mean you do not enjoy these foods, but you may sense a stronger bitter taste compared to a "Non-Taster." In addition, tasters may need to watch their salt intake, because they may have an increased preference for salty foods, which mask the bitterness[32]. A genetic result of "Inconclusive" means that there is not enough scientific evidence for how your genotype is associated with bitter taste sensitivity.



YOUR RESULT

TASTER

You are likely to have a high sensitivity to bitter taste.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
TAS2R38-rs713598	C/C	★★★☆
TAS2R38-rs1726866	C/C	★★★☆

FOOD REACTIONS
SWEET TASTE

Sweet is one of the most basic tastes we can experience, and is usually found in sugar and sugary foods. The sensation of sweet taste is triggered to the brain from the taste buds. There are receptors on your tongue that are programmed by your genes to determine how you taste sweetness. A 2009 study showed that genetic variants found in the sweet taste receptors can result in "Typical" or "Decreased" sensitivity to the sweet taste of sugar[33]. People with "Decreased" sensitivity may prefer foods with more sugar since they are less likely to taste sweetness in foods that are low sugar.

YOUR RESULT

TYPICAL

You are likely to have typical sensitivity to the sweet taste of sugar.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
TAS1R3-rs35744813	G/G	★★☆☆

FOOD REACTIONS
LACTOSE INTOLERANCE

Lactose intolerance is the inability to digest lactose, the sugar found in milk and milk products. This condition is caused by the lack of an enzyme called lactase. The rs4988235 variant lies close to the lactase (LCT) gene, in the MCM6 gene, and has been shown to regulate lactase levels[34,35,36]. If you are lactose intolerant you should make sure that you are getting enough calcium from non-dairy or lactose-free sources. On the other hand, if you are not lactose intolerant, be aware that dairy products can be high in calories, fat, or both. You need to watch your intake accordingly or select low fat dairy products. People with a C/C genotype at rs4988235 are "More Likely" to be lactose intolerant, while people with other genotypes are "Less Likely"[37]. This variant has been found to be associated with lactose intolerance in Caucasians, while other variants might play an important role in other ethnicities, including Africans and Asians.

YOUR RESULT

LESS LIKELY

People with your genotype are less likely to be lactose intolerant.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
MCM6-rs4988235	T/C	★★★☆

FOOD REACTIONS

ALCOHOL FLUSH

Drinking alcoholic beverages is a relaxing or social activity for many, but for some it is exceedingly unpleasant due to their body's adverse reaction to alcohol. One such reaction is called alcohol flush, in which drinking even small amounts of alcohol causes a person's face to flush red and in some cases feel warm and itchy. People who flush may also experience other unpleasant symptoms, such as rapid heartbeat, nausea, or dizziness in response to alcohol. Alcohol flush is largely attributed to genetic variation in the ALDH2 gene, which encodes an enzyme critical for proper alcohol metabolism. Those who carry the inactive version of this gene are much "More Likely" to flush and experience other negative responses to alcohol[38,39], while people with other genotypes are "Less Likely" to flush. Perhaps not surprisingly, this variant is also associated with overall reduced consumption of alcohol[40]. In most cases, avoiding alcohol is the best remedy for those who experience alcohol flush.

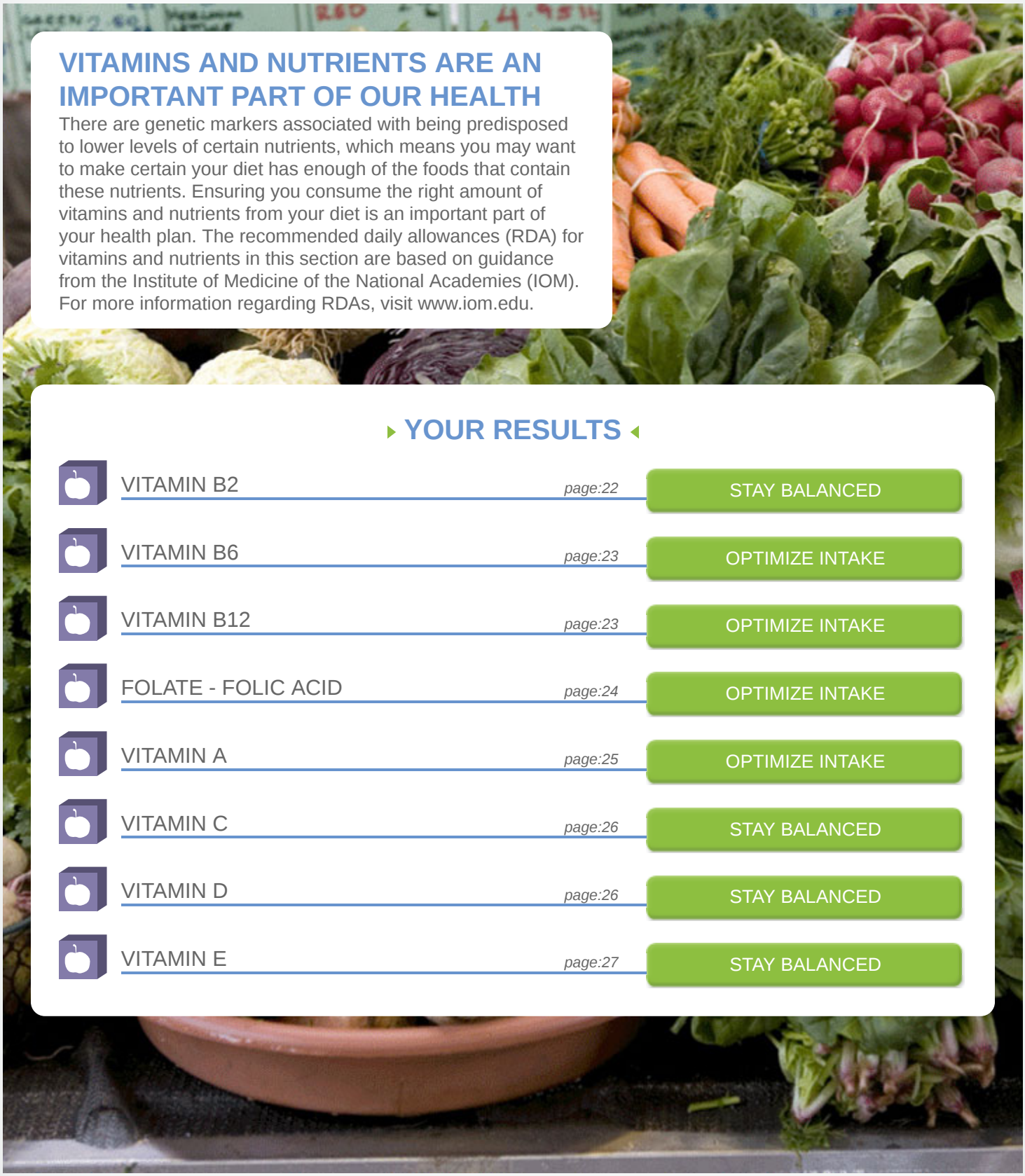
YOUR RESULT

LESS LIKELY

People with your genotype are less likely to experience alcohol flush.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ALDH2-rs671	G/G	★★★★



VITAMINS AND NUTRIENTS ARE AN IMPORTANT PART OF OUR HEALTH

There are genetic markers associated with being predisposed to lower levels of certain nutrients, which means you may want to make certain your diet has enough of the foods that contain these nutrients. Ensuring you consume the right amount of vitamins and nutrients from your diet is an important part of your health plan. The recommended daily allowances (RDA) for vitamins and nutrients in this section are based on guidance from the Institute of Medicine of the National Academies (IOM). For more information regarding RDAs, visit www.iom.edu.

YOUR RESULTS

YOUR NUTRITION RECOMMENDATIONS

- ✓ You have a genetic variant associated with lower levels of folic acid. Good sources of folate include vegetables, fruits, whole grains, legumes, as well as fortified foods and vitamin supplements.
- ✓ You have a genetic variant associated with lower vitamin B6 levels. Be sure your diet includes foods rich in vitamin B6, such as dark green leafy vegetables, whole grains, legumes, poultry, fish and eggs.
- ✓ You have a genetic variant associated with lower vitamin B12 levels. Be sure your diet includes foods rich in vitamin B12, such as meat, fish, poultry and milk products. You can also obtain B12 from fortified foods and vitamin supplements.

NUTRITIONAL NEEDS

VITAMIN B2

Vitamin B2, or riboflavin, is a central component of flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), both of which serve as cofactors of several critical enzymes involved in the electron transport chain, as well as in the metabolism of carbohydrates, fats and proteins[41]. Vitamin B2 is found in a variety of foods including milk, cheese, green leafy vegetables, legumes, beans, lean meats and fortified grains. Individuals with the T/T genotype at a variant in the MTHFR gene are likely to have increased levels of homocysteine, which are a risk factor for cardiovascular disease and stroke[42,43,44]. Levels of homocysteine were highest in T/T individuals with low riboflavin or vitamin B2 levels, and further, riboflavin supplementation was found to reduce homocysteine levels in these individuals[45,46]. Thus, individuals with the T/T genotype should "Optimize Intake" of vitamin B2 by eating foods rich in vitamin B2. On the other hand, vitamin B2 levels are likely to have a relatively small impact on homocysteine levels in people with the C/T or C/C genotypes, and hence, they should "Stay Balanced" and maintain a healthy diet.

YOUR RESULT

STAY BALANCED

In people with your genotype, riboflavin levels have a relatively small impact on levels of homocysteine. Elevated levels of homocysteine are a risk factor for heart disease. You should maintain a healthy diet.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
MTHFR-rs1801133	C/T	★★★☆

NUTRITIONAL NEEDS

VITAMIN B6

Vitamin B6, also called pyridoxine, helps your body's neurological system to function properly, promotes red blood cell health, and is involved in sugar metabolism ("http://ods.od.nih.gov/factsheets/vitaminb6/"). Vitamin B6 is found naturally in many foods, including beans, whole grains, meat, eggs and fish. Most people receive sufficient amounts of vitamin B6 from a healthy diet, and B6 deficiency is rare in the United States.

The genetic marker rs4654748 in the NBPF3 gene (near the ALPL gene) has been found in multiple studies to be associated with reduced levels of vitamin B6, possibly due to faster than normal clearance of this vitamin from the bloodstream[47,48]. Individuals with a C/C or C/T genotype had lower levels of B6 than those with the T/T genotype. Therefore, if your genotype is C/C or C/T, you will get a result of "Optimize Intake." If your genotype is T/T, it is suggested that you "Stay Balanced" and maintain a healthy diet. The studies we report observed associations between vitamin levels and particular genotypes; however, that does not mean that your levels are out of balance. You should ensure that you are eating a healthy diet and discuss this result with your physician. The recommended intake of vitamin B6 for most adults is 1.3 to 1.7 milligrams per day.

YOUR RESULT

OPTIMIZE INTAKE

People with your genotype are more likely to have lower blood levels of vitamin B6. You may optimize your intake of vitamin B6 by paying attention to your diet and eating foods rich in vitamin B6.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
NBPF3-rs4654748	C/C	★★★★

NUTRITIONAL NEEDS

VITAMIN B12

Vitamin B12 plays an important role in how your brain and nervous system function. It helps to keep red blood cells healthy and is a critical component for synthesis and regulation of your DNA[49]. Vitamin B12 is found naturally in foods of animal origin including meat, fish, poultry, eggs and milk products. A healthy diet will typically provide sufficient B12, although vegetarians, vegans, older people, and those with problems absorbing B12 due to digestive system disorders may be deficient. Symptoms of vitamin B12 deficiency can vary, but may include fatigue, weakness, bloating, or numbness and tingling in the hands and feet. The recommended intake for adults is 2.4 micrograms per day.

Multiple genetic studies have identified a marker in the gene FUT2 as being associated with lower levels of B12 in the blood[48,50,47]. This effect may be due to reduced absorption of B12 in the gut[48]. People with G/G or A/G genotypes are recommended to "Optimize Intake" because they may have lower levels of B12. Eating foods rich in vitamin B12 can promote healthy levels of B12, especially for those over the age of 50. People with the A/A genotype should "Stay Balanced" and maintain a healthy diet. The studies we report observed associations between vitamin B12 levels and particular genotypes; however, that does not mean that your levels are out of balance. You should ensure that you are eating a healthy diet and discuss this result with your physician.

YOUR RESULT

OPTIMIZE INTAKE

People with your genotype are more likely to have lower blood levels of vitamin B12. You may optimize your intake of vitamin B12 by paying attention to your diet and eating foods rich in vitamin B12.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
FUT2-rs602662	G/G	★★★★

NUTRITIONAL NEEDS

FOLATE - FOLIC ACID

Folate is found in many foods, such as green leafy vegetables like chard or kale, as well as beans, lentils, fruits and fortified grains. This nutrient plays a role in protein metabolism, as well as DNA repair[51]. Folate can lower the blood level of homocysteine, a substance linked to cardiovascular disease at high levels[52]. Diets rich in folate have been associated with reduced risk of cardiovascular disease[53]. Folate is particularly important early in pregnancy for preventing some birth defects[51]. For this reason, pregnant women or women intending to become pregnant are advised an elevated recommended daily intake of 600 micrograms of folate. The recommended intake of folate for most adults is 400 micrograms per day.

A relatively common variant in the MTHFR gene, known as C677T (rs1801133), has been associated with lowered folate and elevated homocysteine levels in the blood[52]. Hence, people with a T/T or C/T genotype should "Optimize Intake" of folate. People with the C/C genotype should "Stay Balanced" and maintain a healthy diet. The studies we report observed associations between vitamin levels and particular genotypes; however, that does not mean that your levels are out of balance. You should ensure that you are eating a healthy diet and discuss this result with your physician.

YOUR RESULT

OPTIMIZE INTAKE

People with your genotype are more likely to have lower blood levels of folate and higher blood levels of homocysteine. Foods rich in folic acid are recommended for you.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
MTHFR-rs1801133	C/T	★★★☆

NUTRITIONAL NEEDS

VITAMIN A

Vitamin A is a nutrient that describes a number of related compounds, including retinol, retinal, and retinoic acid. Vitamin A is critical for numerous functions in the body, including healthy vision, immune system action, bone growth, reproduction, and the proper regulation of gene expression[54,55,56,57]. The recommended intake of vitamin A for most adults is 700 to 900 micrograms per day.

Much of the vitamin A found in your body is derived from beta-carotene, a nutrient found in some plants and foods, such as pumpkin, carrots, sweet potatoes and spinach. A genetic study has found that vitamin A conversion from beta-carotene is impaired in women carrying variants of the BCMO1 gene[58]. This association has not been studied in men.

Those with a result of "Optimize Intake" may bypass this effect by consuming adequate amounts of preformed vitamin A, which can be found in fortified milk and breakfast cereals, as well as in multivitamins containing retinyl palmitate or retinyl acetate[59,60]. People who receive a "Stay Balanced" outcome should maintain a healthy diet. An additional outcome in this report is "Inconclusive," which means that there was not enough scientific evidence to determine how your genotype relates to the efficiency of converting beta-carotene to vitamin A. The study we report observed associations between vitamin A levels and particular genotypes. However, that does not mean that your levels are out of balance. You should eat a healthy diet and speak with your physician before making specific changes to your dietary regimen.

YOUR RESULT

OPTIMIZE INTAKE

People with your genotype are likely to have a reduced efficiency in converting beta-carotene into vitamin A. Therefore, you may have a reduced level of vitamin A in your blood.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
BCMO1-rs7501331	T/T	★★☆☆
BCMO1-rs12934922	A/T	★★☆☆

NUTRITIONAL NEEDS

VITAMIN C

Vitamin C, or L-ascorbic acid, must be acquired from dietary sources, as humans are unable to synthesize it. Some dietary sources of vitamin C include lemons, oranges, red peppers, watermelons, strawberries and citrus juices or juices fortified with vitamin C. While a severe deficiency of vitamin C ultimately leads to scurvy, variations in vitamin C levels have also been associated with a wide range of chronic complex diseases, such as atherosclerosis, type 2 diabetes and cancer[61]. These associations are thought to result from a contribution of vitamin C as an antioxidant, as well as its role in the synthesis of collagen and various hormones. After ingestion, the vitamin C in one's diet gets transported across the cell membrane via transport proteins, one of which is SLC23A1. A recent study of over 15,000 people found that the A allele of a variant in SLC23A1 was associated with decreased levels of circulating vitamin C[62]. Therefore, if your genotype is A/A or A/G, you will get a result of "Optimize Intake." People with a G/G genotype should "Stay Balanced" and maintain a healthy diet.

YOUR RESULT

STAY BALANCED

Your genotype is not associated with lower blood levels of vitamin C. You should maintain a healthy diet.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
SLC23A1-rs33972313	G/G	★★★★

NUTRITIONAL NEEDS

VITAMIN D

Vitamin D is important for the absorption and utilization of calcium, which is beneficial for maintaining good bone health[63]. Exposure to sunlight is an important determinant of a person's vitamin D level, since there are few natural dietary sources of vitamin D. While sunscreen use blocks skin production of vitamin D, excessive sun exposure is a risk factor for skin cancer and related conditions, and is not recommended. Dietary sources of vitamin D include some fatty fish, fish liver oils, and milk or cereals fortified with vitamin D. The recommended intake of vitamin D for most adults is 600 IUs per day. About 115 IUs of vitamin D is found in one cup of vitamin D-fortified, non-fat, fluid milk.

Multiple genetic studies have identified a variant in the GC gene that codes for the vitamin D-binding protein that is associated with decreased blood levels of 25-hydroxyvitamin D, which is the major circulating form of vitamin D[64,65]. People with the G/G or G/T genotype at this genetic marker may be susceptible to lower blood vitamin D levels due to reduced ability to transport vitamin D in the body. Therefore, these people may need to "Optimize Intake" of vitamin D. People with a T/T genotype are advised to "Stay Balanced" and maintain a healthy diet. The studies we report observed associations between vitamin D levels and certain genotypes; however, that does not mean that your levels are out of balance. You should eat a healthy diet and speak with your physician before making specific changes to your dietary regimen.

YOUR RESULT

STAY BALANCED

Your genotype is not associated with lower levels of vitamin D (plasma 25-hydroxyvitamin D levels). However, other factors, such as diet and exposure to sunlight, play an important role in regulating levels of vitamin D in blood.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
GC-rs2282679	T/T	★★★★

NUTRITIONAL NEEDS

VITAMIN E

Vitamin E is a group of eight antioxidant molecules, of which alpha-tocopherol is the most abundant in the body. Vitamin E functions to promote a strong immune system and regulates other metabolic processes[66,67]. The recommended intake of vitamin E for most adults is 15 milligrams per day. Note that synthetic varieties of vitamin E found in some fortified foods and supplements are less biologically active. Sources of naturally-occurring vitamin E in foods are vegetable oils, green leafy vegetables, eggs and nuts.

One study of 3,891 individuals found that people with the A/A or A/C genotypes at an intergenic marker, rs12272004, near the APOA5 gene, had increased plasma levels of alpha-tocopherol[68]. Therefore, they should "Stay Balanced" and maintain a healthy diet. This is good news since increased vitamin E levels are associated with decreased frailty and disability in old age[69]. People with the C/C genotype were not associated with increased levels of alpha-tocopherol, and hence they would need to "Optimize Intake" of vitamin E through the increased intake of foods rich in vitamin E. Keep in mind, however, that most adults normally do not take in adequate amounts of vitamin E on a daily basis[70], so keeping an eye on your vitamin E intake is good advice for anyone. The studies we report observed associations between vitamin E levels and certain genotypes; however, that does not mean that your levels are out of balance. You should eat a healthy diet and speak with your physician before making specific changes to your dietary regimen.

YOUR RESULT

STAY BALANCED

Your genotype is associated with increased alpha-tocopherol levels, which is one compound that makes up vitamin E. You should maintain a healthy diet to stay balanced.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
INTERGENIC-rs12272004	A/C	★★★★

NUTRIENTS, WEIGHT MANAGEMENT AND GENETICS

New studies continue to emerge that demonstrate links between nutrients and genetics that show benefits in health and weight loss. Some of the benefits that scientists observe in relation to genes are listed below.

Important: The genes and associated benefits listed below are not part of your genetic test. The content on this page is informational.

NUTRIENT/FOOD	POTENTIAL HEALTH & WEIGHT LOSS BENEFITS	ASSOCIATED GENE(S)
Resveratrol	Weight Loss, Decrease Weight Gain	SIRT1, PPARA, PPARG, ER
Polyphenols (tea)	Decrease Weight Gain	PPARG
Conjugated Linoleic Acid (CLA)	Fat Burning, Weight Loss	PPARA, PPARG
Ispoprenols (farnesol)	Weight Loss	PPARA, PPARG
Abietic Acid	Weight Loss	PPARG
Capsaicin (Hot Pepper)	Weight Loss, Anti-inflammatory	PPARG
Phytol (Chlorophyll)	Weight Loss	PPARA
Auraptene (Citrus)	Weight Loss	PPARA, PPARG
Isohumulone (Hops)	Weight Loss	PPARA, PPARG
Guggulsterone (Gugle)	Weight Loss	Farnesoid X Receptor
Soy/Genistein	Weight Loss	Steroid Receptors: Estrogen, Androgen, Progesterone
Diosgenin	Weight Loss	Steroid Receptors: Progesterone
Ginseng	Weight Loss	Steroid Receptors: Estrogen
Hyperforin	Weight Loss	Pregnane X Receptor
Alpha-lipoic Acid	Reduction of Overeating	AMPK Inhibitor
Anthocyanins (Pigment)	Overall Health Benefit	Adiponectin
Licorice LFO (Polyphenols)	Overall Health Benefit	FA synthase
Pomegranate Extract (Lenolenic Acid)	Overall Health Benefit	b-oxidation/PPARA

EXERCISE HAS LONG BEEN SHOWN TO PROVIDE MANY HEALTH BENEFITS

Studies have shown a link between genetics and exercise, and how people respond to exercise for weight loss and other health benefits. A few examples of this link include the ACE and ACTN3 genes and the association with elite athlete status, as well as the LPL gene and its connection to the loss of body fat in response to exercise. A summary of your results is listed below.

YOUR RESULTS

ENDURANCE TRAINING	page:30	ENHANCED BENEFIT
STRENGTH TRAINING	page:31	LESS BENEFICIAL
AEROBIC CAPACITY (VO2MAX)	page:31	TYPICAL
MUSCLE POWER	page:32	ENHANCED MUSCLE POWER
ACHILLES TENDINOPATHY	page:32	TYPICAL
WEIGHT LOSS RESPONSE TO EXERCISE	page:33	EXERCISE STRONGLY RECOMMENDED
BLOOD PRESSURE RESPONSE TO EXERCISE	page:33	EXERCISE STRONGLY RECOMMENDED
HDL (GOOD) CHOLESTEROL RESPONSE TO EXERCISE	page:34	NORMAL BENEFIT
LOSS OF BODY FAT RESPONSE TO EXERCISE	page:34	NORMAL BENEFIT
INSULIN SENSITIVITY RESPONSE TO EXERCISE	page:34	ENHANCED BENEFIT

YOUR EXERCISE RECOMMENDATIONS

- ✓ Your genetics are associated with enhanced health benefits from endurance exercises, such as mid-long distance walking, jogging and bicycling. Weight resistance exercises may be less beneficial.
- ✓ You have a genetic variant associated with being overweight. You can lower your chances by leading a physically active lifestyle.
- ✓ You have a genetic variant associated with elevated blood pressure if you are not physically active. Exercise may help you manage your blood pressure.
- ✓ You have a genetic variant some call the "sprinter gene" that most elite power athletes also have. Thus, you may have an increased ability for sports or exercise that require fast bursts of muscle power, such as sprinting or weightlifting.

EXERCISE

ENDURANCE TRAINING

Endurance training is generally used to describe exercise that is done for a longer duration with moderate intensity. Most people can benefit from a combination of endurance, high intensity and resistance exercises. Some people have genetic markers that are associated with "Enhanced Benefit" from endurance training, while others will gain "Normal Benefit." The studies that were used to calculate your result tested responses to a 20-week endurance training program[71,72,73]. This result can be used to help tailor your exercise routine. Always consult your physician or health care provider before beginning any exercise program.

YOUR RESULT

ENHANCED BENEFIT

Endurance training may provide enhanced health benefits to people with your genotype.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
LIPC-rs1800588	C/C	★★★☆
LPL-rs328	C/C	★★☆☆
PPARD-rs2016520	A/A	★★★☆

EXERCISE
STRENGTH TRAINING

Strength training can be described as exercises that incorporate the use of opposing forces to build muscle. The possible outcomes in this report are "Beneficial" and "Less Beneficial." In a small study of young adult men, those with the C/G or C/C genotypes at rs7566605 were more likely to experience increased fat volume after participating in 12 weeks of resistance training, and thus strength training was "Less Beneficial"[74]. This association has not been identified in women.

YOUR RESULT

LESS BENEFICIAL

Strength training may be less beneficial to people with your genotype, as there is a chance for a small gain in fat volume. Moderate strength training is still recommended for overall health benefits.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
INSIG2-rs7566605	C/G	★★☆☆

EXERCISE
AEROBIC CAPACITY (VO2MAX)

Maximal oxygen uptake (VO2max) is widely used as the best measure of an individual's cardiorespiratory fitness. VO2max is defined as the maximum volume of oxygen per unit time that an individual uses at maximum exertion. The baseline VO2max level can vary depending on age, gender, past medical history, current health and level of physical activity. However, anyone can increase their fitness and VO2max by endurance training. Elite athletes in endurance sports, such as cross-country skiing and long-distance running, have a higher VO2max than elite athletes in power sports, such as wrestling and weightlifting[75]. The rs8192678 SNP in the PPARGC1A gene, which is a key regulator of energy metabolism, was associated with baseline VO2max (L/min) in a study of 303 Spanish and British men[76]. The G/G and G/A genotypes of rs8192678 were associated with "Typical" VO2max, whereas the A/A genotype was associated with a "Decreased" VO2max. This association has not been studied in women. Please remember that you can always increase your VO2max and fitness by endurance training, even if you start with a decreased aerobic capacity.

YOUR RESULT

TYPICAL

Your genotype is associated with typical aerobic capacity.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
PPARGC1A-rs8192678	G/A	★★☆☆

EXERCISE
MUSCLE POWER

Do you have a genetic variant that is found in nearly all sprinters qualified for top-level competitions like the Olympic Games? The so-called "sprinter gene" refers to the functional version of the ACTN3 gene, which contains information for making a protein found in fast-twitch muscle fibers[77]. The protein and the fast-twitch muscle fibers are important in generating explosive bursts of force. This is why the functional version of ACTN3 is also seen with high frequencies in other elite power-oriented athletes, such as weightlifters[78]. About 80% of people have at least one functional copy of the ACTN3 gene, which can lead to enhanced muscle power. However, having functional ACTN3 is only one of a myriad of genetic and non-genetic factors that contribute to the success of elite athletes. The remaining 20% of people, who do not have a functional copy of ACTN3, may have less muscle power and are less likely to be world-class sprinters or weightlifters, but their chance to excel may not be affected in sports that require other types of body performance, such as endurance and nimbleness.

YOUR RESULT

ENHANCED MUSCLE POWER

Your body is producing functional ACTN3 protein, which is associated with enhanced performance in sprinting and other power sports.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ACTN3-rs1815739	C/T	★★★☆

EXERCISE
ACHILLES TENDINOPATHY

The Achilles tendon connects your calf muscles to your heel bone. Tendinopathy describes either the inflammation or tiny tears to the tendon. People who play sports and runners who place stress on the Achilles tendon have the greatest likelihood of tendinopathy. If you have a G/G genotype you may be more "Injury-Prone," while other genotypes have a "Typical" likelihood of developing Achilles tendinopathy. In a small study, people with the G/G genotype at rs679620 (MMP3) had 2.5 times more chance of developing Achilles tendinopathy compared to other genotypes[79].

YOUR RESULT

TYPICAL

Your genotype is associated with a typical likelihood of Achilles tendinopathy.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
MMP3-rs679620	A/G	★★☆☆

EXERCISE

WEIGHT LOSS RESPONSE TO EXERCISE

Exercise is a large part of many weight loss plans, as it is a crucial tool for weight control for everyone. The possible outcomes in this report are "Exercise Strongly Recommended" and "Exercise Recommended." If your report shows "Exercise Strongly Recommended," your genotype has been shown to be associated with a tendency to be overweight, and exercise is strongly recommended for you. If your report shows "Exercise Recommended," you have one less risk factor for being overweight. However, this should not be taken as one less reason to exercise, because being physically active is beneficial to all people, regardless of genetic makeup. People with the "Exercise Strongly Recommended" outcome contain a specific variant (T allele) in the genetic marker rs1121890 of the FTO gene, which has been shown to be associated with increased body mass index (BMI) and waistline[80,81]. However, a large study showed that people who have this variant could reduce their propensity to increased BMI by being physically active[81].

YOUR RESULT

EXERCISE STRONGLY RECOMMENDED

You have a genetic variant that is associated with being overweight or obese. Regular exercise and an active lifestyle are strongly recommended.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
FTO-rs1121980	C/T	★★★☆

EXERCISE

BLOOD PRESSURE RESPONSE TO EXERCISE

High blood pressure, also known as hypertension, is a common health issue. It has been estimated that a majority of people will have hypertension at some time in their lives. A genetic variant in the EDN1 gene has been shown to increase the likelihood of hypertension in people who were low in cardiorespiratory fitness, which refers to the ability of the heart and lungs to provide muscles with oxygen for physical activity[82]. This genetic variant did not show an effect in people who were high in cardiorespiratory fitness. If you have this variant, your result is "Exercise Strongly Recommended," since you may need to exercise to reduce your chances of hypertension. If you do not have the variant, your result is "Exercise Recommended," since exercise is still the right decision to manage other risk factors for high blood pressure you may have.

YOUR RESULT

EXERCISE STRONGLY RECOMMENDED

Your genotype is associated with an increased likelihood of elevated blood pressure, if you have low fitness levels. Exercise may help you manage your blood pressure.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
EDN1-rs5370	G/T	★★★☆

EXERCISE

HDL (GOOD) CHOLESTEROL RESPONSE TO EXERCISE

One of the health benefits of exercise can be the improvement of your cholesterol. HDL cholesterol is known as the good cholesterol, and having more HDL is beneficial. Most people can improve their HDL levels by exercising. In the Heritage Family Study, people with the A/G and G/G genotypes were more likely to have an "Enhanced Benefit" in their HDL levels by exercising[73]. People with "Normal Benefit" may also increase their HDL levels by exercising, but may not experience an enhanced effect.

YOUR RESULT

NORMAL BENEFIT

Your genotype is associated with a typical increase in HDL (good) cholesterol in response to a 20-week endurance training program.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
PPARD-rs2016520	A/A	★★★☆

EXERCISE

LOSS OF BODY FAT RESPONSE TO EXERCISE

Many people exercise to lose body fat. If you have a specific genotype in the gene LPL, you may have an "Enhanced Benefit" from exercise to lose body fat[71]. If you have the "Normal Benefit" genotype, you will still experience fat reduction if you exercise, but it might take more effort. The study was based on women who participated in a 20-week endurance training program. This association has not been identified in men.

YOUR RESULT

NORMAL BENEFIT

Your genotype is associated with a typical reduction in body fat mass and percent of body fat in response to exercise.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
LPL-rs328	C/C	★★☆☆

EXERCISE

INSULIN SENSITIVITY RESPONSE TO EXERCISE

Insulin sensitivity is a good thing. Insulin in your body helps control your response to glucose, commonly known as sugar. Having an increased insulin sensitivity means that the body has a better ability to process sugar. The opposite of insulin sensitivity is called insulin resistance, which is linked to obesity and type 2 diabetes. Most people have a beneficial response to exercise, resulting in increased insulin sensitivity. According to a study, people with C/C or C/T genotypes, at a marker in the LIPC gene, showed an "Enhanced Benefit," compared to those with a T/T genotype[72]. Although people with T/T genotypes are likely to gain "Less Benefit" in insulin sensitivity from exercise training, exercise remains important in many other aspects of their health.

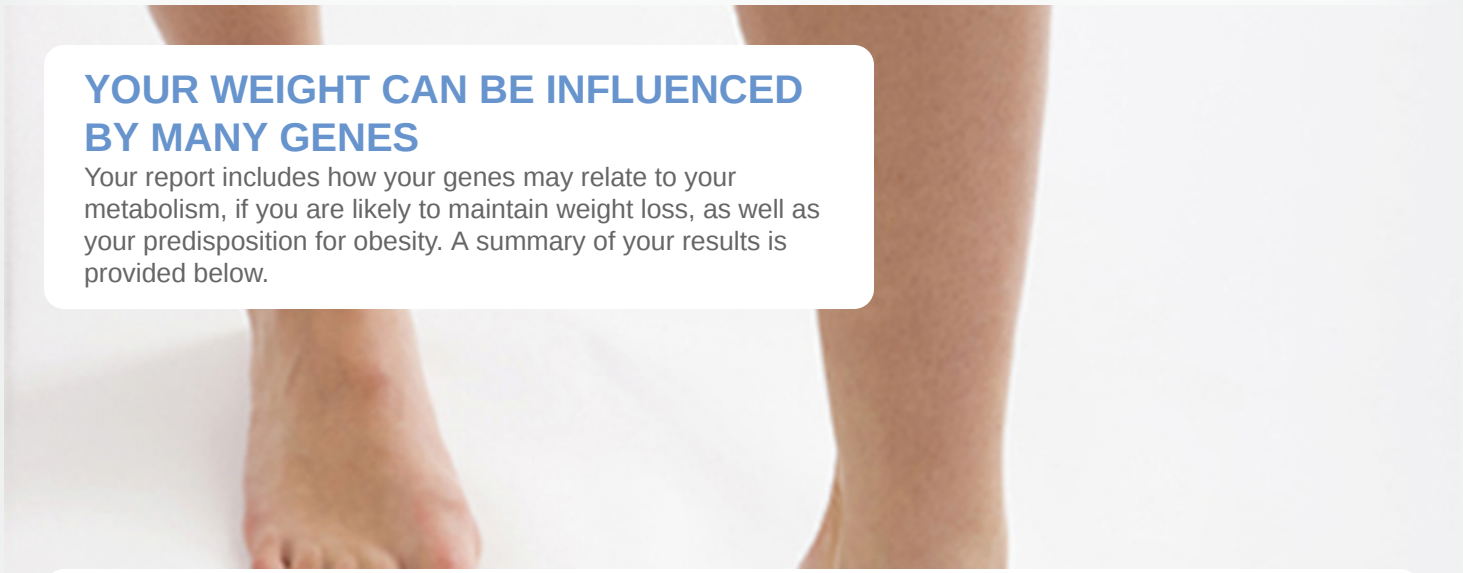
YOUR RESULT

ENHANCED BENEFIT

Your genotype is associated with enhanced insulin sensitivity in response to exercise.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
LIPC-rs1800588	C/C	★★★☆



YOUR WEIGHT CAN BE INFLUENCED BY MANY GENES

Your report includes how your genes may relate to your metabolism, if you are likely to maintain weight loss, as well as your predisposition for obesity. A summary of your results is provided below.

YOUR RESULTS

OBESITY	*page:37*	AVERAGE
WEIGHT LOSS-REGAIN	*page:37*	MORE LIKELY TO GAIN WEIGHT BACK
METABOLISM	*page:38*	NORMAL
ADIPONECTIN LEVELS	*page:38*	POSSIBLY LOW

YOUR BODY AND WEIGHT

YOUR ACTUAL WEIGHT (BMI)

Actual Weight

Weight: 140 lbs Height: 5' 6"

Normal

YOUR **BMI** body mass index **22.6**

Category	BMI range - kg/m2
Underweight	Less than 18.5
Normal	from 18.5 to 24.9
Overweight	from 25 to 29.9
Obese	from 30 to 34.9
Clinically Obese	from 35 to 39.9
Extremely Obese	40 or greater

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women. BMI is usually represented in kg/m2. Your BMI was calculated using your survey responses for weight and height. If your BMI is not listed here, you may not have completed those responses in the survey.

Your actual weight is a result of a combination of factors including lifestyle, environment and genetics. Your Obesity Index result is a measure of your likelihood, based on genetics, to have a BMI over 35 (clinically or extremely obese). Since your weight is affected by many factors, it is possible for your Obesity Index result to be very different than your actual weight. The important point is that the genetics of obesity do not lead to an inevitable outcome. Many people have a choice of managing lifestyle to counteract genetics. For example, some people that are of normal weight BMI can have an Obesity Index of above average or high. This example is commonly seen in someone who is controlling diet, nutrition, eating behaviors and/or exercise to manage their body weight. The opposite can also be true. Some people who have an actual BMI in the obese categories can have an Obesity Index of average, below average or low. This case can sometimes be explained by lifestyle choices, environment or other health factors that have led a person to become obese without having the genetics associated to obesity.

YOUR BODY AND WEIGHT
OBESITY

Obesity is influenced by both genetic and environmental factors. Approximately 40 to 70% of an individual's susceptibility to obesity is inherited[1]. When someone reaches a body mass index (BMI) of 30 to 35 (clinically obese) or above 40 (morbidly obese), genetic factors with strong effects are likely to be involved. There are 2 possible outcomes of this test: "Average" and "Above Average". An "Above Average" outcome does not mean that you are obese, it only means that you have a higher than average genetic likelihood for a high BMI.

Your genetic predisposition to obesity is determined from your genotypes at variants in the FTO (fat mass and obesity associated) and MC4R (melanocortin-4 receptor) genes. The association of these genes to obesity is well-established. The MC4R gene is expressed in the brain's hunger center and is involved in regulating energy balance[83]. Rare mutations in the MC4R gene have been shown to cause a rare, inherited form of obesity. FTO is less well-understood, but is also believed to be important for controlling feeding behavior and energy balance[84]. Your test result includes common variants that have been confirmed in many large genetic studies (including multiple studies of over 38000 individuals) to be associated with a predisposition for high BMI and/or obesity[19,85,86,87,88]. However, as lifestyle also has a considerable impact on obesity, you can mitigate your risks by eating a proper diet, exercising and reducing stress[89,90].

YOUR RESULT

AVERAGE

Your genetic profile indicates an average predisposition for being overweight.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
FTO-rs9939609	A/T	★★★★
MC4R-rs17782313	T/T	★★★★

YOUR BODY AND WEIGHT
WEIGHT LOSS-REGAIN

There are genes associated with the tendency to gain weight back after a person loses weight, and there are genes that protect a person from weight regain. In one study, people with the G/G genotype at a marker in the ADIPOQ gene were "More Likely to Gain Weight Back," while people with other genotypes were more likely to show "Weight Loss Maintained"[91]. It is best after losing weight to maintain a healthy diet, exercise and nutrition plan to keep the extra pounds off and support long-term health.

YOUR RESULT

MORE LIKELY TO GAIN WEIGHT BACK

You may have difficulty keeping weight off after losing weight.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ADIPOQ-rs17300539	G/G	★★☆☆

YOUR BODY AND WEIGHT

METABOLISM

Metabolism describes the way your body burns energy (calories) and tends to have a strong correlation to managing your weight. Resting metabolism is how your body burns energy while at rest. People with a "Fast" metabolism can sometimes eat more food with little exercise and not gain weight. People with a "Normal" metabolism tend to require average amounts of food intake and average amounts of exercise to maintain weight. A genetic marker in the leptin receptor (LEPR) is associated with interactions in your brain that trigger how and when you burn energy. People with a C/C genotype tend to have an increased resting metabolic rate, or "Fast" metabolism, while people with C/G or G/G genotypes are not associated with an increased resting metabolic rate; therefore, they have a "Normal" metabolism[92]. However, having this genetic variant is only one of many other genetic and non-genetic factors that contribute towards your metabolism. Exercise is a common method of increasing your metabolism.

YOUR RESULT

NORMAL

Your genotype is associated with a normal resting metabolic rate.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
LEPR-rs8179183	G/G	★★★☆

YOUR BODY AND WEIGHT

ADIPONECTIN LEVELS

Adiponectin is a hormone that is produced by fat cells and functions in the body to trigger your liver and muscles to get energy from fat[93]. Higher levels of adiponectin are considered good for weight loss and health[94]. Your health care provider can test your adiponectin levels. If you have low levels, losing weight may be a good way to increase your adiponectin levels[93]. A variant in the adiponectin gene (ADIPOQ) is associated with adiponectin levels. People with A/A or A/G genotypes were associated with "Possibly Low" levels of adiponectin, while those with the G/G genotype had "Typical" levels[95].

YOUR RESULT

POSSIBLY LOW

Your genotype is associated with lower adiponectin levels.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ADIPOQ-rs17366568	A/G	★★★★

YOUR METABOLIC HEALTH CAN BE INFLUENCED BY MANY GENES

Your report includes genetic variants that measure your likelihood for having decreased HDL cholesterol levels, as well as elevated LDL cholesterol, blood sugar and triglyceride levels. All of these are indicators of adverse metabolic health, which are precursors to various health conditions, including coronary artery disease, stroke and type 2 diabetes. Your genetic results for these metabolic health factors are summarized below.

YOUR PROBABILITIES

ELEVATED LDL CHOLESTEROL	*page:40*	ABOVE AVERAGE
DECREASED HDL CHOLESTEROL	*page:41*	ABOVE AVERAGE
ELEVATED TRIGLYCERIDES	*page:42*	ABOVE AVERAGE
ELEVATED BLOOD SUGAR	*page:43*	AVERAGE

YOUR HEALTH RECOMMENDATIONS

- ✓ You have a higher than average genetic likelihood for elevated LDL cholesterol levels. Regular monitoring of your cholesterol by your physician is recommended.
- ✓ Your genetic profile shows a higher than average likelihood for decreased HDL (good) cholesterol. HDL levels can sometimes be improved through aerobic exercise and a healthy diet.
- ✓ You have a higher than average genetic likelihood for elevated triglyceride levels. Therefore, regular monitoring by your physician is recommended. You can help manage triglyceride levels by maintaining a healthy weight, reducing saturated fat and sugar intake, and increasing your consumption of omega-3 fatty acids (fish or seafood).

METABOLIC HEALTH FACTORS

ELEVATED LDL CHOLESTEROL

Low-density lipoprotein (LDL) is the type of cholesterol that can become dangerous if you have too much of it. Like gunk clogging up your kitchen drain, LDL cholesterol can form plaque and build up in the walls of your arteries. This can make your arteries narrower and less flexible, putting you at risk for conditions like a heart attack or stroke. Optimally, LDL levels should be less than 100 mg/dl. Near-optimal levels range from 100 to 129 mg/dl and borderline high from 130 to 159 mg/dl. A score greater than 160 mg/dl is high and greater than 190 mg/dl is very high. Your physician can measure your cholesterol levels.

A genetic result of "High" or "Above Average" does not mean you have elevated LDL cholesterol levels, but tells you that you may have a genetic propensity for elevated LDL cholesterol levels. On the other hand, a result of "Low" or "Below Average," tells you that you have a lower than average genetic likelihood for elevated LDL cholesterol levels. However, you could still develop problems with your LDL levels as a result of your diet and other factors. This report is based on genetic variants studied in over 19,000 individuals. A genetic result of "High" means that you share a similar genetic profile with individuals from the Framingham Heart Study who had elevated LDL cholesterol levels measuring, on average, above 139 mg/dl with approximately 25% of individuals measuring above 160 mg/dl[8]. A genetic result of "Above Average" means that you share a similar genetic profile with individuals measuring, on average, above 130 mg/dl LDL with approximately 17% of individuals measuring above 160 mg/dl LDL cholesterol[8]. A genetic result of "Average" means that you share a similar genetic profile with individuals measuring, on average, near-optimal LDL cholesterol levels. Diet plays an important part in LDL levels. Processed foods and foods high in trans fat contribute to elevated LDL levels.

YOUR PROBABILITY

ABOVE AVERAGE

You share a similar genetic profile with individuals who exhibit borderline-high LDL cholesterol levels. Therefore, you have a higher than average likelihood for elevated LDL (bad) cholesterol levels.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ABCG8-rs6544713	C/T	★★★★
APOB-rs515135	G/A	★★★★
CELSR2-rs12740374	G/G	★★★★
HMGCR-rs3846663	C/T	★★★★
HNF1A-rs2650000	A/C	★★★★
INTERGENIC-rs1501908	G/G	★★★★
LDLR-rs6511720	G/G	★★★★
MAFB-rs6102059	C/T	★★★★
NCAN-rs10401969	T/T	★★★★
PCSK9-rs11206510	T/T	★★★★

METABOLIC HEALTH FACTORS

DECREASED HDL CHOLESTEROL

High-density lipoprotein (HDL) cholesterol is known as good cholesterol, because high levels of HDL cholesterol seem to protect against heart attack, while low levels of HDL cholesterol (less than 40 mg/dL) increase the risk of heart disease[96]. While multiple mechanisms are known to account for this, the major one is thought to be the role of HDL in transporting excess cholesterol away from the arteries and back to the liver, where it is passed from the body[97]. Your HDL cholesterol can be measured with a simple blood test. In men, typical HDL cholesterol levels range from 40 to 50 mg/dl. In women, female hormones cause typical HDL cholesterol levels to range from 50 to 60 mg/dl; however, after menopause there is a tendency for decreased HDL cholesterol levels. Foods containing trans fats can lower HDL cholesterol levels, which is unhealthy. Cholesterol levels should be monitored by your physician.

A genetic result of "High" or "Above Average" does not mean you have decreased HDL cholesterol levels, but tells you that you may have a high propensity for decreased HDL cholesterol levels. On the other hand, a result of "Low" or "Below Average," tells you that you have a lower than average propensity for decreased HDL cholesterol levels. Our genetic testing is based on genetic variants studied in over 19,000 individuals. A result of "High" means that you share a similar genetic profile with individuals from the Framingham Heart Study who had decreased HDL cholesterol levels measuring, on average, below 46 mg/dl with approximately 37% of individuals measuring below 40 mg/dl[8]. On the other hand, a result of "Above Average" means that you share a similar genetic profile with individuals measuring, on average, below 50 mg/dl HDL cholesterol with approximately 30% of individuals measuring below 40 mg/dl HDL cholesterol[8].

YOUR PROBABILITY

ABOVE AVERAGE

You share a similar genetic profile with individuals exhibiting decreased HDL cholesterol levels. Therefore, you have a higher than average likelihood for decreased HDL cholesterol levels.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ABCA1-rs1883025	G/G	★★★★
ANGPTL4-rs2967605	G/G	★★★★
CETP-rs247616	C/C	★★★★
FADS1-rs174547	T/T	★★★★
GALNT2-rs4846914	A/G	★★★★
HNF4A-rs1800961	C/C	★★★★
KCTD10-rs2338104	C/C	★★★★
LCAT-rs2271293	A/G	★★★★
LIPC-rs10468017	C/C	★★★★
LIPG-rs4939883	T/T	★★★★
LPL-rs12678919	A/A	★★★★
PLTP-rs7679	C/T	★★★★
TTC39B-rs471364	A/A	★★★★
ZNF259-rs964184	C/G	★★★★

METABOLIC HEALTH FACTORS

ELEVATED TRIGLYCERIDES

Triglyceride is the chemical term for fat as it is stored in your body. People with elevated triglycerides are at risk of conditions, such as coronary artery disease or type 2 diabetes. Having higher triglycerides is often associated with poor lifestyle choices, such as lack of exercise, excessive alcohol consumption, cigarette smoking, excessive refined carbohydrate consumption and being overweight. A normal triglyceride score is under 150 mg/dl. Triglyceride levels in the range of 150 to 199 mg/dl are defined as borderline high, with over 200 mg/dl considered high and over 500 mg/dl very high. Your triglyceride levels can be monitored by your physician.

A result of "High" or "Above Average" does not mean you have elevated triglyceride levels, but tells you that you may have a propensity for elevated triglycerides levels. On the other hand, a genetic test result of "Low" or "Below Average," tells you that you have a lower than average likelihood for elevated triglyceride levels. The genetic test is based on genetic variants studied in over 19,000 individuals. A genetic result of "High" means that you share a similar genetic profile with individuals from the Framingham Heart Study who had elevated triglyceride levels measuring on average above 150 mg/dl with approximately 31% of individuals measuring above 200 mg/dl[8].

YOUR PROBABILITY

ABOVE AVERAGE

You share a similar genetic profile with individuals who exhibit borderline-high triglyceride levels. Therefore, you have a higher than average likelihood for elevated triglyceride levels.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ANGPTL3-rs10889353	A/C	★★★★
APOB-rs7557067	A/A	★★★★
FADS1-rs174547	T/T	★★★★
GCKR-rs1260326	C/T	★★★★
LPL-rs12678919	A/A	★★★★
MLXIPL-rs714052	T/T	★★★★
NCAN-rs17216525	C/C	★★★★
PLTP-rs7679	C/T	★★★★
TRIB1-rs2954029	A/A	★★★★
XKR6-rs7819412	A/A	★★★★
ZNF259-rs964184	C/G	★★★★

METABOLIC HEALTH FACTORS

ELEVATED BLOOD SUGAR

Elevated blood sugar is a health condition that results from higher than normal levels of the sugar (glucose) in the blood plasma. High blood sugar levels are measured as a reading greater than 140 mg/dl or a fasting plasma glucose level of greater than 100 mg/dl. High blood sugar levels often indicate a condition called insulin resistance and can lead to type 2 diabetes. Your physician can directly measure blood sugar or you can use a blood test at home to check your blood sugar.

A genetic result of "High" or "Above Average" does not mean you have elevated blood sugar levels, but tells you that you may have a genetic propensity for elevated blood sugar levels. On the other hand, a result of "Low" or "Below Average," tells you that you have a lower than average genetic likelihood for elevated blood sugar levels. This report is based on genetic variants identified in a study of more than 100,000 individuals[9,98].

YOUR PROBABILITY

AVERAGE

Based on your genetic profile you have an average likelihood for elevated blood sugar levels.

YOUR RELATED GENES

Gene Tested	Your Genotype	Scientific Strength
ADCY5-rs11708067	A/A	★★★★
ADRA2A-rs10885122	G/G	★★★★
CRY2-rs11605924	A/C	★★★★
FADS1-rs174550	T/T	★★★★
G6PC2-rs560887	G/G	★★★★
GCK-rs4607517	A/G	★★★★
GCKR-rs780094	G/A	★★★★
GLIS3-rs7034200	A/C	★★★★
MADD-rs7944584	A/T	★★★★
MTNR1B-rs10830963	C/C	★★★★
PROX1-rs340874	C/C	★★★★
SLC2A2-rs11920090	T/T	★★★★
TCF7L2-rs7903146	C/C	★★★★

END OF REPORT

The scientific studies referenced in this report are provided below and can be referenced at www.pubmed.gov. All of these papers were published in peer-reviewed journals. PubMed is a service managed by the National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, and it tracks more than 19 million citations for biomedical articles and scientific research.

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