DNA NUTRITION REPORT

Genetic Testing For a Healthy Lifestyle

Sample Report

DNA NUTRITION

INTRODUCTION

Modern genetics is a rapidly advancing field. This expansion of self- understanding has led to the amazing discovery that all humans share more than 99% of their DNA. It is in the < 1% variation that makes each of us unique from everyone else in the world. Despite the common association of human genetics with hereditary disorders and disease predisposition, this discovery has also led to the understanding that no one approach to diet and fitness will work for everyone. Most people who have seriously engaged in a diet and exercise plan are likely already aware of this. The goal of this report is to offer an explanation to these commonly held ideologies and provide answers to important questions surrounding your diet, nutrition, exercise, and metabolism. It is our hope that this report will be useful to anyone, regardless of his or her current level of health or physical fitness. Whether you find yourself 40 pounds overweight or have run two marathons in the past month, the information

contained in this report will help you live a healthier lifestyle and understand how your body functions like never before, at the genetic level. If after reviewing this report you have any questions, please feel free to contact us regarding any aspect of this document. We also strongly urge you to review these findings with your primary care physician and discuss any changes to your diet or exercise plan before making any changes. Thank you for giving us the opportunity to contribute to your overall health and wellness!

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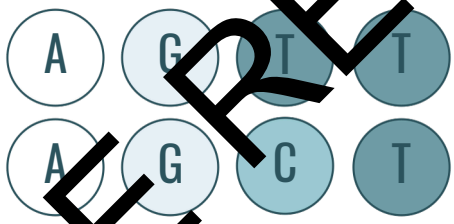
BASICS OF BIOLOGY

To get the most out of this report it will be helpful to understand some commonly used terms in biology. Please take a minute to read this section before moving on to the rest of your report!

1) There are four letters to your genetic code: A, T, C, and G. These letters are often called alleles.

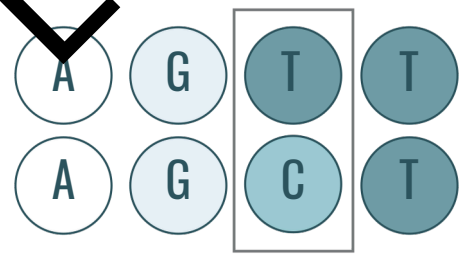
2) You have two copies of your genetic code, one from your mom and one from your dad.



Copy from Mom

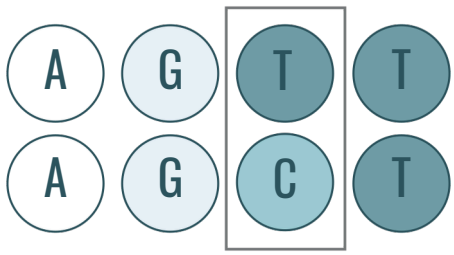
Copy from Dad

3) Changes in your genetic code are called “SNPs”. The sequence of your genetic code at a SNP is called a “genotype”.



C/T Genotype

4) SNPs are always named with a number that begins with “rs”.

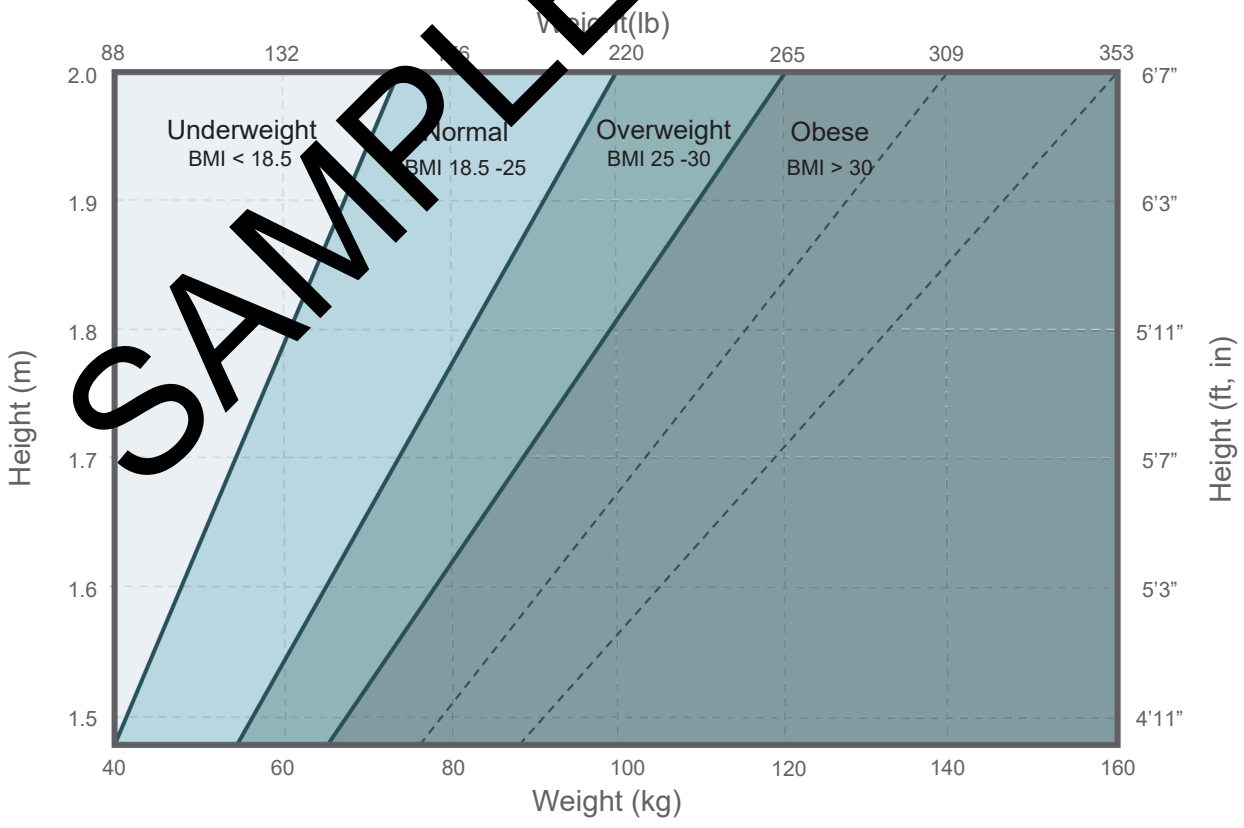


C/T Genotype at SNP rs1234

BODY MASS INDEX (BMI)

Body mass index (BMI) is a value obtained from height and weight of an individual that is used to categorize that individual into a class of body type. BMI results are a single number that is then interpreted using a series of ranges such as those listed in the figure below. There is some debate on the exact values, but generally speaking, obesity is defined as a BMI of over 30. The BMI is useful because it is a single measurement that can indicate an individual's risk of comorbidities (co-occurring condition) that may result from being over or underweight. Please note that this BMI calculation is only valid for men and women over the age of 20.If you do not see your BMI metrics to the right you may not have provided us with your height and weight along with your test requisition.

Customer Information	
Name	SampleReport
Date	May 27, 2023
Weight	150 lbs
Height	66 inches
Age	39
Sex	Female
BodyMass Index Calculations	
BMI	24.2
BMI Result	Normal Weight
Risk of Comorbidities	Average



DIETARY REQUIREMENTS

YOUR RESULTS

Optimum Diet Type –

Balanced Diet

Monounsaturated Fats –

Increased Benefit

Polyunsaturated Fats –

Increased Benefit

Sensitivity to Salt –

These days, the choice of what to eat can be a baffling dilemma. There are continually new types of diets being developed, each with a crowd of supporting followers that claim “this diet worked for me”. However, it is well-known that there is no one diet that works for everyone. There are several factors that determine how your body ultimately responds to food –and your genetics are one of the most important considerations. This is due to the fact that every person metabolizes dietary components differently. The amount of fat that is absorbed by your small intestine, what sugars are converted into energy, which vitamins are absorbed and how efficiently... are all determined by your genetics. The goal of this section is to make you better aware of what types of food and overall diet plan you should pursue.

OPTIMUM DIET TYPE

YOUR RESULT:

Balanced Diet

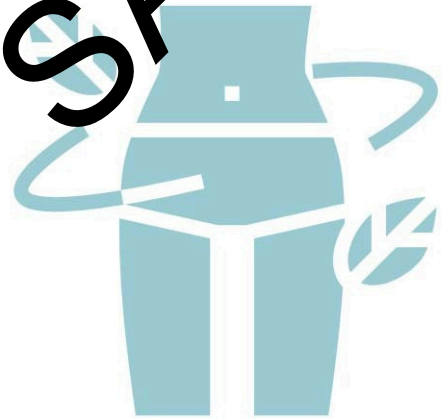
People with your genotype typically respond best to a balanced diet. Please refer to the example diet options below for additional information regarding your optimal diet.

GENE	SNP	YOUR GENOTYPE
ADRB2	rs1042714	CC
PPARG	rs18012282	CC
FABP2	rs17998	TC

In this section your optimum diet, the best diet to maintain optimal health, has been determined by looking at several genes involved with fat and carbohydrate metabolism. Based on these results, you have been assigned to one of the following diet types:

- Balanced Diet
- Mediterranean Diet
- Low Fat/High Protein Diet
- Low Carbohydrate Diet

We encourage you to review the examples of popular diet types that match your genetic recommendation (listed later in this report). Your suggested diet is recommended for you because your genotype indicates that it will provide you with increased weight control and additional health benefits. However, it is always recommended to discuss any change in your diet plan with your primary health care provider. [51, 40, 27, 58, 59, 60, 61, 63]



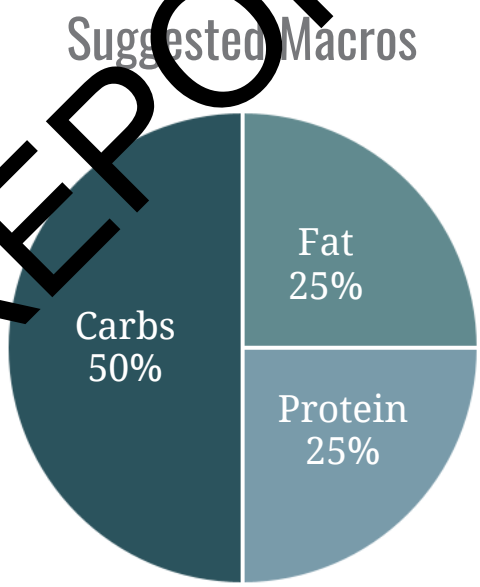
A proper diet maintains more than just your weight. It provides your overall body with health benefits.

BALANCED DIET

Abalanced diet will help you get the right amount of foods to reach your goals and find optimal health. What does a balanced diet look like? Instead of counting calories, simply use your hand as a guide to “measure” the food on your plate. With each meal/snack, you will aim to include lean protein and vegetables. With most meals you can also include what we like to refer to as “smart carbohydrates”. Smart carbohydrates are whole food carbohydrates that give you lots of nutrition in the form of vitamins, minerals, and fiber. Also, with most meals, you can include a healthy fat. You will also want to include healthy fats that come from whole food sources.

Women begin by eating:	Men begin by eating:
• 1 palm of leanprotein each meal • 1 fist of vegetables each meal • 1 cupped handful of smart carbohydrates most meals • 1 thumb of fat most meals	• 2 palms of leanprotein each meal 2 fists of • vegetables each meal 2 cupped handfuls of • smart carbohydrates most meals • 2 thumbs of fat most meals

Portion sizes provide a general idea for building a healthy plate. There are many other factors to take into consideration when working to meet your specific goals. Feeling hungry? Start by adding more vegetables to your plate. Always consult your physician prior to beginning a new diet plan.



LEAN PROTEIN

- Remove visible fat/skin
- Beef (look for extra lean cuts 90% or greater with 10% or le of fat)
- Pork
- Chicken
- Turkey
- Venison
- Eggs/Egg whites
- Fish to include: tuna; salmon, tilapia, cod, haddock, trout
- Seafood such as: shrimp, scallops, crab (not imitation)
- Dairy: milk, cottage cheese, plain/Greek yogurt

Protein powders
Beans
Lentils

VEGETABLES

- Asparagus
- Broccoli
- Brussels sprouts
- Cabbage
- Carrots
- Cauliflower
- Celery
- Cucumbers
- Green beans

Peppers (green/yellow /orange/red)

- Lettuce (not iceberg)
- Mushrooms
- Onions
- Radishes
- Snap peas
- Tomatoes
- Turnips
- Yellow Squash

Zucchini

SMART CARBOHYDRATES

- Barley
- Corn
- Oats
- Potatoes (purple,red, or gold)
- Quinoa
- Rice (brown, red, or wild)
- Squash
- Sweet potatoes/yams
- Fresh or frozen fruit

HEALTHY FATS

- Avocado
- Butter (not margarine)
- Naturalpeanut butter; natural nut or seed butters (almond, cashew, etc.)
- Nuts/seeds (almonds, cashews, chia, ground flax, hemp, pecans, pumpkin, sunflower, walnuts)
- Cold-pressed oils (avocado oil, coconut oil, fish oil, olive oil, flax seed oil, hemp seed oil, pumpkin seed oil)

Be sure to count the fats you used to prepare your food as well as any used in dressings or sauces.

MONOUNSATURATED FAT

YOUR RESULT:

Increased Benefit

You are likely toexperiencean increased benefit from eatingmonounsaturated fats. People with your genotype who eat more than 13% of their total calories in monounsaturated fatsoftenhavealower body weight.

GENE	SNP	YOUR GENOTYPE
ADIPOQ	rs17300539	AG

Despite the belief of many, fat is an extremely important part of any balanced diet. However, not all fats are created equal and careful consideration needs to be paid. Avocados, olives, peanuts, and oils are great healthy dietary fats. Monounsaturated fats also add Vitamin E to our diet. Additionally, not all people metabolize fats in the same manner. Recent studies have indicated that some people can actually maintain a lower body weight by consuming more than 13% of their daily calories through monounsaturated fats. Based on your genotype in the *ADIPOQ* gene, you may experience an "Increased Benefit" from eating moderate amounts of monounsaturated fats. Individuals who lack this genetic variant still receive a "Normal" benefit as monounsaturated fats are still a healthy dietary fat when consumed in proper amounts.[37]

POLYUNSATURATED FAT

YOUR RESULT:

Increased Benefit

Your body will experience an additional benefit from eating polyunsaturated fats, such as Omega-3 and Omega-6 fatty acids. Try to consume more polyunsaturated fats and less saturated fats in your diet.

GENE	SNP	YOUR GENOTYPE
PPARG	rs1801282	CC

Omega-3 and omega-6 are the two types of polyunsaturated fats that are important nutrients for the proper growth and function of your heart and brain. Based on a genetic variant in the PPARG gene, some individuals have been shown to maintain a lower body weight when they consume more polyunsaturated fats than saturated fats. For these individuals, you will receive an "Increased Benefit" from eating more polyunsaturated fats, while those lacking the genetic variant will still receive a "Normal" benefit. Great sources of omega-3 include fish, flaxseed, walnuts, and dark green leafy vegetables. Corn, cottonseed, safflower, and soybean are examples of omega-6 sources.[6]

SALT SENSITIVITY

YOUR RESULT:

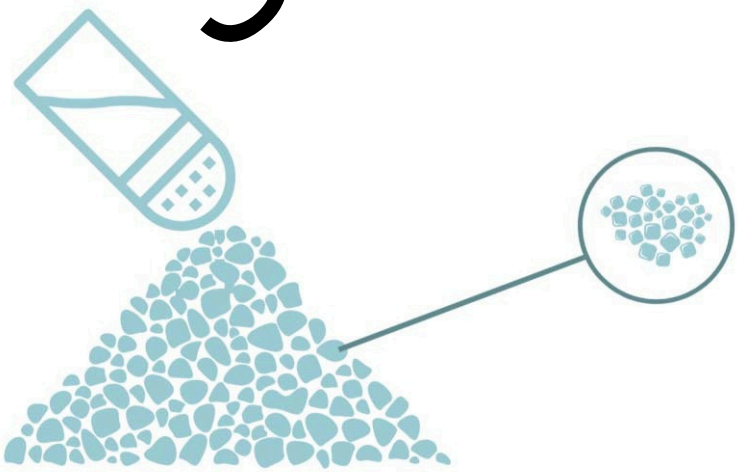
Possibly Sensitive

You have a slightly increased risk of experiencing an above-average increase in blood pressure following the consumption of dietary salt.

GENE	SNP	YOUR GENOTYPE
ACE	rs4343	AG
AGT	rs699	AA
NOS3	rs1800779	GG

The amount of dietary salt consumed has long been known to contribute to high blood pressure, also known as hypertension. But some people are more sensitive to salt than others, meaning they may experience a greater increase in blood pressure after consuming a large amount of salt. This difference comes down to mutations in the genes that control the renin-angiotensin system (RAS), a hormone system that regulates blood pressure.

Angiotensin is a hormone that causes vasoconstriction and increases salt absorption, which increases blood pressure. Angiotensin Converting Enzyme (ACE) contributes to this process by converting angiotensin I into the more active form of angiotensin II. You may have heard of ACE-inhibitors, which are a class of blood pressure medications that work by limiting the actions of that enzyme.
Several genetic mutations are known to alter the functions of both angiotensin and ACE and increase the risk of hypertension. Genetic variants in the *ACE*, *AGT*, and *NOS3*genes have the possibility of making a person much more salt-sensitive, which could result in an elevation of blood pressure following salt intake.[83, 84, 85] If your results in this section suggest you could be salt-sensitive, speak with your physician about ways to monitor your blood pressure and consider low-sodium alternatives when cooking or dining out.



Salt is a mineral consisting primarily of sodium chloride, a chemical compound belonging to the larger class of salts; salt in its natural form as a crystalline mineral is known as rock salt or halite.

EXERCISE & WEIGHT LOSS

YOUR RESULTS

Overall Metabolic Rate –

Normal

Loss of Body Fat –

Normal

More Effective

Weight Loss & Regain –
Response to Dieting –

LessLikely

Best Diet for Weight Loss –

Low-Fat Diet

Obesity –

Many recent studies have started to provide strong evidence that an individual's genetic makeup can drastically influence how they respond to exercise and diet. For example, certain genetic variants in the *PPARD*gene have been linked to greatly enhanced benefits from moderate endurance training, while others require high intensity exercise to efficiently lose weight. Other variants determine how much fat your body will utilize during exercise. While these conclusions are amazing, they reinforce something that nearly everyone who has attempted a weight-loss program will tell you – some people lose weight with less effort. The goal of this series of genetic tests is to best inform you of how your body responds to exercise and to help create a personalized approach for your overall fitness plan.

OVERALL METABOLIC RATE

YOUR RESULT:

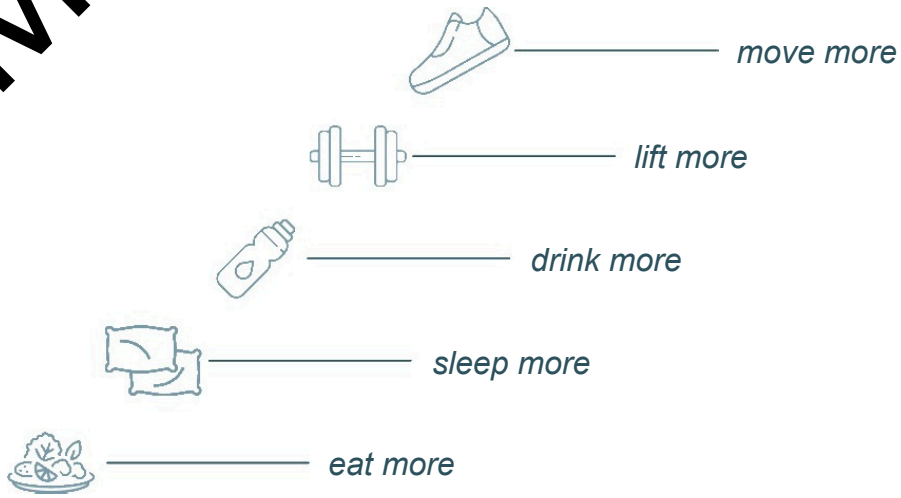
Normal

People withyourgenotypetypicallyhave a normal resting metabolic rate.

GENE	SNP	YOUR GENOTYPE
LEPR	rs1805094	GG

Nearly everyone knows someone with a “fast metabolism,” maybe you are even one yourself! These people are usually described as being able to eat whatever they want without gaining a pound. The term metabolism describes how your body breaks down and utilizes the calories you consume. Resting metabolism describes how your body uses energy during rest, as any type of exercise will generally increase your metabolic rate. There are many different factors that can regulate your metabolism, but recent genetic findings have uncovered a marker in the *LEPR*gene that can influence your metabolic rate. The study revealed that individuals with two copies of the "C" allele are more likely to have a significantly increased resting metabolic rate, while individuals with other genotypes are likely to have a “Normal” metabolic rate. However, it is important to remember that your metabolism is ultimately not controlled by only one gene, but is rather a consequence of your diet, genetics, and daily activities.[67]

5 WAYS TO BOOST YOUR METABOLISM



LOSS OF BODY FAT IN RESPONSE TO EXERCISE

YOUR RESULT:

Normal

People withyour genotype experience a typical reduction in body fat in response to exercise.

	SNP	YOUR GENOTYPE
LPL	rs328	CC

Weight control and the loss of body fat are one of many benefits that result from regular exercise. For many people, burning excess fat is their primary fitness goal. Given this, it may be surprising to learn that not everyone burns fat equally during exercise. A genetic variant in the *LPL*gene has been associated with how much fat is burned during exercise. Individuals with one or more "G" alleles at position rs328 in the *LPL*gene have been shown to have an "Enhanced" ability to burn fat as a result of exercise. Of course, if you lack this genetic variant you will still lose fat in response to exercise, but be aware that it may take a little more effort as compared to others with this variant.[2]

RESPONSE TO DIETING

YOUR RESULT:

More Effective

It is likely that you will experience additional weight-loss from dieting, especially if you are already overweight.

GENE	SNP	YOUR
ADIPOQ	rs17300539	AG

Adiponectin is a hormone released from fatty tissue that is known to contribute to a variety of different metabolic processes, including the regulation of blood sugar and the breakdown of fatty acids. Levels of adiponectin are known to be inversely related to body fat, meaning that the more adiponectin you have circulating in your blood, the less likely you are to have excessive body fat. A study identified a genetic variant in the *ADIPOQ* gene that resulted in higher levels of adiponectin with one or more copies of the A allele at position rs17300539. Moreover, the study also identified individuals with one or more copies of an "A" allele to have better and more long-lasting results from a calorie-restricted diet with regards to metabolic markers, such as insulin and triglyceride levels. Participants in the study who had one or more copies of the "A" allele were also shown to maintain these benefits of dieting for a much longer period of time as compared to "GG" participants.[28, 37]

WEIGHT LOSS & REGAIN

YOUR RESULT:

Less Likely

People with this genotype are more likely to keep weight off after losing it.

GENE	SNP	YOUR GENOTYPE
ADIPOQ	rs17300539	AG

Unfortunately, many individuals find that it is difficult to keep the pounds off following a successful weight loss program. This may be due to a regression in diet and exercise, but your genetics also play a part in how likely you are to gain weight back after losing it. A recent study identified a genetic variant in the *ADIPOQ* gene that influences weight loss. People who have two copies of the "G" allele at this location have been found to be more likely to gain weight back following a weight loss program, while individuals without this genotype are more likely to maintain their weight loss. Regardless of your genotype, it is important to maintain a healthy diet and active lifestyle following any weight loss program to ensure the pounds stay off. [28]

BEST DIET FOR WEIGHT LOSS

YOUR RESULT:

Low-Fat Diet

Resultsfromyour test indicate that you will lose 2.5x more weight on a diet that is low in fat as opposed to a low carbohydrate diet.

GENE	SNP	YOUR GENOTYPE
FAB2	rs1799883	CC
PPARG	rs1801282	CC
ADRB2	rs1042714	TC

It is well known that not everyone metabolizes food in the same manner. This is probably most evident when you are trying to lose weight through dieting. It is also evidenced by the never-ending feud that exists between rival diet programs such as paleo and Atkins. What most individuals do not realize is that not every diet will work for every person. Just because your good friend had amazing results from Atkins does not mean that it will work for you. This section of the report is based on research that has been performed on the two most popular approaches to weight loss, a low-fat vs. a low-carb diet. Based on your genotype at three different locations, you are predisposed to having one diet work better for you than the other. **Researchers have found that people who have subscribed to the correct diet based on their genotype lose 2.5 times more weight than if they were practicing the alternative diet.** Some individuals have also been shown to have good results, regardless of diet type. Based on your results at the following three locations, you will receive one of the following outcomes:

- "Any Diet Works for You"
- "Low Carb Diet"
- "Low Fat Diet"

If you have struggled with finding the right diet for weight loss in the past, then you may want to consider trying again with the diet suggested for you in this panel. It should also be stressed that any diet will work if it is supplying the correct caloric and vitamin intake. Be sure to discuss any significant changes in your diet with your primary healthcare provider before beginning a new program.[20, 10, 5, 1, 13, 8]

LOW-FAT DIET

Eating the right kindsoffat in the right amounts are important for hormone regulation, healthy immune system, vitamin absorption, nourishing your fatty tissues (brain, eyes, skin), and for faster workout recovery. There are several different kinds of fats and how much fat you eat is just as important as balancing the type of fats you eat. Equally important is that your fats come from a variety of whole unprocessed foods when possible (eggs, meats, fish, olives, nuts, and seeds). This will help optimize health, body composition, and performance. Fatsareenergydense. Thismeanstheyhavemorecaloriespergramthancarbohydratesandprotein.

With a low-fat diet, you don't have to get fat at every meal. With each meal/snack, you will want to include lean protein and vegetables. Lean proteins will have the fat trimmed from it and the skin removed. With most meals you can also include what we like to refer to as "smart carbohydrates," which are whole food carbohydrates that give you lots of nutrition in the form of vitamins, minerals and fiber.

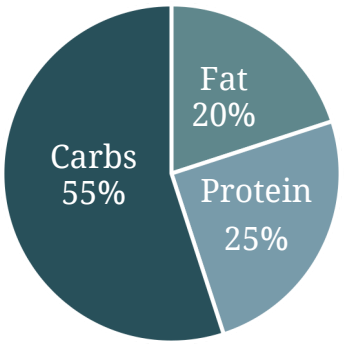
LEAN PROTEIN

- Remove visible fat/skin
- Beef (look for extra lean cuts; 90% or greater with 10% or less of fat)
- Pork
- Chicken
- Turkey
- Venison
- Eggs/Egg whites
- Lentils
- Fishto include: tuna; salmon, tilapia, cod, haddock, trout
- Seafood such as: shrimp, scallops, crab (not imitation) Dairy:
- milk, cottage cheese, plain/Greek yogurt Protein
- powders Beans
-

SMART CARBOHYDRATES

- Barley
- Corn
- Oats
- Potatoes (purple, red, gold)
- Quinoa
- Rice (brown, red, wild)
- Squash
- Sweet potatoes/yams
- Fresh or frozen fruit

Suggested Macros



HEALTHY FATS

Saturated Fat

You will get a good portion of this fromyour protein selection:
- Animal fats (egg yolks, dairy, meat, butter, cheese)
- Tropical oils (coconut oil, palm oil)

Monounsaturated Fat

- Olives
- Avocado
- Olive oil, avocado oil, macadamia nut oil, almond oil
- Nuts and nut butters (natural)

Polyunsaturated Fat

- Flax seeds/flax seed oil
- Cold Pressed oils (pumpkin, hemp seed)
- Omega 3: Fish oil/fatty cold-water fish (salmon, mackerel, herring, sardines)
- Omega 6: use these fats sparingly as they have been industrialized through high-heat processing and have been shown to promote inflammation (canola, corn, cottonseed, grapeseed, palm kernel, peanut, rice bran, safflower, sesame, soybean, sunflower, vegetable).

UNHEALTHYFATS

Trans Fats

These are artificially produced (man-made) in an effort to convert a liquid oil into a solid (this makes foods have a longer shelf life and a better mouth feel). You want to minimize or completely avoid because trans fats increase risk of coronary heart disease, cancer, and other chronic health conditions/diseases. If you see Trans Fat on the label of a food, you want to say no thank you. However, the FDA doesn't require trans fats to be listed on the food label if it contains less than 0.5 grams. So, you will want to learn to read your ingredient lists. Look on labels for partially hydrogenated or vegetable shortening, monoglycerides, or diglycerides. These are commonly found in:
- Margarine
- Vegetable shortening or "spreads"

Peanut butter (unless it is natural)
-
- Baked goods
- Fried foods
- Processed foods (be extra cautious of things that are labeled "low-fat" or "fat free")

OBESITY

YOUR RESULT:

SlightlyDecreased Risk

You have anObesityIndex slightly lower than the average individual and are at a slightly decreased risk of becoming overweight (i.e. BMI>25) due to genetic factors.

GENE	SNP	YOUR GENOTYPE
APOA2	rs5082	AG
APOA5	rs662799	AA
MC4R	rs2229616	CC
FAM71F1	rs9371601	GG
FTO	rs1121980	GG
FTO	rs9939609	GG
ANKK1-DRD2	rs1800497	TT

Your risk for becoming obese is largely due to a combination of lifestyle choices and genetics. Often, individuals who have a BMI above 25 have a strong genetic determinant that is influencing their weight, as it is estimated that 40-70% of your susceptibility to obesity is inherited. This panel explores many of these potential markers, including those that relate to hunger, the ability to feel full, howyour body responds to exercise, and various metabolic markers. The markers that are examined in this section have been very strongly linked to an increase in BMI and overall obesity risk in a multitude of different studies.[95]One of the most well-studied is the *FTO*gene, originally described as "the fat gene," which plays a large role in the regulation of energy intake in the body. Aside from energy intake, the *FTO*gene has also been implicated in hunger and satiety responses.[96, 102] Other important genes tested in this section include *APOA2*, *APOA5*, and *MC4R*in which certain variants have been strongly linked to an increased Body Mass Index (BMI) and appetite regulation.[97-101] Another variant in the *ANKK1-DRD2*gene has been linked to addictive behaviors and the tendency to overeat.[107, 108]All of the genetic results from this section have been compiled into an "Obesity Index" using a proprietary algorithm developed by Dynamic DNA Laboratories. The five possible results from this section are:

- Significantly Decreased Risk
- Slightly Decreased Risk
- Average Risk
- Slightly Increased Risk
- Significantly Increased Risk

Depending on your results from this section, you may find that if you have ever struggled with weight then there may be a contributing genetic factor, especially if you do not eat a healthy diet and regularly engage in a suitable form of exercise. Conversely, individuals who have a lower risk of obesity are not immune from becoming obese and still need to routinely engage in healthy lifestyle choices.

METABOLIC HEALTH FACTORS

YOUR RESULTS

HDL Cholesterol –

Average

LDL Cholesterol –

Average

Triglyceride Levels –

Average Levels

Iron Levels –

Average

Blood Sugar Levels –

Average

Oxidative Stress –

Slightly Increased

Detoxification –

The results that are presented in the next section have all been linked to various metabolic factors, such as cholesterol levels and blood sugar, by clinical genetic studies. It is important to remember that these results do not always reflect your current physiological state. For example, if you have genetic markers that are associated with low levels of HDL cholesterol, this does not mean that your HDL levels are low or ever guarantee that they will be low. The following results are only an indication of your predisposition to these factors. While genetics do play an important role in physiological factors, they are not the only factor. Other lifestyle choices such as diet and exercise have a tremendous influence on your metabolic factors and overall health.

HDL CHOLESTEROL

YOUR RESULT:

Average

Based on your genotype, you are more likely to have average levels of HDL cholesterol.

GENE	SNP	YOUR GENOTYPE
TMEM57	rs10903129	AG
FADS2	rs174570	CC
TTC39B	rs47136	TT
HNF4A	rs[illegible]	CC
PC1F1	[illegible]7679	TT
RAB11F	rs2967605	CC
ABCG5	rs6756629	GG
CPN1A-6P	rs7395662	AA
[illegible]TF2	rs2271293	GG
DNAH11	rs12670798	TT
ACP2	rs2167079	CC
Intergenic	rs9891572	CC

Often referred as “good cholesterol”, your HDL cholesterol is one number that you want to be high when you visit your doctor. Clinical studies have shown that low HDL levels (i.e. less than 40 mg/dL) are associated with an increased risk of cardiovascular disease. Typical healthy HDL values range from 40-50 mg/dL in men and 50-60 mg/dL in women.

It is critical to remember that your cholesterol levels are a consequence of not only your genetics, but also your dietary choices and the amount of exercise that you perform. The genetic markers that are included in this report are known to be associated with not only HDL cholesterol, but also LDL cholesterol and triglyceride levels (see findings on the next two pages). Based on your genotype at these five locations, you are classified as being more likely to have Lower HDL Cholesterol, Average HDL cholesterol, or Higher HDL Cholesterol. Again, if your results indicate that you have “Low HDL Cholesterol” this does not guarantee that you have or will ever develop low levels of HDL, only that you are genetically predisposed to have lower HDL levels. Regardless of these findings, there is no substitute for a healthy diet and active lifestyle to regulate your cholesterol levels.[32, 30, 31, 56, 46, 54, 62, 53]

HDL

High Density Lipoprotein
GOODCHOLESTEROL

High DensityLipoproteincarries excess cholesterol in yourbloodbacktoyour liver where it’s broken downandremovedfrom your body. This means a highlevelofgoodHDL cholesterol can maintainyourhearthealth.

LDL

Low Density Lipoprotein
BAD CHOLESTEROL

Low Density Lipoproteincarrierscholesterol to your cells. Butwhenyouhavetoomuch LDL, it can build up inyourarterywalls,causing them to narrow. Thisreducesbloodflow,which can be badforyourhearthealth.

TRIGLYCERIDE LEVELS

YOUR RESULT:

Average

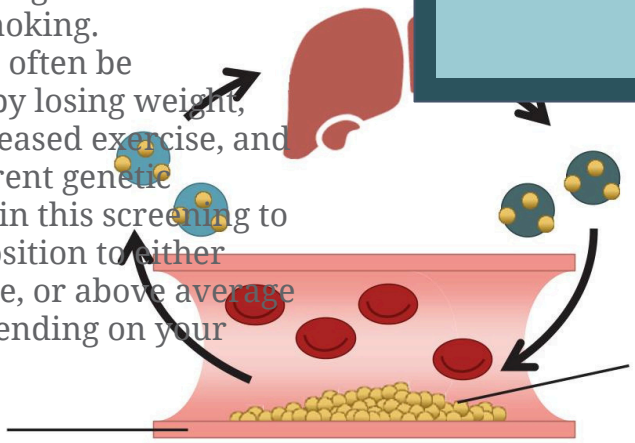
Based on your genotype, you are more likely to have average triglyceride levels.

GENE	SNP	YOUR GENOTYPE
TMEM57	rs10903129	AG
ABCG5	rs6756629	GG
NUTF2	rs227123	GG
FADS2	rs174570	CC
PC1F1	rs7679	TT
OR4A46	rs7395662	AA
DNAH11	rs12670798	TT
Intergenic	rs2624265	TT

Triglycerides are a type of fat and are the main components of vegetable oils and animal fats. In medicine, triglyceride levels are the measurement of these molecules in the blood stream (which must be conducted by a physician). Knowing your triglyceride levels is important because high levels have been closely associated with several negative health outcomes, including coronary artery disease, atherosclerosis, diabetes and kidney disease. Average triglyceride levels are less than 150 mg/dL. Levels above 200 mg/dL are considered high, while levels above 500 mg/dL are considered very high. In addition to genetics, other factors that may raise triglyceride levels are being overweight, a lack of exercise, a diet high in carbohydrates, and smoking. Triglyceride levels can often be effectively controlled by losing weight, diet modification, increased exercise, and medication. Five different genetic markers are analyzed in this screening to indicate your predisposition to either below average, average, or above average triglyceride levels depending on your genotype.[30-32, 46, 53, 54, 56, 62]

5 TIPS TO LOWER TRIGLYCERIDES

1. Limit added sugars & sweets
2. Choose healthy fats
3. Decrease alcohol
4. Reach a healthy weight
5. Limit fried foods and trans fats



BLOOD SUGAR LEVELS

YOUR RESULT:

Average Levels

Generally, people in goodhealth with your genotype at these locations have average fasting blood glucose levels.

GENE	SNP	YOUR GENOTYPE
G6PC2	rs560887	TC
MTNR1B	rs10830963	GG
GCK	rs4607517	GG
DGKB	rs2191349	TG
GCKR	rs780094	TC

Your level of blood sugar refers to the amount of glucose that is circulating in your bloodstream. Blood sugar levels are carefully regulated by the body, but fluctuate greatly throughout the day in response to activity and food intake. Typical blood sugar measurements for a healthy individual range from 70-100 mg/dL, depending largely on when your last meal was. Blood sugar levels higher than this can result in a diagnosis of prediabetes or diabetes depending on when the test was performed in relation to your last meal. In addition to diabetes, high blood sugaris closely associated with several negative health outcomes, including cardiovascular problems, kidney disease, vision loss, and nerve damage. As with the other metabolic traits that have been discussed in this section, blood sugar levels are subject to a wide variety of factors, including diet, exercise, and genetics. This panel investigates five different genes that have been identified in clinical genetic studies to correspond to blood sugar levels.[91-95] Depending on the outcome of your test, you may be predisposed to have blood sugar levels that are “Likely Lower,” “Possibly Lower,” “Average,” “Possibly Increased,” or “Likely Higher.” It is important to note that these test results are not a substitute for an actual blood glucose test, but are an indication of your genetic predisposition.

Blood Glucose Chart			
(Mg/DL)	Fasting	After Eating	2-3 Hours After Eating
Normal	80-100	170-200	120-140
Impaired Glucose	101-125	190-230	140-160
Diabetic	126+	220-300	200+

OXIDATIVE STRESS

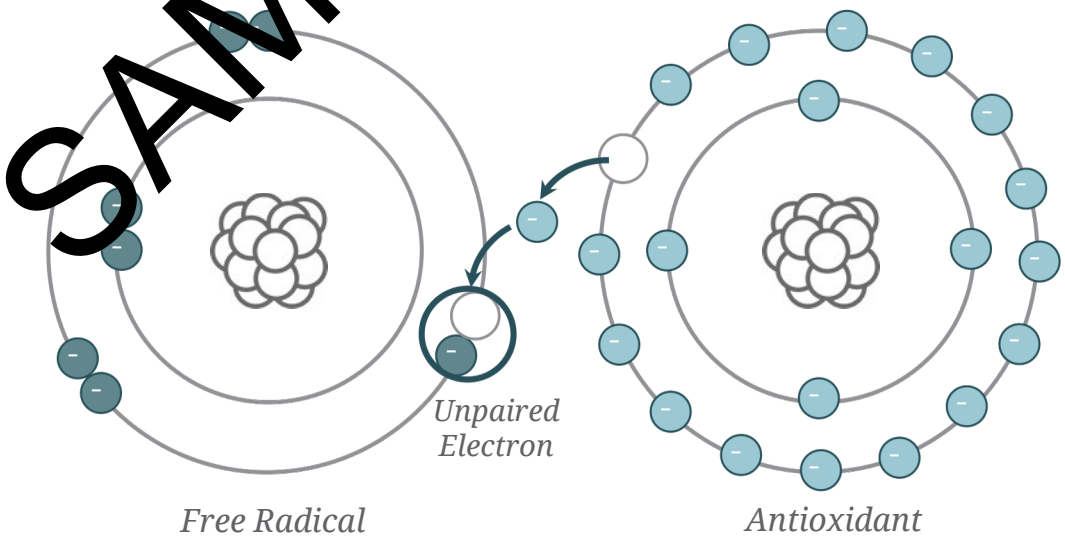
YOUR RESULT:

Slightly Increased

Basedonyour genotype,youmay be predisposed to slightly increased oxidative stress.

GENE	SNP	YOUR GENOTYPE
SOD2	rs4880	AG

When food is metabolized by the body harmful substances known as "free radicals" are produced during the process. These molecules, such as hydrogen peroxide, are known to have damaging properties to cellular health. However, the body is prepared for this and produces several different enzymes to counteract the damaging effects of free radicals. Certain foods, rich in Vitamins C, A, and E, are also known to reduce levels of free radicals. Collectively, these substances are known as antioxidants. A recent study has identified a genetic variation that can influence the levels of one important antioxidant, referred to as SOD2. If you have one of more copies of the "A" allele at SNP rs4880 you may have lower levels of the SOD2 enzyme and are at a higher risk for increased oxidative stress. If your genotype indicates that you have reduced SOD2 activity you should try and include more foods that are rich in antioxidants into your diet, such as blueberries, dark chocolate, kidney beans, and artichokes.[4]



DETOXIFICATION

YOUR RESULT:

Slightly Reduced

Slightly reduced clearanceof common toxins from the body.

GENE	SNP	YOUR GENOTYPE
GSTP1	rs1695	AG

Detoxification is a broad term, but is generally referred to as the removal of harmful substances from the body. There are several different mechanisms of detoxification in the human body to deal with the wide range of environmental hazards that we may encounter. One of the most important enzymes involved in detoxification is known as GST or Glutathione S-Transferase. In the body, it is the job of GST to bind toxins using glutathione, which forms a less harmful substance that can be easily evacuated from the body. A series of studies have identified a SNPin the *GSTP1*gene that can led to an altered form of the GST detoxification enzyme. Individuals who have one or more copies of the "G" allele at position rs1695 may not be able to clear some toxins from the body as effectively as individuals who lack this allele. If you have any copies of the "G" allele you should make a special effort to avoid some common toxins such as:

- •Cigarette Smoke
- •Insect Sprays
- • Herbicides
- •Charred Foods
- •Heavy Metals
- • Fungicides

Of course, all of us should make an effort to avoid these substances, but individuals with this genetic marker may want to consider the use of an all natural insecticide, avoid smoking, and consider organic foods.[9, 15, 27, 69]

IRON LEVELS

YOUR RESULT:

Average

Based on your genotype at these three locations, you are unlikely to experience an excess of iron in your blood as a result of genetic variations in your HFE gene.

GENE	SNP	YOUR GENOTYPE
HFE	rs1799945	CG
HFE	rs1800730	GG
HFE	rs180058[illegible]	AA

Iron is one of the essential micronutrients required by our bodies. Among other important biological roles, iron is required for oxygen transport in our blood—it helps to bind the oxygen molecules to the red blood cells so the oxygen can be moved around our body from our lungs to where it is needed. There are two types of dietary iron: heme and nonheme. Heme iron is contained in meat; sources that are especially high include red meats, shellfish, and liver. Nonheme iron is found in eggs, tofu, spinach, and legumes, and it is what manufacturers use to fortify cereals, breads, and pastas. Our bodies absorb heme iron much more readily than nonheme, meaning that if you're a vegan or vegetarian, your recommended daily allowance (RDA) of iron is 1.8 times higher than a person of your same age and gender who regularly eats meat. Pregnant women need significantly more iron in order to support the baby's growth as well as maintain the blood-rich placenta.
Because iron is so important and we can only get it from our diet, our bodies are really good at absorbing iron from our food, but we don't have any way of getting rid of too much iron—the only way our bodies have of controlling our iron levels is regulating how much iron gets absorbed. Once our body thinks it has all the iron it needs, it will stop absorbing it from our food. Some people have a genetic mutation that prevents the absorption process from shutting off, resulting in an accumulation of excess iron.
This genetic mutation occurs in the *HFE* gene and having at least one mutated allele is common in those of European ancestry. Approximately 10% of Caucasians have a single mutation, meaning they are carriers, but only 0.4% are homozygous for the mutation and are more likely (though not guaranteed) to develop excess iron levels.[79-82] Having mutations in other genes that code for iron processing proteins increases those chances. (These mutations are much less common in other ethnic groups.) If your results in this section suggest you may be likely to accumulate excess iron, speak with your doctor about ways to keep an eye on your iron levels.

DNA NUTRITION

YOUR RESULTS:

Calcium –

Slightly Decreased Levels

Copper –

PossiblyIncreased

Folate –

Magnesium –

Slightly Decreased Levels

PossiblyReduced

Omega-3 & Omega-6 –

Typical

Increased Levels

Phosphorus –

Selenium –

Average Levels

Vitamin A –

Vitamin B2-

Slightly Increased

Balanced Intake

Vitamin B6 –

Likely Average

Average

Vitamin C –

Vitamin B12 –

Average

Vitamin D –

Significantly Lower

Vitamin E –

Average

NUTRITIONAL NEEDS

Many people are not aware that your genes play a critical role in how your body utilizes and metabolizes different vitamins. There are 13 different vitamins and at least 16 different minerals that are critical for human health. The body needs these compounds for a wide variety of tasks, including enzymatic reactions, proper hormone function, cell signaling, reproduction, and growth. While it is easy to take a multivitamin, there is a growing body of knowledge that many vitamins are not readily absorbed by the body in this fashion. Additionally, some individuals metabolize vitamins differently and may require additional intake of some key nutrients. The intent of this section is to better inform you of what vitamins and nutrients you need to focus on obtaining in your diet. Experts agree that the best source of virtually every vitamin and mineral is dietary. Given this, we provide food recommendations for each key nutrient that is discussed in this section, in addition to the daily recommended allowances (RDAs) that are suggested by the Institute of Medicine of the National Academies.

CALCIUM

YOUR RESULT:

SlightlyDecreased Levels

Your results indicate that youmay be genetically predisposed to having slightly lower serum levels of calcium.

GENE	SNP	YOUR GENOTYPE
CASR	rs1801725	GG
CASR	rs17251221	AA
DGKD	rs1550532	CC
GCKR	rs780094	TC
GATA3	rs3049100	TC
CARS	rs7481584	AA
DGKH	rs7336933	GG
CYP24A1	rs1470669	AA

Recommended Daily Allowance for Calcium

Age	Male	Female
1-3 years	700 mg	700 mg
4-8 years	1,000 mg	1,000 mg
9-13 years	1,300 mg	1,300 mg
14-18 years	1,300 mg	1,300 mg
19-50 years	1,000 mg	1,000 mg
51-70 years	1,000 mg	1,200 mg
71+ years	1,200 mg	1,200 mg

Calcium is the most abundant mineral in the human body. It plays vital roles in the vascular system, muscle function, nerve transmission, and hormone secretion, but only 1% of the body's total calcium is involved in these functions. The remaining 99% of the calcium in the body is stored in bones and teeth, where it supports their structure and function as well as serving as a storage location the body can pull from when it needs it. In fact, bones are constantly remodeling themselves by depositing and reabsorbing calcium. When we're young, more new bone is made than old bone is removed, so our bone mass increases until around age 30, after which point we usually begin to lose bone mass. The older we get, the more our bone density decreases, and we become more prone to fractures and breaks, especially during physical activities.

Calcium deficiency has no short-term effects as such a small amount is needed for vital biological processes and the body has such a large store in its bones. However, long-term calcium deficiency can result in bone loss later in life. Osteoporosis, a condition characterized by fragile bones and increased fractures and breaks, is a serious public health concern as it affects over 10 million adults in the U.S., 80% of whom are women. 34 million U.S. adults have osteopenia, which is the low bone mass that precedes osteoporosis.[115-117]Osteoporosis especially affects postmenopausal women as well as women who are no longer having a regular menstrual period due to an eating disorder or extreme athletic training. This is due to the changes in circulating estrogen levels, which impacts calcium absorption.

The healthiest way to increase calcium is to optimize your intake through your diet. Dietary sources of calcium include dairy products like milk, cheese, and yogurt; fortified cereals and juices; and vegetables like cabbage, kale, and broccoli. It's also important to be sure you're getting enough vitamin D along with your calcium, as vitamin D helps your body absorb calcium. Calcium supplements are common, but you should always speak with your physician before starting any supplements, as excess calcium can cause renal insufficiency, vascular and soft tissue calcifications, and kidney stones.

COPPER

YOUR RESULT:

Possibly Increased

Your body may bepredisposed to having higher levels of copper. Try to maintain these levels by eating foods high in copper such as dark chocolate, cashews, lentils, and mushrooms.

GENE	SNP	YOUR GENOTYPE
SELENBP1	rs2769264	TG

Recommended Daily Allowance for Copper

Age	Male	Female
[illegible] years	340 mcg	340 mcg
4-8 years	440 mcg	440 mcg
[illegible] years	700 mcg	700 mcg
14-18 years	890 mcg	890 mcg
19+ years	900 mcg	900 mcg

Copper is an essential micronutrient, meaning our bodies require it but only in very small amounts. The human body contains only about 100 milligrams of copper. Copper plays a critical role in iron absorption and red blood cell formation and it is also an important component in chemical reactions involved in metabolism, antioxidant defense, and immune function.[114]It's necessary for the growth of bones, connective tissue, and many organs so it's especially important for pregnant women to get adequate amounts in their diet to ensure the fetus has enough copper for development, both in utero and after birth. Breastmilk is very low in copper so infants utilize copper that they have stored as a fetus for their growth during the first 4-6 months of their life. To facilitate this, fetuses have highly efficient copper storage mechanisms; newborns actually have four times the amount of copper stores compared to adults. Copper deficiencies in pregnant mothers can result in low birth weight, muscle weakness, and neurological problems in infants, but this can be avoided by simply following a balanced diet. However, if iron or zinc supplements are required it is important to be sure the mother is getting an adequate amount of copper as well, since iron and zinc affect the bioavailability of copper. Most prenatal vitamins include a nutritionally significant amount of copper for this reason.
The recommended daily allowance of copper for adults is 0.9 mg/day, pregnant women is 1.0 mg/day, and breastfeeding women is 1.3 mg/day. Good sources of dietary copper include whole grains, nuts, legumes, mushrooms, shellfish, and dark chocolate. If you're concerned you aren't getting enough copper, you should speak with your physician about your nutritional needs before taking a supplement because long-term excess dietary copper can result in copper toxicity, which can have negative effects on liver and kidney function.

FOLATE

YOUR RESULT:

Possibly Reduced

Based on your genotype, you are at a slightly increased risk for lower than average plasma levels of folate. Try to optimize your intake of foods rich in folate to prevent accelerated aging as a result of a possible folate deficiency.

GENE	SNP	YOUR GENOTYPE
MTHFR	rs1801131	TG
MTHFR	rs180113[illegible]	AG

Recommended Daily Allowance for Folate

Age	Male	Female
1-3 years	150 mcg DFE	150 mcg DFE
4-8 years	200 mcg DFE	200 mcg DFE
9-13 years	300 mcg DFE	300 mcg DFE
14+ years	400 mcg DFE	400 mcg DFE

The current RDAs for folate are given as micrograms (mcg) of dietary folate equivalents (DFEs). The FNB developed DFEs to reflect the higher bioavailability of folic acid than that of food folate. At least 85% of folic acid is estimated to be bioavailable when taken with food, whereas only about 50% of folate naturally present in food is bioavailable. Based on these values, the Food and Nutrition Board (FNB) defined DFE as follows:

1 mcg DFE = 1 mcg food folate

1 mcg DFE = 0.6 mcg folic acid from fortified foods or dietary supplements consumed with foods

1 mcg DFE = 0.5 mcg folic acid from dietary supplements taken on an empty stomach

Folate is derived from the Latin word "folium," which means leaf. Green leafy vegetables, such as spinach or kale, as well as beans, fruits, fortified grains, and lentils are great resources for folate intake. Diets that are rich in folate can even decrease the risk of cardiovascular disease. Daily intake of folate is highly recommended for pregnant women or those who intend to become pregnant. Adding folate is highly important in the early stages of pregnancy since it is known to prevent some birth defects. It is for this reason that women who are pregnant or plan to become pregnant should increase their daily intake of folate.

Given its importance, it is beneficial to know how your body metabolizes the folate that you ingest. Two well-studied variants in the *MTHFR*gene have been linked to altered folate metabolism, resulting in lower folate levels and elevated plasma levels of homocysteine which has been implicated in a wide range of negative health outcomes. If your result for this section is to "Optimize Levels" then you should strongly consider optimizing your daily intake of folate. However, it is recommended to focus on foods that are rich in folate, as opposed to the synthetic form, folic acid. It is important to note that not all individuals with this genotype have a vitamin imbalance, but many do and you should consider discussing these results with your primary care physician.[24, 71]

MAGNESIUM

YOUR RESULT:

SlightlyDecreased Levels

Your results indicate that youmay be genetically predisposed to having slightly lower serum levels of magnesium.

GENE	SNP	YOUR GENOTYPE
MUC1	rs4072037	CC
SHROOM3	rs13146355	AG
DCDC5	rs392556	TT
ATP2B1	rs7965584	AG

Recommended Daily Allowance for Magnesium

Age	Male	Female
1-3 years	80 mg	80 mg
4-8 years	130 mg	130 mg
9-13 years	240 mg	240 mg
14-18 years	410 mg	360 mg
19-30 years	400 mg	310 mg
31+ years	420 mg	320 mg

Magnesium is an essential micronutrient that is involved in a wide range of biological processes, including protein and DNA synthesis, muscle and nerve function, blood glucose control, and blood pressure regulation. Magnesium is present in every cell of the body and is a necessary component of the main energy source of cells, adenosine triphosphate (ATP).

Magnesium deficiency in healthy individuals is rare because the kidneys do a good job of controlling the excretion.[119]However, those with gastrointestinal diseases, diabetes, or alcohol dependence may have difficulty absorbing adequate amounts of magnesium. Symptoms of chronic magnesium deficiency include numbness, tingling, muscle cramps, seizures, and heart problems. Excess magnesium is also rare for the same reason, the kidneys control excretion of excess amounts. However, high doses from supplement use have been found to cause nausea, cramping, and diarrhea. Patients with impaired renal function or kidney failure are at risk of magnesium toxicity. Magnesium supplements can also interact with certain medications, such as antibiotics, diuretics, and proton pump inhibitors, so supplement use should always be discussed with your physician.

The recommended daily allowance of magnesium for healthy adults is 400-420 mg/day for men and 310-320 mg/day for women, with higher levels for pregnant women to help support the developing fetus. Foods high in magnesium include nuts, green leafy vegetables, legumes, and whole grains.

OMEGA-3 & OMEGA-6

YOUR RESULT:

Typical

People withyour genotype typically have average plasma levels of Omega-3 and Omega-6 fatty acids.

GENE	SNP	YOUR GENOTYPE
FADS1	rs174547	TT

Both omega-3 and omega-6 fatty acids are classified as polyunsaturated fats. In moderation, polyunsaturated fats are considered necessary and healthy. Many studies have even linked the ingestion of foods rich in omega-3 and omega-6 fatty acids to a reduced risk of cardiovascular disease.[18]Excellent sources of omega-3 fats are fish, flaxseed, canola oil, walnuts, hemp seed, and dark green leafy vegetables. Foods rich in omega-6 fatty acids include corn, safflower, soybean, and sunflower oils. A marker in the *FADS1*gene has been linked to inefficient processing of omega-3 and omega-6 fats. Individuals who have a genotype of "G/A" or "G/G" have a potentially increased risk for decreased plasma levels of these beneficial fats. It is important to note that results such as these do not directly indicate a deficiency, but only suggest that you are predisposed to developing one. If this is your genotype you should try to optimize your intake of these polyunsaturated fats, within the limits of your diet plan.[64]

PHOSPHORUS

YOUR RESULT:

Increased Levels

Oneor more genetic variants were identified that may results in increased serum levels of phosphorous.

GENE	SNP	YOUR GENOTYPE
ALPL	rs1697421	TT
CSTA	rs17265703	AA
PDE7B	rs9475	CC

Recommended Daily Allowancefor Phosphorus

Age	Male	Female
1 year	460 mg	460 mg
4-8 years	500 mg	500 mg
9-13 years	1,250 mg	1,250 mg
14-18 years	1,250 mg	1,250 mg
19+ years	700 mg	700 mg

Phosphorus is required for the structure and function of every cell in the human body. Phosphorus helps form the membrane around each cell, is an important part of the DNA molecule, and even helps your body process energy. On a larger level, phosphorus is also required for the structure of teeth and bones and it helps kidneys filter waste. Phosphorus is necessary for muscle contraction, so it is not only important for movement, but also digestion via the contraction of the smooth muscles in the digestive tract as well as keeping the heart beating through contractions of the cardiac muscles. Phosphorus deficiency is very rare but some medications can lower the body's levels of phosphorous.[118]These medications include insulin, ACE inhibitors, corticosteroids, antacids, and anticonvulsants. Most people get more than the necessary amount of phosphorous in their diets—many foods are high in phosphorus and phosphorus is also often added during food processing. Healthy kidneys do a great job at removing excess phosphorus, but those with chronic kidney disease (CKD) may develop excess levels of phosphorus, which can result in bone loss as the body pulls calcium from the bones to bind the excess phosphates in the blood and then that calcium gets deposited in blood vessels and other organs like the heart and lungs, causing dangerous calcification of these organs. This is only a concern for those with CKD, and those patients should discuss their nutritional needs with their physician and consider a low-phosphorus diet. Medications are also available that can bind the excess phosphorus and prevent it from being absorbed.

The recommended daily allowance of phosphorus for healthy adults is 700 mg/day. Sources of phosphorus include dairy products, meats, nuts, and beans. Additionally, processed foods like fast food and soda often contain high levels of added phosphorus.

SELENIUM

YOUR RESULT:

Average Levels

Youarelikelytohaveaverage plasma levels of selenium.

GENE	SNP	YOUR GENOTYPE
DMGDH	rs921943	CC

Recommended Daily Allowance for Selenium

Age	Male	Female
1-3 years	20 mcg	20 mcg
4-8 years	30 mcg	30 mcg
9-13 years	40 mcg	40 mcg
14+ years	55 mcg	55 mcg

Selenium is an essential micronutrient that is required for biochemical reactions involved in antioxidant responses as well as hormone activation. Selenium deficiencies are rare in the developed world and are mostly seen in countries that have poor soil quality and populations that have a primarily vegetarian diet. Deficiencies in selenium and other trace elements are often seen in patients with HIV and can also be a side effect of kidney dialysis. These deficiencies rarely cause problems on their own, but can often predispose one to other illnesses and diseases, especially in immunocompromised populations like HIV patients.[114] Chronic excess selenium intake can result in hair and nail loss, skin lesions and rashes, fatigue, irritability, and nervous system abnormalities. For these reasons, consult your physician before taking any supplements. The recommended daily allowance of selenium for adults is 0.55 mg/day. The best sources of dietary selenium are seafood, meat, and fortified cereals and dairy products. The selenium content in plants and grains can vary widely across geographic regions due to differences in soil concentrations of selenium.

VITAMIN A

YOUR RESULT:

Slightly Increased

You are likely to have higher plasma levels of beta-carotene.

GENE	SNP	YOUR GENOTYPE
BCM01	rs6564851	TG

Vitamin A is a critical micronutrient that is known to be of great importance in many bodily functions, including gene expression, proper immune function, reproduction, and vision. Vitamin A is actually a catch-all term that encompasses multiple chemical compounds such as retinol, retinoic acid, and retinal. The majority of these compounds in your body are created through the conversion of dietary beta-carotene. Good dietary sources of beta-carotene include colorful fruits and vegetables such as carrots, pumpkins, and green leafy plants. As a general rule of thumb, the stronger the color of the fruit or vegetable – the more beta-carotene the food contains. In some individuals, the conversion of beta-carotene into vitamin A analogs is reduced by a genetic mutation in the BCMO1 gene at position rs6564851. While the studies relating to this finding are relatively small, there is evidence that individuals with a genotype of "A/A" may have a hard time converting beta-carotene. If this is your genotype, you are advised to try and eat a diet that is especially rich in brightly colored fruits and vegetables. Other sources include fortified milks, cereals, and a daily multi-vitamin. People without this should also strive to eat a diet that is rich in beta-carotene as the foods associated with this compound are a part of any healthy diet.[34, 36]

Recommended Daily Allowance for Vitamin A

Age	Male	Female
1-3 years	300 mcg RAE	300 mcg DFE
4-8 years	400 mcg DFE	400 mcg DFE
9-13 years	600 mcg DFE	600 mcg DFE
14+ years	900 mcg DFE	700 mcg DFE

DAs for vitamin A are given as mcg of retinol activity equivalents (RAE) to account for the different bioactivities of retinol and provitamin A carotenoids. Because the body converts all dietary sources of vitamin A into retinol, 1 mcg of physiologically available retinol is equivalent to the following amounts from dietary sources: 1 mcg of retinol, 12 mcg of beta-carotene, and 24 mcg of alpha-carotene or beta-cryptoxanthin. From dietary supplements, the body converts 2 mcg of beta-carotene to 1 mcg of retinol.

VITAMIN B2

YOUR RESULT:

Balanced Intake

Peoplewith your genotypeare less likely to have altered folate metabolism associated with vitamin B2 deficiencies.

GENE	SNP	YOUR GENOTYPE
MTHFR	rs101133	AG

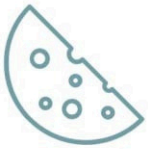
Vitamin B2 is also known as riboflavin. All of the B vitamins play an important role of converting food into fuel to give our bodies the energy it needs. Riboflavin also works as an antioxidant, fighting free radicals that can damage your cells and DNA. Fatigue, digestive problems, and sensitivity to light are a few examples of a riboflavin deficiency. Vitamin B2 also functions as an important cofactor (helper molecule) for an enzyme that is responsible for metabolizing folate encoded by the *MTHFR*gene. Individuals who have a genotype of "A/A" at position rs1801133 are at a higher risk of altered folate metabolism if they are deficient in vitamin B2. If this is your genotype you need to ensure that you are receiving the recommended daily allowance of riboflavin based on your age and sex. Individuals without this genotype should still strive to ingest the recommended daily amounts of Vitamin B2, as altered folate metabolism is by no means the only negative health outcome associated with riboflavin deficiency.[65,70]

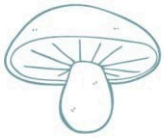
Recommended Daily Allowancefor Vitamin B2

Age	Male	Female
1-3 years	0.5 mg	0.5 mg
4-8 years	0.6 mg	0.6 mg
9-13 years	0.9 mg	0.9 mg
14-18 years	1.3 mg	1.0 mg
19+ years	1.3 mg	1.1 mg

GOOD SOURCES OF B2








VITAMIN B6

YOUR RESULT:

Average

People withyour genotype typically have average plasma levels of Vitamin B6.

GENE	SNP	YOUR GENOTYPE
NBPF3	rs4654748	TT

Also known as pyridoxine, vitamin B6 ensures that your neurological system is functioning and develops red blood cell health. It is rare to have a vitamin B6 deficiency here in the United States since most individual's diets contain high amounts of vitamin B6. Beans, eggs, fish, and whole grains are excellent natural sources of vitamin B6, in addition to fortified cereals. However, those who are deficient in vitamin B6 may be so due to a genetic variant in the *NBPF3*gene at position rs4654748. People with one or more "G" alleles at this location have been associated with lower than average plasma levels of vitamin B6. If this is your genotype you should consider trying to optimize your intake of vitamin B6. In light of this, it is important to remember that your genotype is only associated with people who have decreased levels of vitamin B6 and does not guarantee that you will also have low levels. We encourage you to discuss these results with your physician if you are concerned about any of your vitamin levels.[43]

Recommended Daily Allowancefor Vitamin B6

Age	Male	Female
1-3 years	0.5 mg	0.5 mg
4-8 years	0.6 mg	0.6 mg
9-13 years	1.0 mg	1.0 mg
14-18 years	1.3 mg	1.2 mg
19-50 years	1.3 mg	1.3 mg
50+ years	1.7 mg	1.5 mg

VITAMIN B12

YOUR RESULT:

Likely Average

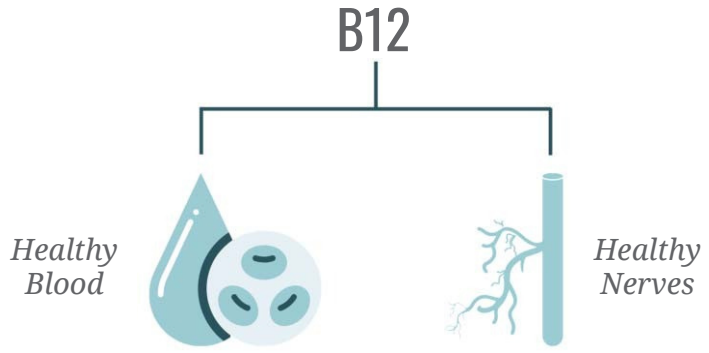
Based on your genotype,you are more likely to have average plasma levels of Vitamin B12.

GENE	SNP	YOUR GENOTYPE
		AG

Recommended Daily Allowance for Vitamin B12

Age	Male	Female
1-3 years	0.9 mcg	0.9 mcg
4-8 years	1.2 mcg	1.2 mcg
9-13 years	1.8 mcg	1.8 mcg
14+ years	2.4 mcg	2.4 mcg

If you are showing signs of fatigue, weakness, bloat, or numbness or tingling in your hands or feet, these are symptoms of vitamin B12 deficiency. Vitamin B12 plays a large role in the operation of the nervous system, DNA synthesis and red blood cell function. The best sources of vitamin B12 are meat, fish, poultry, eggs and milk products. Given this, vegans and vegetarians need to monitor their vitamin B12 carefully. The elderly and those with digestive disorders may also have trouble getting enough vitamin B12, as it is absorbed in the gastrointestinal tract. Recently, a polymorphism in the *FUT2* gene has been linked to decreased plasma levels of vitamin B12. Individuals who have two copies of the "G" allele at position rs602662 are at a higher risk for being deficient in vitamin B12, while individuals with only one "G" allele are more likely to have average plasma levels. If your genotype indicates that you are at an increased risk for vitamin B12 deficiency then you should try and maximize your intake by eating a diet rich in the aforementioned food as well as fortified cereals. Those without the "G" allele should continue to eat a balanced and healthy diet to maintain a proper balance of Vitamin B12.[43, 25]



VITAMIN C

YOUR RESULT:

Average

Based onyour genotype, you are likely to have average plasma levels of Vitamin C.

GENE	SNP	YOUR GENOTYPE
SLC23A1	rs33972313	CC
SLC23A2	rs11950646	AA
SLC23A2	rs6053005	TC

Recommended Daily Allowance for Vitamin C

Age	Male	Female
1-3 years	15 mg	15 mg
4-8 years	25 mg	25 mg
9-13 years	45 mg	45 mg
14-18 years	75 mg	65 mg
19+ years	90 mg	75 mg

Vitamin C, also known as l-ascorbic acid, has many important jobs in the body. It is a critical dietary component to the synthesis of collagen which keeps skin firm and youthful looking as well as playing a critical role in wound healing. Vitamin C is also important for the production of certain neurotransmitters, contributes to protein synthesis, and is an important antioxidant. It even helps regenerate other antioxidants like vitamin E. It also aids the body's absorption of nonheme iron, the dietary iron found in non-meat foods like spinach and legumes. Vitamin C is one of many vitamins that the human body is not able to produce; therefore, it is vital to ensure that you are receiving enough through dietary sources. The best sources of Vitamin C are from fresh fruits and vegetables. Some of the highest sources of Vitamin C include guavas, bell peppers, kiwi, strawberries, broccoli, and oranges. Given that Vitamin C is also a powerful antioxidant, deficiencies in Vitamin C have been linked to multiple disorders including muscle pain, fatigue, swollen gums, and slow wound healing. Most adults need to ingest between 75-90 milligrams of Vitamin C per day to maintain optimum levels. However, multiple studies have indicated a mutation in the *SLC23A1*gene is linked to decreased levels of Vitamin C in the blood. If your results for this section indicate that you are predisposed to having lower than average levels of Vitamin C, you should make an extra effort to consume more fresh fruits and vegetables on a daily basis.

VITAMIN D

YOUR RESULT:

Significantly Lower

Peoplewith your genotype typically have significantly lower plasma levels of Vitamin D. Optimize your intake of Vitamin D by eating foods such as egg yolks, fatty fish, and orange juice.

GENE	SNP	YOUR GENOTYPE
GC	rs2282679	GG

Recommended Daily Allowance for Vitamin D		
Age	Male	Female
1-70 years	15 mcg	15 mcg
70+ years	20 mcg	20 mcg

Vitamin D has many roles in the body. It promotes calcium absorption in the gut, is needed for bone growth, and even reduces inflammation. If the body does not get the sufficient amount of vitamin D, bones can become brittle and thin. It even helps to prevent osteoporosis in older adults. Great sources of vitamin D include fatty fish, fish liveroils, and milk. Regular exposure to moderate amounts of sunlight is also critical to maintaining a healthy level, as sunlight helps the skin synthesize vitamin D. In the United States, vitamin D deficiency is relatively common largely due to limited sun exposure.

However, there is also a common marker in the *GC*gene that can predispose an individual to decreased plasma levels of vitamin D. Individuals with a "C/C" or "C/A" genotype produce an alternate form of a protein that binds and prevents vitamin D from circulating throughout the body. It is recommended that people with this genotype need to try and enhance their intake of foods rich in vitamin D and get regular, healthy exposure to natural sunlight. For most people, simply 10 minutes of midday sunshine without sunscreen is enough to produce a sufficient amount of vitamin D. Individuals with a genotype of "A/A" should still focus on maintaining vitamin D levels, as it is one of the easiest vitamins to become deficient in. [38,52]

VITAMIN E

YOUR RESULT:

Average

Averagelevelsof Vitamin E

GENE	SNP	YOUR GENOTYPE
intergenic	rs12272004	CC

Vitamin E is a collective term for a number of compounds referred to as tocopherols or tocotrienols, but alpha-tocopherol (α-tocopherol) is the most biologically active form of vitamin E is one of the most important natural antioxidants. It is lipid soluble, so it embeds itself within cell membranes to protect those cells from free radicals. Excess vitamin E is stored within fat cells. Because of this solubility, the best dietary sources of vitamin E contain a high percentage of fat, such as cooking oils (sunflower oil, canola oil, olive oil, etc.); nuts like almonds, peanuts, and pistachios; and spreads like peanut butter, margarine, and mayonnaise. Not everyone absorbs the same amount of vitamin E as others though, and that may be due to genetic differences. The SNP rs12272004 has been associated with α-tocopherol levels.[86, 87, 88] If your genotype at this location suggests you may be prone to lower levels of vitamin E, try to optimize your levels by incorporating more foods into your diet that are rich in vitamin E.

Recommended Daily Allowance for Vitamin E

Age	Male	Female
1-3 years	6 mg	6 mg
4-8 years	7 mg	7 mg
9-13 years	11 mg	11 mg
14+ years	15 mg	15 mg

ZINC

YOUR RESULT:

Average Levels

Nogenetic variantswere identified that predispose you to having altered serum levels of zinc.

GENE	SNP	YOUR GENOTYPE
CA1	rs1532423	GG
PPCDC	rs2120079	TC
NBDY	rs4803508	TT

Zinc is the second most abundant trace metal after iron and is critical for growth and development in pregnancy and childhood. Zinc is involved in a wide range of biological processes including immune function, protein synthesis, wound healing, DNA synthesis, and cell division, and it is required for the senses of taste and smell. Unlike other micronutrients, the body has no way of storing zinc so it is important to get adequate amounts of zinc through one's dietary intake.

Recommended Daily Allowance for Zinc

Age	Male	Female
1-3 years	3 mg	3 mg
4-8 years	5 mg	5 mg
9-13 years	8 mg	8 mg
14-18 years	11 mg	9 mg
19+ years	11 mg	8 mg

Zinc deficiency is uncommon in developed countries but can be found among those with digestive or other chronic disorders that inhibit absorption or increase loss of zinc, such as Crohn's disease, chronic liver or renal disease, and diabetes, among others.[1] There is some concern that vegetarians may be at a higher risk of zinc deficiency than meat eaters because the zinc contained in non-meat sources has a lower bioavailability, meaning the body can't use it as efficiently as the zinc found in meat. Additionally, compounds found in legumes and whole grains (common staples of vegetarian diets) can bind to zinc and prevent its absorption. Despite this, vegetarians in developed countries have not been found to have overt zinc deficiency, though their levels do tend to be lower than meat eaters.

Zinc deficiency's most apparent symptom is an impaired immune system, resulting in a higher rate of infections among children and the elderly whose immune systems are already not as strong as most adults'. Zinc levels may also contribute to the longevity of bouts of the common cold. Studies have found that taking a zinc supplement when patients come down with a cold significantly shortened the duration of symptoms, however most researchers agree that more data is needed to determine optimal dosages.

Zinc interacts with iron and copper, so it's important to keep the levels of these three trace nutrients in balance. High levels of supplemental iron can decrease zinc absorption. High levels of zinc intake can result in copper deficiency and cause anemia. For healthy individuals, maintaining a balanced diet is enough to keep these micronutrients at optimal levels. Zinc supplements can interact with certain medications, so it's important to discuss your supplement use with your physician. Zinc is known to interact with certain classes of antibiotics, inhibiting the absorption of both. Zinc can also interact with certain diuretics and result in increased zinc excretion, depleting zinc levels.

The current recommended daily allowance of zinc for adult women is 8 mg/day, for men and pregnant women is 11 mg/day, and for breastfeeding women is 12 mg/day. The best sources of zinc include shellfish, red meat, and poultry. Vegetarian sources include fortified cereals, baked beans, yogurt, legumes such as chickpeas, and nuts like cashews and almonds.

REACTIONS TO FOOD

YOUR RESULTS

Lactose Intolerance –

Much More Likely

Alcohol Flush –

LessLikely

Caffeine Metabolism –

FastMetabolizer

Gluten Sensitivity –

Average Risk

Peanut Allergy –

Many people experience different reactions to foods due to their genetics. As with most compounds that enter the body, food is metabolized by the body and this action is not performed the same by everyone. One of the best known examples of a reaction to food is lactose intolerance, which results from an inability to breakdown the lactose sugar in dairy products. In this section, some genetic variants are examined that determine how you will react to some of the most common food and drinks.

LACTOSE INTOLERANCE

YOUR RESULT:

Much More Likely

People withyour genotypehave much higher chances of developing lactose intolerance.

GENE	SNP	YOUR GENOTYPE
MCM6	rs4988235	GG
MCM6	rs182549	CC
MCM6	rs4138037	AA

Unbelievably, the ability to digest milk after childhood is considered a genetic adaptation. No other species of animal on Earth retains the ability to digest milk in their adulthood, except for humans. Not even all human adults can fully digest milk. The problem arises due to the lactose in milk not being properly degraded by the enzyme lactase. So, if milk has never settled your stomach there may be good reason why due to genetic differences in the *MCM6*gene. Individuals with two copies of the "G" allele at marker rs4988235 are far more likely to experience discomfort after eating dairy products, while people with other genotypes are less likely to have side effects. Should you prove to be lactose intolerant, it is important to make sure that you are receiving enough calcium from other dietary sources.[3]

ALCOHOL FLUSH

YOUR RESULT:

Less Likely

Itisveryunlikelythat you will experience alcohol flushing.

GENE	SNP	YOUR GENOTYPE
ALDH2	rs671	GG

While most people are capable of having the occasional drink, some individuals are known to have a strong negative response to alcohol. Often referred to as alcohol flush, this condition is a result of alcohol not being properly metabolized by the body. Primary symptoms include reddening of the face, nausea and tachycardia (rapid heartbeat). The alcohol flush reaction is caused by a buildup of acetaldehyde due to a defective enzyme encoded by the *ALDH2*gene. So, if you have negative reactions to alcohol, or suffer severe hangovers, your genes may be to blame. Individuals who carry one or more copies of the "A" allele at position rs671 are far more likely to experience negative side effects from drinking alcohol.[11, 7]

CAFFEINE METABOLISM

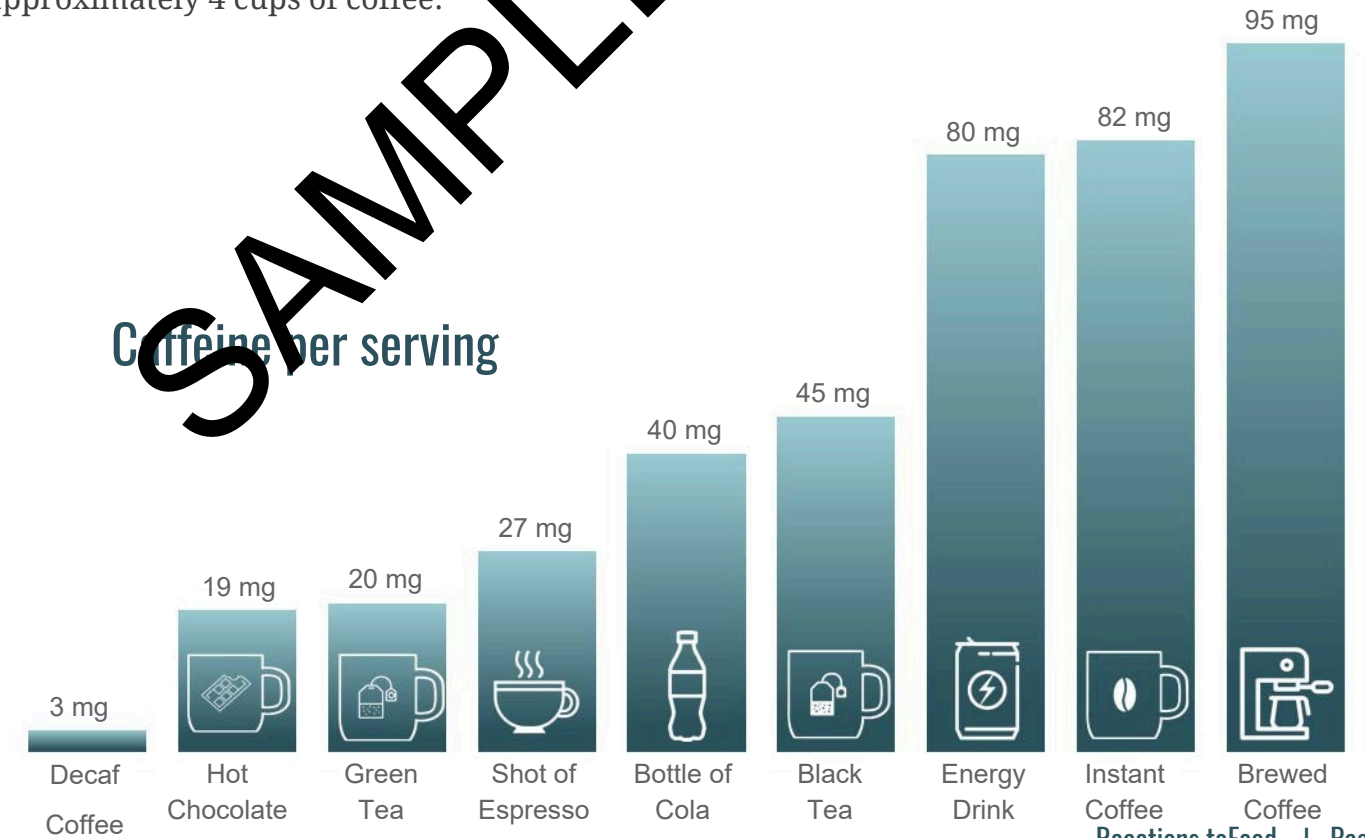
YOUR RESULT:

Fast Metabolizer

Youare likelytometabolizecaffeine rapidly.

GENE	SNP	YOUR GENOTYPE
CYP1A2	rs2069514	GG
CYP1A2	rs762551	AA

Caffeine is by far the most widely consumed stimulant throughout the world. However, most people are unaware that your DNA ultimately decides how your body metabolizes it. This is due to a genetic variant that was located in the *CYP1A2* gene at position rs762551. Depending on the sequence of your DNA at this location, you will break down caffeine at different rates. Individuals with a genotype of "C/C" or "C/A" will metabolize caffeine much slower than individuals with an "A/A" genotype. If you are a slow metabolizer of caffeine you should try to limityour totaldailycaffeineintake to lessthan 200 mg perday –orroughlytwocups of coffee. If youareafastmetabolizer of caffeine and are a healthy adult,westillsuggest that you try and limit your daily intake of caffeine to no more than 400 mg per day, or approximately 4 cups of coffee. [50]



GLUTEN SENSITIVITY

YOUR RESULT:

Average Risk

Youareat an average risk of developing a sensitivity to gluten in your lifetime.

GENE	SNP	YOUR GENOTYPE
HLA-DQ2.2	rs2395182	TT
HLA-DQ2.2	rs4713586	AG
HLA-DQ8	rs7454108	TT
HLA-DQ2.2	rs7775228	TC
HLA-DQ2.5	rs2187668	TC

In the past decade there has been more and more attention devoted to gluten. Simply put, gluten is nothing more than a combination of assorted proteins in common grains, such as wheat, oat, and barley. However, there is a growing body of evidence suggesting that products containing gluten may not be the best choice for everyone. Of the known gluten sensitivities, Celiac disease is by far the best studied and most notable condition, but it is not the only known gluten sensitive condition. There is undoubtedly a genetic link to Celiac disease and gluten sensitivity, but the conditionalso seems to be based on environmental factors. Of the proposed genetic markers, a variety of SNPs in the HLA-region have been most closely associated with gluten sensitivity.[110-113] This section tests the five best-studied genetic variants relating to gluten intolerance. The possible results from this section are “Low Risk,” “Average Risk,” “Slightly Increased Risk,” and “Increased Risk.” It is important to note that many people with an “Increased Risk” are able to tolerate gluten well, but many do experience discomfort. If you have experienced discomfort after consuming food products containing gluten, we encourage you to discuss the possibility of a gluten sensitivity with your primary care physician.

PEANUT ALLERGY

YOUR RESULT:

SlightlyIncreased Risk

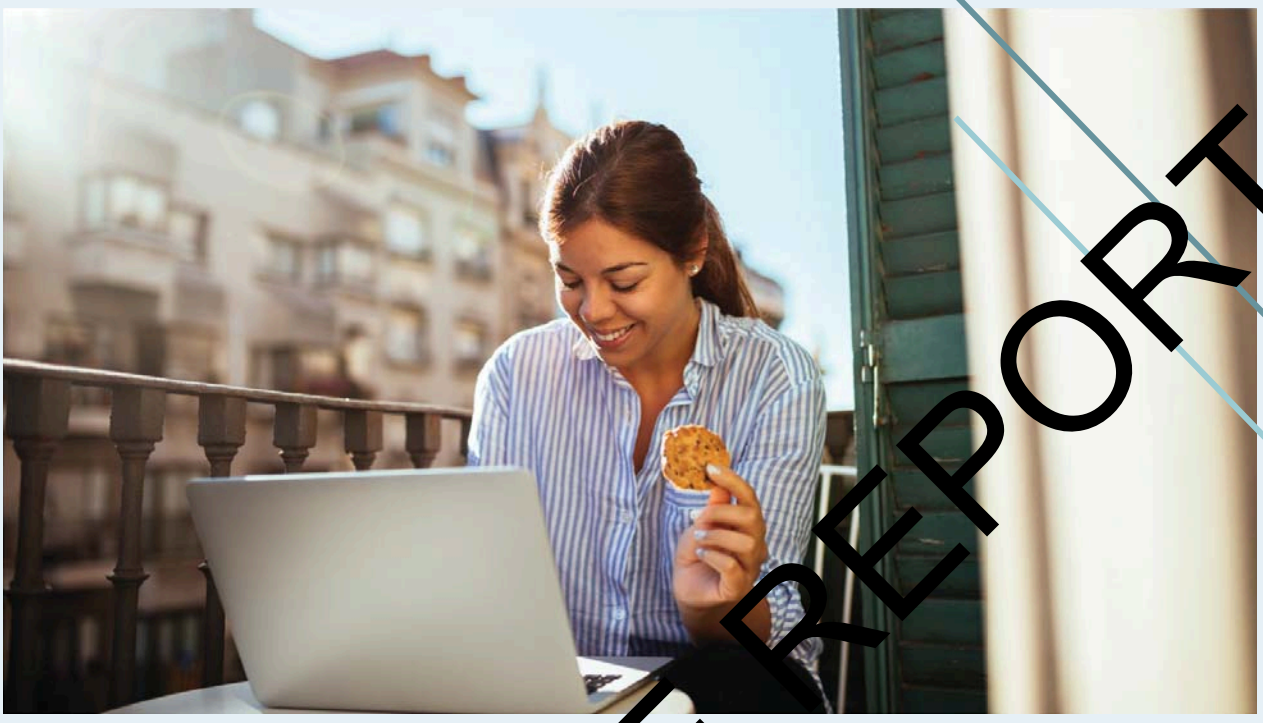
Youhavea slightlygreater chance of developing a peanut allergy in your lifetime.

GENE	SNP	YOUR GENOTYPE
intergenic	rs9275596	TC
HLA-DRA	rs7192	TG

Many allergies develop in childhood, but it is not uncommon for an adult to develop a new allergy to a food or medication. One of the most common developed food allergies is peanuts. In a recent study published in the prestigious journal *Nature*, two SNPs near the HLA genes were identified that increase your risk of developing a peanut allergy. Results from this study indicate that depending on your genotype at these two locations you may be upwards of six times more likely to develop a peanut allergy than an individual lacking these variants.[109] However, if your results fromthis section indicate an increased risk of developing a peanut allergy it is not a guarantee that you will ever develop an additional allergy. The results from this section only indicate your predisposition to developing peanut allergy. If you have an increased risk you should watch for common food allergy symptoms such as runny nose, itching or tingling around the mouth, shortness of breath, digestive problems, and skin irritation after consuming peanut products.

The peanut is actually the edible seed of this plant, Arachis hypogaea*, which is classified as a legume and is related to peas and beans. The seeds ripen in pods underground, a process known as geocarpy.*

Eating Behaviors



YOUR RESULTS

Eating Disinhibition –

More Likely

Tendency to Overeat –

LessLikely

Satiety –

Typical

Snacking –

Typical

Bitter Taster

Umami Taste –

Recent advances in nutritional science have identified several different genes that influence a wide variety of the psychological and physiological responses that you have to food. Many people are not aware that your genes can influence how you think and perceive different foods. However, the idea makes sense when you think about how your friends and family behave around the dinner table! Do you always seem to be hungry, while a good friend can rarely finish their meal? Maybe you are not a fan of dessert, but your spouse cannot seem to have enough? The results in the following section explores how your DNA can influence certain behaviors, such as snacking, feeling full, and even how you taste food.

EATING DISINHIBITION

YOUR RESULT:

More Likely

Peoplewithyour genotype are more likely to display eating disinhibition.

GENE	SNP	YOUR GENOTYPE
TAS2R38	rs1726866	AG

Eating disinhibition describes the tendency to excessively eat in response to a stimulus, such as when you have a favorite meal, are under stress, or are out at a social gathering. A study published in 2010 identified a single gene, *TAS2R38*, which is associated with this behavior. The study revealed that individuals with an "A" allele at position rs1726866 were “More Likely” to display eating disinhibition than an individual with only "G" alleles. [44]

TENDENCY TO OVEREAT

YOUR RESULT:

Less Likely

Yourgenotypeis associated with a tendency to overeat.

GENE	SNP	YOUR GENOTYPE
ANKK1-DRD2	rs1800497	GG

It is safe to say that nearly everyone will over eat at some point in their lifetime. Most often, it is the result of a favorite meal or special event. However, some people overeat on a regular basis which can lead to increased caloric intake and multiple negative health outcomes. The tendency to overeat in some individuals is thought to occur as a result of how the brain processes reward signals using neurotransmitters, such as dopamine. Similar mechanisms have been hypothesized to predispose an individual to engaging in addictive behaviors. One of the genes most closely associated with this is *ANKK1-DRD2*, which ultimately influences how the brain uses dopamine. Individuals with an "A/A" or "A/G" genotype at this location are considered to be more likely to overeat on a regular basis. Individuals with a "G/G" genotype are not typically associated with overeating behaviors. If you are prone to overeating, you may want to limit you portion size and avoid foods that are high in sugar and/or fat.[12]

SATIETY

YOUR RESULT:

Typical

People withyour genotype typically feel full after a meal.

GENE	SNP	YOUR GENOTYPE
FTO	rs9939609	TT

The term satiety is better described as the feeling of fullness that you experience after a meal. However, not all individuals will feel equally full after eating an identical meal. This is partly due to physical differences between individuals, but is also due to your genetic makeup. The best studied genetic variant that contributes to satiety is rs9939609 in the *FTO*gene. Coined as “the fat gene” in the media, the *FTO*gene plays a large role in several obesity related disorders. Individuals with two copies of the "A" allele at this location are considered more likely to experience hunger after a meal, while individuals with one or two copies of the "T" allele are more likely to feel full. If you have difficulty feeling full after a meal you may want to consider increasing the amount of fiber in your dietandeating healthy snacks throughout the day. [23]

SNACKING

YOUR RESULT:

Typical

Your genotype is not typically associated with excess snacking.

GENE	SNP	YOUR GENOTYPE
LEPR	rs2025804	AA

While typically viewed as an unhealthy behavior, healthy snacking throughout the day can be an effective way to reduce hunger cravings and the tendency to overeat. However, unhealthy snacking can undoubtedly lead to an increased calorie intake and subsequent negative health outcomes. It is generally thought that the tendency to snack is largely controlled by the hormone leptin, which helps your body to regulate the amount of food that you eat. Genetically, the *LEPR* gene ultimately controls how leptin is processed in your body. Individuals with two copies of the "G" allele at position rs2025804 are more likely to exhibit extreme snacking behaviors. If you are predisposed to snacking more, then you may want to consider selecting healthy snacks throughout the day. Additionally, when you are snacking try to eat slower and measure out your portions before eating the snack. [14]

UMAMI TASTE

YOUR RESULT:

Average

People withyour genotype typically taste an average level of umami flavor.

GENE	SNP	YOUR GENOTYPE
TAS1R3	rs307377	CC

Umami is a flavor that is often associated with Japanese cuisine, especially broths and cooked meats. It is described as a savory flavor and the Japanese word translates to "pleasant savory taste" or sometimes simply "delicious taste." First described in the early 1900's, it was discovered by a Japanese chemistry professor who observed that the taste of dashi, a soup base made from seaweed and dried tuna flakes, was distinct from that of the other four tastes known at the time (sweet, salty, sour, and bitter). The scientific community debated the existence of this fifth taste until the mid-1980's when more research began to be done on umami. Further evidence was obtained in the early 2000's when distinct umami taste receptors were discovered.[77,78] The main chemical molecule that creates the umami taste is glutamate. Glutamate, most commonly found as its salt form monosodium glutamate (MSG), is present in many meats, cheeses, mushrooms, certain vegetables, soy sauce, and green tea. MSG can also be added to dishes in its pure form as a flavor enhancer. While many in the Western world believe MSG to be dangerous and unhealthy, no scientific study has found any evidence of adverse reactions and the FDA has given MSG the classification of GRAS, or "generally recognized as safe." In fact, MSG has a lower sodium content than table salt and so it can be a good way to lower salt content while preserving flavor. Not everyone is as sensitive to umami taste as others. Unsurprisingly, the ability to differentiate umami from salting is far more common in Asian and other Eastern populations. Globally, those sensitive to umami taste account for about 9% of the population, but within Asia, over 16% of the population are umami sensitive. If you narrow that down to just within Japan, the percentage rises to almost 27%! This is a great example of how population genetics can influence cultural traditions like cuisine.

BITTER TASTE

YOUR RESULT:

Bitter Taster

Based on your TAS2R38 genotype you should be able to fully perceive the tase of bitter foods.

GENE	SNP	YOUR GENOTYPE
TAS2R38	rs10246939	TC
TAS2R38	rs1726866	AG
TAS2R38	rs713598	GC

You may have noticed that some people love the taste of foods and drinks like black coffee or raw cabbage, while others can't stand the bitterness of these things. While a lot of food preferences are subjective and based on personal experiences or cultural norms, the perception of bitterness has a strong genetic component.
Several SNPs within the *TAS2R38*gene determine whether you are a "taster" or "non-taster" of bitterness. If you have G alleles at rs1726866 and rs10246939 and a C allele at rs713598, you are a "taster," which means that you are far more sensitive to certain chemical compounds present in foods like phenylthiocarbamide (PTC) or 6-n-propylthiouracil (PROP) than people who don't have those alleles and you will perceive these foods as more bitter.[74, 75, 76] These foods include rhubarb, sauerkraut, dark beers, coffee, certain cheeses, and cruciferous vegetables like cabbage, cauliflower, broccoli, Brussels sprouts, and kale.
This ability to perceive certain foods as far more bitter than others has had both benefits and drawbacks throughout human history: "tasters" may be able to sense potential toxins and determine which foods may be poisonous or spoiled, but they may also tend to avoid foods that have important nutritional content due to their bitter taste.

METHODOLOGY

Laboratory specimens associated with this report were analyzed using a DNA microarray. GenomicDNA wasextractedfromthesubmittedspecimen and amplified usingwholegenome amplification techniques. Thepolymorphismsassayedin this reportwere targetedthrough the use of oligonucleotide primers. Single nucleotide polymorphisms were determined by fluorophore-based detection of a labeled probe hybridized to the complementary target sequence.

LIMITATIONS

This test detects polymorphisms other than those listed in this report. Polymorphisms not detected in this analysis include known mutations that result in an altered predisposition to the conditions discussed in this report. The absence of a detectable gene variant or polymorphism does not rule out the possibility that the test subject has an increased chance of developing any conditions discussed here. In very rare circumstances, polymorphisms in the primer or probe binding site may affect genotyping results. This test does not identify non-genetic factors that may contribute to an individual's predisposition to developing any of the conditions discussed in these findings. This test has not been approved by the United States Food and Drug Administration (FDA) and should not be used as the sole evidence of diagnosis. Genetic screening does not replace the need for regular clinical screenings for any of the conditions or analytes mentioned in this report.

DISCLAIMER

The information contained within this report is intended for informational purposes only. Do not alter any regularly scheduled health screenings due to the findings of this genetic analysis.

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