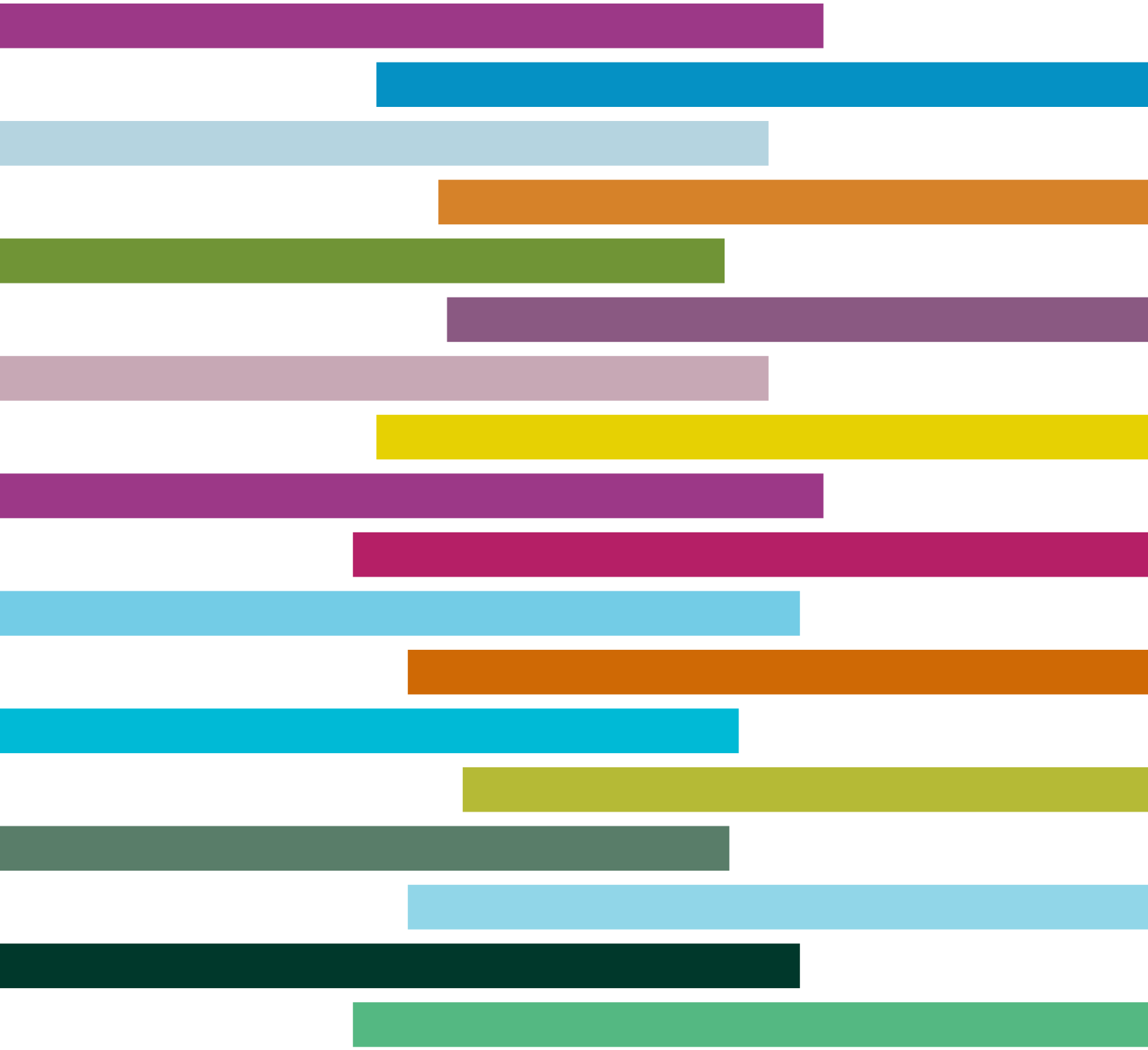
BARTOSZ MALLEK'S

VITAGENE VITALITY

Discover Your Past. Shape Your Future.



Welcome to Your Vitagene Vitality Guide

Dear Bartosz,

Welcome to your Vitagene Vitality Guide! You have joined the millions of people who, like you, believe in the power of unlocking their DNA. Your Vitality Guide will become your best resource for understanding what makes you, ***you***. It will teach you how to diet, exercise, and supplement right for your DNA and why you should.

Your genes have a lot to say. They tell us where our ancestors came from. They tell us how our bodies interact with the world around us. Our genes play a role in who we are, in how we metabolize foods, and even in our risk for vitamin deficiencies. Knowing what your genes have to say is a critical first step to finding your unique path to optimal wellness.

Your Vitality Guide will help you not only get to know your genes, but also understand how you can use that knowledge. How ***you*** can diet to lose weight. How ***you*** can exercise for peak performance. How ***you*** can supplement to increase energy or lower stress. By studying your DNA alongside your health goals, lifestyle factors, and family history we give you smart and actionable recommendations. We use industry-leading research to bring you DNA results paired with diet, exercise, and supplement recommendations that are easy to implement and tailored to you. Even better, your Vitality Guide enables you to supplement effectively by telling you everything you need to know about the vitamins that we recommend for you.

You are unique. We believe that understanding what makes you unique is the first step on the path to optimal wellness. And the second step is taking action on it. We are so excited that you have decided to uncover the full potential of your DNA and can't wait to partner with you on your path to better health. If you have any questions, you can reach us at 1-844-MYVITAGENE or by email at support@vitagene.com.

Be well,

The Vitagene Team

What's In Your
VITALITY GUIDE

Genetics 101

A Crash Course In Understanding Your DNA

Over seven billion people live on Earth and every single one is unique. Even identical twins have been found to have differences in their genes. Our DNA distinguishes us from one another, but also links us together — humans share 99.9% of the same genetic makeup. However, the remaining 0.1% of variation among humans contains a vast amount of information that determines everything from our heritage to our susceptibility to some diseases. But what about the foods we eat? Or the way we live our lives, from our work schedules to our sleep patterns? Does our DNA have the ability to predict what foods, exercises, and even which supplements are right for us?

Science says yes.

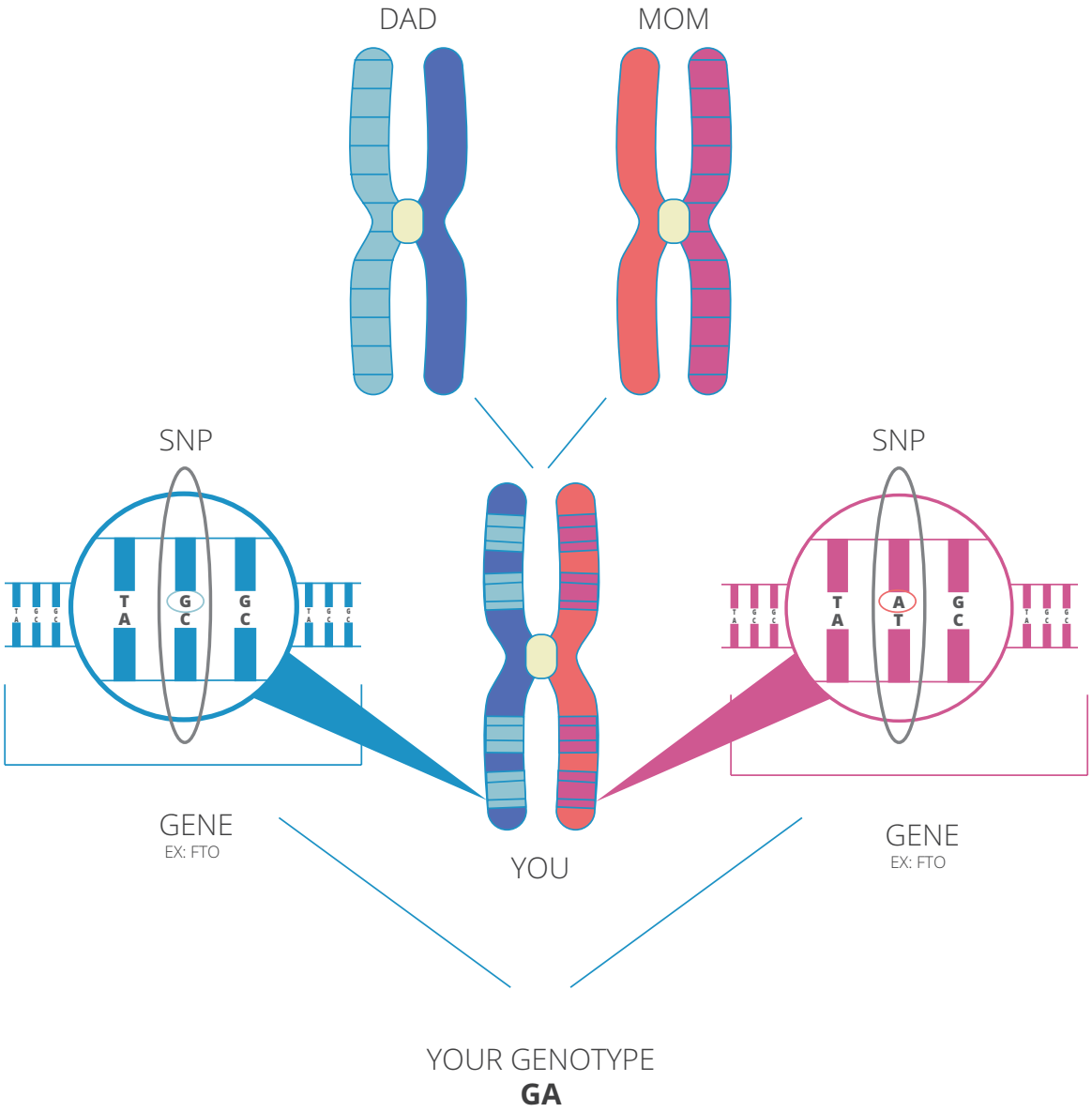
DNA is within every one of our trillions of cells and acts as the blueprint for each one. But how? How does this molecule determine what traits we develop? The answer lies in proteins. There are millions of proteins that signal which hormones to release and when, and that play key roles in metabolism. And it is the unique code of our DNA that tells our bodies which proteins to make. It's no surprise, then, that our DNA can tell us vital information about our diet, exercise, and vitamin needs.

How do you know what my genes say?

All genes are written in the same basic language, made up of parts called nucleotides that are abbreviated A, T, C, and G. Your "genotype" is your unique code of letters. Each strand of DNA is millions of letters long, and it is in these letters that our differences, called variants, can be found. Vitagene looks at a type of variant called a SNP (pronounced "snip"), a single nucleotide polymorphism, which is just a fancy way of saying one letter got swapped out for another. There are millions of known SNPs, and thousands of studies exploring their meaning.

You are the sum of all your parts.

Your DNA is the blueprint for your life, and plays a key role in determining who you become. It can tell you about your risk levels of developing different health issues, including nutrient deficiencies – but research shows that there's something you can do about it. You are the sum of all your parts, including your diet, exercise, sleep, and medication patterns. Maybe your DNA says you have an increased risk for high cholesterol, but your DNA can also tell you how you process different foods and respond to various exercises so that you can limit that risk. This is where Vitagene comes in – we analyze your DNA alongside your lifestyle factors to help you understand your DNA, what is says about your health, and then give you actionable recommendations to diet, exercise, and safely supplement to achieve your optimal health.



Bartosz's Vitality Snapshot

Your high level summary of your DNA attributes.

Diet

Obesity

Typical Risk

- Maintain low risk with diet
- Supplement with needed vitamins
- Exercise at least 3 times per week

Alcohol

Normal Metabolism

- Consume alcohol in moderation
- Track number of drinks you have
- Eat while drinking to reduce hangovers

Fat and Sodium

Normal Fat
Normal Sodium

- Eat plant based fats: avocado and nuts
- Consider low-carb diet
- Don't overdo salty foods

Cholesterol

Normal Cholesterol
Normal Triglycerides

- Limit saturated fat intake
- Avoid processed foods
- Limit consumption of sweets

Dairy

Likely Tolerant

- Eat dairy in moderation
- Get calcium from greens
- Supplement for digestion

Gluten

Likely Tolerant

- Choose whole wheat grains
- Try quinoa, rice, and corn
- Avoid sugars and starch

Emotional Eating

Unlikely Emotional

- Mix up the flavors on your plate
- Include exercise in daily routine
- Socialize to reduce stress

Weight Regain

Likely Regain After Diet

- Try not to restrict calories
- Eat more vegetables
- Supplement while dieting

Exercise

Performance

Mixed
Increased Strength

- Try endurance and power activities
- Do exercises with both (boxing, spin)
- Mix in resistance training

Response

Improves Blood Pressure
Improves Weight

- Get your heart rate up for 30 min every workout
- Take stairs and walk or bike when possible
- For weight loss, focus on exercise plan

Cramping

Increased Cramping

- Drink 64 oz of water daily
- Stretch before exercise
- Limit intensity when fatigued

Behavior

Lose Interest

- Exercise with friends or outdoors
- Sign up for sports or competitions
- Try classes like spin or zumba

Micronutrients

Vitamin A

Low Vitamin A

- Try to eat liver or fish
- Take preformed vitamin A

Folate and B12

Normal Folate
High Vitamin B12

- Balance diet with beans and nuts
- Eat lots of leafy greens
- Reduce intake of red meats and shellfish

Vitamin D

Normal Vitamin D

- Spend time outdoors
- Balance diet with mushrooms and dairy

Iron

Low Iron

- Eat meats, beans, and spinach
- Consider iron supplementation

Bartosz's Genetic Health Results

Diet

Did you know that your DNA can influence which foods you prefer? In fact, your DNA plays a large role in determining how your body interacts with food--from your preferences, to your sensitivities and metabolism. Studies have shown that **people on a genetics-based diet lost 33% more weight than those on regular diet plans.*** And even if you aren't looking to lose weight, understanding your genetics is important to get the most out of the foods you eat. Do you process carbohydrates or fats better? Plus, our DNA can tell us our risk of things like high cholesterol and insulin resistance, which we can take preventative action on through our diet. With the power of your DNA, you can achieve a diet that helps you stay healthier and happier.

*Pirastu, N. *European Journal of Human Genetics*. 2014. Abstract nos. C14.3, P17.26-M, and P15.19-S

Obesity Risk

Typical Risk

Your DNA Says...

You do not have an increased risk of obesity.

Improve and Protect Your Body

Reducing foods with high sugar or starch content may work best for you. Genetics and lifestyle are both key contributors to obesity prevention. Research also shows that our diet and exercise habits can influence the way our genes work in our bodies. For you to maintain a low risk of obesity it is important to eat right and stay active. Your DNA also says that exercise may be a significant factor for you. Learn more in the Exercise section.

SNP	Gene	Your Genotype
rs1121980	FTO	GG
rs17782313	MC4R	TT
rs17817449	FTO	TT
rs2867125	TMEM18	CC
rs3751812	FTO	GG
rs5082	APOA2	GG
rs6232	PSK1	TT
rs6265	BDNF	CC
rs652722	PAX6	CC
rs671	ALDH2	GG
rs7481311	BDNF	CC
rs8050136	FTO	CC

Science

Genes contribute to obesity by influencing the hormones that make us feel hungry or full. They can also impact how our body processes and stores fat. There are rare genetic diseases where one gene can determine if a person is obese or not, but for most it is a combination of variants. We look at different SNPs that determine if you are more or less likely to be at risk for obesity.

History

It wasn't until 2007 that a link between SNPs and obesity was discovered. Since then several variants have been identified as having an association to weight. One of the most studied genes in the field of obesity is the FTO gene. It has been studied in people from all over the world. In the past decade hundreds of articles have been published on the FTO gene.

Prevalence

Obesity is becoming more and more common, currently impacting more than 30% of Americans. Another 20% of Americans are overweight. The chance of having risk genotype for any of these SNPs is roughly 56% on average.

Fat Intake

Normal Intake

Your DNA Says...

Your weight is not associated with fat intake.

Improve and Protect Your Body

You may have better weight loss success on a low-carb diet rather than reducing total fat intake. Try to substitute starches and sweets for healthy, plant-based fats like olive oil, avocados, and nuts. Limit your intake of processed meats and trans-fats, which are not natural for your body to process.

SNP	Gene	Your Genotype
rs12255372	TCF7L2	GG
rs5082	Intergenic	GG

Science

Your genes play a large role in determining your ideal diet. They influence how your body processes different types of foods, like fats. The SNPs we look at can tell you whether or not eating a low-fat diet will make an impact on your health. Different variants at these SNPs have been associated with different responses to fat intake, including changes in body weight, insulin levels, and cholesterol.

History

In the 1970's, the low-fat diet became a craze in American culture. Unfortunately, most consumers replaced fat with sugar, which could have worse effects on health. The benefits of eating a diet low in fat has been a topic of controversy. In the 1990's a diet high in healthy fats started gaining momentum. The answer to which diet type is more beneficial may be more personal than that.

Prevalence

On average, every age category in America exceeds the recommended level of fat intake. About 63% of people have your genotype at the SNP rs12255372. About 7% of people have your genotype at the SNP rs5082.

Sodium Intake

Normal Intake

Your DNA Says...

Your blood pressure is less likely to improve on a low-sodium diet.

Improve and Protect Your Body

While lowering your salt intake may not help your blood pressure, you should still aim to eat a diet rich in fruits and vegetables for your overall heart health. There are plenty of other ways to maintain a healthy blood pressure. Exercising regularly is an important factor for your blood pressure. Learn more about this may help you in the Exercise section.

SNP	Gene	Your Genotype
rs1042713	ADRB2	AG

Science

The low-sodium DASH diet has been used to reduce blood pressure, but some respond better to it than others. This may be due to a gene that impacts hormone levels and communication between cells. There are several signals and hormones influence blood pressure, including the steroid hormone aldosterone. The SNP we look at has been associated with aldosterone levels and blood pressure response to the DASH diet.

History

In an effort to reduce the prevalence of high blood pressure, the National Institutes of Health (NIH) developed the DASH diet. In addition to eating less salt, people on the diet consume more nutrients that lower blood pressure, like potassium, calcium, and magnesium. It was originally not intended for weight loss and was relatively high in grains. Now, it includes more vegetables and fruits.

Prevalence

On average, people in the United States consume almost 50% more sodium than recommended. Some estimates report that 77% of salt intake is from restaurant or fast food. Roughly 49% of people have your genotype at the SNP rs1042713.

Cholesterol Levels

Typical Risk

Your DNA Says...

You have a typical risk of high cholesterol.

Improve and Protect Your Body

Your genes are just one factor that contribute to cholesterol. Even though you have a typical risk of high levels, it is important to limit calories from saturated fat (animal fats) and trans-fats (processed fats like solid vegetable oils). Focus on including healthy fats in your diet, such as vegetable oils, avocados, and nuts.

SNP	Gene	Your Genotype
rs11206510	PCSK9	TC
rs11563251	UGT1A1	CC
rs12748152	PIGV-NR0B2	CC
rs1532085	LIPC	AA
rs1564348	LPA	TC
rs1800588	LIPC	CC
rs1883025	ABCA1	CC
rs2479409	PCSK9	AA
rs2650000	HNF1A	CC
rs3177928	HLA-DRA	AA
rs3764261	CETP	CC
rs4253772	PPARA	CC
rs4420638	APOC1	AG
rs4722551	MIR148A	TC
rs6831256	LRPAP1	AG
rs693	APOB	GG
rs7941030	UBASH3B	CC

Science

Cholesterol is a fat in the blood that is critical for brain, hormone and vitamin D function. Healthy levels are important, but too much can clog our arteries. We look at SNPs that have been associated with cholesterol levels to determine your risk level. These work by influencing the hormones and enzymes that break down and store and cholesterol.

History

We started to understand the relationship between high cholesterol and heart conditions in the mid-1900s. Since then, there has been controversy on the best method for lowering cholesterol. Treatments now include medication, lifestyle changes, and supplementation. Red yeast rice, fish oil, and vitamin B3 are just a few of those found to help maintain healthy cholesterol levels.

Prevalence

About half of all Americans have cholesterol levels outside of the healthy range. Only 30% of people with high cholesterol levels have them under control. The chance of having risk genotype for any of these SNPs is roughly 46% on average.

Triglyceride Levels

Typical Risk

Your DNA Says...

You have a typical risk of high triglycerides.

Improve and Protect Your Body

Your genes are only one factor in determining your triglyceride levels. Diet is also very important and consuming an excessive amount of carbohydrates can raise your triglyceride levels even if you are at low risk. Try to limit your intake of sweets, as they are extremely dense in carbohydrates. Exercise can also help maintain normal triglyceride levels. When you are active your body uses up the food it eats as energy so you have less to store as triglycerides for later.

SNP	Gene	Your Genotype
rs1121980	FTO	GG
rs1260326	GCKR	TC
rs12748152	PIGV-NR0B2	CC
rs1495741	NAT2	AG
rs4722551	MIR148A	TC
rs622799	APOA5	TT
rs6831256	LRPAP1	AG
rs693	APOB	GG

Science

Triglycerides are fats in the blood that are broken down to be used as energy for our body. If you don't use them, your body stores them in fat for later. Having a high level in the blood can be influenced by diet, exercise, and genes, and has been linked to an increased risk of heart disease. Some of the genes we look at code for proteins that are important for transporting these fats through your blood and affect circulating levels.

History

The average triglyceride level of Americans has been increasing since 1976. Around this time the low-fat trend began, consequently raising carbohydrate consumption. A diet high in carbohydrates has since been linked to high triglyceride levels. Recent research shows that taking cholesterol-lowering statins may not help with triglyceride levels. Scientists are now looking into therapies that specifically target triglycerides.

Prevalence

At least 1 in 4 American adults have elevated triglycerides. The chance of having risk genotype for any of these SNPs is roughly 41% on average.

Alcohol Metabolism

Normal

Your DNA Says...

You likely metabolize alcohol regularly.

Improve and Protect Your Body

Though you are likely to metabolize alcohol normally, it is a good idea to drink alcohol in moderation. You are more likely to drink large amounts because you are less likely to feel the symptoms. Even if you do not have severe hangovers, alcohol has been shown to have harmful effects on your liver and can cause inflammation. B-vitamins are important for liver function, especially with frequent alcohol consumption.

SNP	Gene	Your Genotype
rs671	ALDH2	GG

Science

Alcohol consumption impacts your whole body, including your brain, heart, and inflammation response. How much depends on how you metabolize alcohol. Your DNA has a lot to say about it. This SNP codes for a protein that can change the way you process alcohol through your liver. It is associated with severe hangovers and the flush response (when face and neck turn red after drinking).

History

The ability to process alcohol may have evolved as early as 10 million years ago, before modern humans existed. It helped our ancestors to eat rotting, fermenting fruit when food was scarce. We have been consuming alcohol for centuries all over the world. Beer may have first been created in ancient Mesopotamia. Archaeologists discovered relics from what they believe to be the first winery in Armenia.

Prevalence

About 27% of adults in the United States binge drink occasionally. According to the 2015 National Survey on Drug Use and Health, roughly 86% of adults have had alcohol in their lifetime. Roughly 93% of people have your genotype at the SNP rs671.

Gluten Sensitivity

Typical Risk

Your DNA Says...

You can likely process gluten normally.

Improve and Protect Your Body

Consume foods that contain gluten as tolerated. Try to choose whole wheat products instead of refined grains like white bread and pasta. If you experience issues while consuming foods that contain gluten, stick to grains that are naturally gluten-free like quinoa, rice, and corn. Be cautious while selecting gluten-free alternatives to cookies, cakes, and breads, as these products often contain sugar, additives, and fillers.

SNP	Gene	Your Genotype
rs2187668	HLSA-DQ	CC

Science

Gluten is a protein that allows food to maintain its shape by acting as glue. For some, it triggers an immune response that can result in damage to the intestine over time. Sensitivity to gluten can range from mild symptoms of upset stomach, to fatigue and weight loss. We look at a variant that has been strongly associated with gluten tolerance. Not surprisingly, this SNP is on a set of genes that are important for your immune response.

History

Gluten sensitivity has been around for a long time. Scientists found a skeleton from 2,000 years ago that had visible symptoms of gluten sensitivity. They sequenced her DNA and found the same variant we look at. Over recent centuries, wheat and how it is grown has significantly changed. The structure of gluten in modern wheat may have something to do with the recent rise in sensitivities.

Prevalence

Roughly 1 in 100 people in the United States has full blown Celiac Disease, and numbers have been on the rise in recent years. Estimates for gluten sensitivity hover around 13% in the general population. Roughly 85% of people have your genotype at the SNP rs2187668.

Lactose Sensitivity

Slight Risk

Your DNA Says...

You can likely tolerate dairy, but may make less of the enzyme that processes lactose.

Improve and Protect Your Body

Although you probably do not notice symptoms of lactose intolerance, your DNA suggests that you may have lower levels of the enzyme lactase that breaks down lactose. Because you may process lactose at a slower rate, reducing your intake of dairy products may help prevent inflammation. Dairy free items that contain calcium include spinach, beans, and supplements. Taking probiotics has also been shown to help with digestion, especially for people with sensitivities.

SNP	Gene	Your Genotype
rs4988235	MCM6	AG

Science

The ability to tolerate dairy stems from the ability to digest lactose, the sugar found in milk. The MCM6 gene influences the enzyme lactase, which is present in all infants and breaks down lactose. As babies transition to other foods, lactase activity is reduced as the need for milk decreases. Some people have a variant on this gene that allows them to continue to make lactase and tolerate dairy into adulthood.

History

Humans first started consuming cow's milk as early as 12,000 years ago. We had started keeping animals in pastures and using their milk as nutrients. Humans actually evolved the ability to maintain lactase into adulthood. In fact, this ability evolved at least three different times in Northern Europe, East Africa, and in the Middle East. People from these cultures still consume the most amount of dairy today.

Prevalence

Almost 90% of adults from East Asian descent are lactose intolerant, while only 5% of individuals of Northern European descent are lactose intolerant. It is more common in cultures that don't depend on milk including African and Middle Eastern lineages. About 17% of people have your genotype at the SNP rs4988235.

Emotional Eating

Low Risk

Your DNA Says...

You have a low risk of eating emotionally.

Improve and Protect Your Body

You probably only eat emotionally if you are under significant stress. Try to exercise and socialize as part of your daily routine to reduce your risk of significant stress. Recent research shows your brain will reach satiety sooner if you eat one flavor type, like salty or savory. If you feel like you reach satiety too quickly and are having to get up to eat between meals, try mixing up the flavors on your plate.

SNP	Gene	Your Genotype
rs1421085	FTO	TT

Science

The FTO gene has been found to have strong associations with body weight. One of the ways it works is by affecting when we reach for more food. Our DNA influences hormones that determine how full we feel after eating. When we overeat as a result of stress or emotion, we are actually seeking to activate the pleasure center in our brain. Your genes influence this process too, by impacting the receptors in this pleasure center.

History

Humans evolved mostly in a time when resources were scarce. In today's world, the overabundance of food has created a problem our bodies were not entirely ready for. Because of this, there has been substantial interest in recent years in studying why we overeat and how it is connected to emotion. The term "comfort food" was even added to the Oxford Dictionary in 1997.

Prevalence

It is estimated that about 60% of Americans snack regularly and consume roughly 20% of their total calories by eating snack foods. About 62% of people have your genotype at the SNP rs1421085.

Weight Regain

Increased Risk

Your DNA Says...

You have an increased risk of regaining weight after dieting.

Improve and Protect Your Body

If you diet by limiting calorie intake, you may end up worse off than when you started. Rather than changing how much food you are eating, consider making changes to what foods you are eating. Instead of restricting calories, focus on increasing vegetable intake. Limit processed foods and sweets, but replace them with fruits and whole grains. If you diet, be sure to supplement to replenish nutrients you may be missing.

SNP	Gene	Your Genotype
rs2815752	NEGR1	AA

Science

Restricting calories has been shown to produce several changes in hormones once the diet is completed. Your DNA is important in determining what changes may occur and to what extent. These hormones, which influence appetite, act on the brain to tell you when and what to eat. The NEGR1 gene has strong action on the brain and food intake. The SNP we look at is associated with weight regain after dieting.

History

In the past century, the rise of obesity in the US has led to a subsequent rise in dieting. The government has launched several programs promoting fitness and balanced food choices that contributed to a culture of fat-trimming. Despite educational efforts and people dieting now more than ever, weight gain has continued to climb. Recent research has targeted why we are so susceptible to weight regain after dieting.

Prevalence

More than 40 million Americans are on some sort of diet. Some estimate that about 65% of people who diet regain the weight within 3 years, while others guess it is closer to 95%. Roughly 48% of people have your genotype at the SNP rs2815752.

Exercise

You are unique, and your exercise regimen should be too. Not everyone is built to run a marathon, just like not everyone is built to bench press their body weight. Your genes determine traits that impact the way your body reacts to different types of physical activity. Vitagene looks at SNPs that affect your ability to build muscle strength, your metabolism's response to activity, and your propensity towards endurance or power exercises. Your DNA can tell you why you may have excelled at certain sports and not others, or why you were never interested in the first place. Understanding which types of exercise you are built for allows you to work with your body to achieve the greatest results.

Power vs. Endurance

Mixed

Your DNA Says...

You are likely to perform well with a mix of endurance and power activities.

Improve and Protect Your Body

Try exercises that mix sustained effort with bursts of speed, such as tennis, boxing, or spin classes. You can enjoy a broad spectrum of activities. Test out a few different exercises to get a feel for what you like best, but be sure to include both endurance and power activities in your routine.

SNP	Gene	Your Genotype
rs1042713	ADRB2	AG
rs1053049	PPARD	TT
rs11549465	HIF1A	TC
rs1815739	ACTN3	TC
rs1870377	KDR	TT
rs4994	ADRB3	AA
rs659366	UCP2	CC
rs699	AGT	AA
rs8192678	PARGC1A	TC

Science

Several genes influence the way your muscles use oxygen and create energy while exercising. Our bodies perform endurance exercise with the help of oxygen. It creates energy using carbohydrates and fats. We can also use what is readily available to perform quick, powerful movements without oxygen. Your DNA can tell you which one of these systems your body performs more efficiently.

History

Humans have been studying the physiology of exercise since the 1700's. Why do some people naturally perform better in certain events? Thousands of articles were published in the 1900's that have helped us to better understand the answers to that question. But it was not until the 21st century that we started to unveil the impact of genes on exercise performance.

Prevalence

The chance of having an endurance prone genotype for any of these SNPs is roughly 42% on average. The chance of having a power associated genotype for any of these SNPs is roughly 55% on average.

Muscle Strength

Increased

Your DNA Says...

You are likely to develop increased muscle strength.

Improve and Protect Your Body

Studies have shown that this variant is more common in elite athletes of all types--wrestlers, weightlifters, and marathon runners. Your ability to develop strength can enhance your performance of endurance and power exercises alike. Try using weights, bands, or bodyweight exercises to build strength in your muscles to make their movements more efficient. These activities have also been shown to help with blood pressure and heart health.

SNP	Gene	Your Genotype
rs11549465	HIF1A	TC

Science

Your muscles use oxygen to create the energy needed to exert force over a long period of time. When there is not enough oxygen, your body can still produce energy, but only for short bursts. The HIF1A gene regulates this process by activating over 40 other genes. These genes are important for both transporting oxygen and creating energy without it. By impacting how you generate energy, your DNA plays a large role in muscle strength.

History

Strength training has been part of exercise regimens for thousands of years. As far back as the Spartans of ancient Greece, bodyweight movements have been used to build strength. Weight lifting as a sport has dramatically progressed in the 1900's. Now, with more sedentary daily lives, it is important to incorporate strength training into our exercise routines.

Prevalence

Maintaining muscle mass and strength throughout life is associated with various health benefits. A good sign is that roughly 82% of adults in the US over 60 years old have normal muscle strength, and only 5% of this population has significantly weak strength levels. About 13% of people have your genotype at the SNP rs11549465.

Muscle Cramps

Increased Risk

Your DNA Says...

You have an increased risk of developing muscle cramps after strenuous exercise.

Improve and Protect Your Body

You probably will not experience symptoms of extreme muscle fatigue, but are at higher risk of cramping from strenuous exercise. It is important for you to monitor yourself and know your limits. Try to avoid strenuous exercise if you know your muscles are fatigued. Cramping usually happens while the muscle is shortened or flexed, so stretching is a key factor in reducing your risk.

SNP	Gene	Your Genotype
rs17602729	AMPD1	AA

Science

Though other factors are involved, our DNA may predispose us to cramping as a result of exercise. Hydration and fatigue also play a large role in when we cramp. The AMPD1 gene tells our body to make an enzyme that is important for working muscles to process energy. The SNP we look at is associated with a deficiency of this enzyme, which may lead to increased cramping and muscle pain with exercise.

History

The earliest reports of muscle cramps come from over 100 years ago from workers in hot and humid conditions. Their sweat had high salt levels, so it was theorized that a loss of electrolytes caused the cramps. Research has shown that the actual cause of muscle cramps is a malfunction of the nerves. In 1997 it was first proposed that muscle fatigue and position can lead to this malfunction.

Prevalence

Estimates of muscle cramping vary quite a bit, although it seems to be more common in women and elderly people. About 80% of cramps occur in the calf muscle, followed by the foot at roughly 40%. Less than 1% of people have your genotype at the SNP rs17602729.

Exercise Behavior

Low Interest

Your DNA Says...

You are less likely to stay interested in exercise routines.

Improve and Protect Your Body

Although you may have trouble with a traditional exercise routine, there are other ways for you to get motivated. Exercising outdoors, with friends, or in competition could spark your interest in physical activity. Emerging research suggests that if you do work out consistently, you may actually be able to train your brain to feel more rewarded by exercise.

SNP	Gene	Your Genotype
rs8044769	FTO	TT

Science

Your DNA can actually play a role in how you feel about your exercise routine--from how hard you think it is to how much you enjoy it. The SNP we look at has also been associated with how likely you are to stick to a routine long term. It is less understood exactly how genes influence behavior. However, the FTO gene impacts regions of the brain involved in energy regulation, which is important for being able to exercise.

History

Since the 1980's, there have been several theories proposed to explain exercise behavior. Sticking to an exercise routine has many benefits, so why is it that a lot of us have trouble staying motivated? The FTO gene was first associated to obesity in 2007. Since then, it has been studied in relation to exercise. During one of these studies, scientists were surprised to find it impacted participants' behavior.

Prevalence

1 in 4 Americans don't participate in any physical activity, and some who do are likely not getting enough. Roughly 18% of people have your genotype at the SNP rs8044769.

Blood Pressure Response

High Improvement

Your DNA Says...

Exercise will likely help you manage blood pressure.

Improve and Protect Your Body

Participate in regular exercise to keep your blood pressure in a healthy range. Activities that include sustained effort are more likely to help you lower blood pressure. Try exercises like hiking or spin classes to keep your heart rate up for a longer period of time.

SNP	Gene	Your Genotype
rs5370	EDN1	GG

Science

The EDN1 gene influences blood pressure by regulating how the muscles around your blood vessels contract and relax. This is important for changing blood flow as needed, but high blood pressure over a long period of time can damage vessels. Several factors are linked to high blood pressure, including salt intake, stress, and genetics. This SNP shows how much blood pressure improves with exercise.

History

We weren't able to measure blood pressure until 1896 when the cuff-based technique was invented. Since then, doctors have been trying to figure out what causes high blood pressure and how to solve it. The first prescription for high blood pressure became available in 1958. Research continues to show improvement with diet, exercise, and supplementation.

Prevalence

Over 30% of adult Americans have high blood pressure, and more than half of them don't know it. It is predicted that by 2030, another 27 million people in the United States will develop high blood pressure. About 57% of people have your genotype at the SNP rs5370.

Weight Response

High Improvement

Your DNA Says...

Exercise will likely help you lose weight.

Improve and Protect Your Body

Make sure to include exercise in your daily routine for optimal weight loss and health results. Any activity that gets your heart rate up will be beneficial to you. Take the stairs and walk whenever possible in addition to your exercise routine. Exercise is also known to help with sleep quality, mood support, skin health, and nail strength. Supplements that increase energy and reduce inflammation may help you live a more active life.

SNP	Gene	Your Genotype
rs1121980	FTO	GG
rs8050136	FTO	CC

Science

The FTO gene has been consistently associated with increased body weight and risk of obesity. This gene can also tell you how well you will respond to regular exercise. Being physically active greatly reduces the risk of obesity for everyone, but just how much can vary depending on your DNA. The SNPs we look at are associated with body weight with a regular exercise routine.

History

Diets have been in effect for centuries, but the use of exercise for weight loss has blossomed in recent history. This is probably due the rise in obesity and more sedentary daily lives. Prior to the 1950's, there had only been a few studies showing the relationship between exercise and weight loss. Research now still shows mixed results, but this may be due to a genetic factor.

Prevalence

While most people tend to turn to diet as a means of weight management rather than exercise, studies have shown that exercise is a key factor. One estimate says that 90% of people who have kept off lost weight exercise on average for an hour each day. Roughly 41% of people have your genotype at the SNP rs1121980. About 48% of people have your genotype at the SNP rs8050136.

Micronutrients

Have you ever felt fatigued for no reason? Headaches you can't explain? If you're like most people, you have probably been deficient in one micronutrient or another at some point. **At least half of all Americans are deficient in one or more micronutrients.** These vitamin and mineral deficiencies can have negative effects on your mood, health, and energy levels. Your DNA has a lot to say about your levels of essential nutrients. By impacting the way you metabolize and process different vitamins, your genes can determine your risk for certain deficiencies. You can use the information from your DNA to supplement as needed to keep your body and mind balanced.

Vitamin D

Normal Levels

Your DNA Says...

You likely have normal levels of vitamin D.

Improve and Protect Your Body

Although you are likely to have normal levels of vitamin D, it is still possible for you to be deficient if you don't spend enough time in the sun. Wearing sunscreen blocks the UV rays that allows us to make vitamin D, so try to get a little bare skin exposure everyday. Enjoying a balanced diet is also helpful, as mushrooms, fish, and cheese all have high levels of vitamin D.

SNP	Gene	Your Genotype
rs1544410	VDR	CC
rs2282679	GC	TT
rs3829251	NADSYN1	GG
rs7041	DBP	CC

Science

Your DNA strongly influences your levels of Vitamin D by impacting the way your body can make and process it. Vitamin D contributes to the health of your immune system, heart, lungs, and bones. It is also important for the absorption of several essential minerals. Some foods contain vitamin D, but with exposure to sunlight our bodies can actually make it from a type of cholesterol.

History

Some estimate that around 80% to 100% of our vitamin D is made with the help of sunlight. The Industrial Revolution brought a significant decrease in time spent outside. Without this precious time in the sun, the need for vitamin D became apparent as a public health issue. Fortification of milk with vitamin D has become relatively standard throughout the United States as a result.

Prevalence

Vitamin D deficiency is very common. Almost 75% of adults in the US have low vitamin D, although not everyone experiences symptoms. The chance of having risk genotype for any of these SNPs is roughly 47% on average.

Vitamin A

Low Levels

Your DNA Says...

You likely have a decreased ability to convert beta-carotene to vitamin A.

Improve and Protect Your Body

To achieve healthy levels of vitamin A, you should be sure to look for sources of preformed vitamin A. Check the ingredient labels of your supplements and multivitamins to make sure you are taking preformed vitamin A rather than beta-carotene. You can get vitamin A through your diet by eating fish and meat. One of the richest sources of vitamin A is beef liver.

SNP	Gene	Your Genotype
rs6420424	BCMO1	AG
rs6564851	BCMO1	TG

Science

Your DNA can influence your levels of vitamin A and where you may need to get it from. Vitamin A is important for your vision, immune system, skin, hair, and nails. It can be found in its pure form or can be made from plant pigments. One of these pigments is beta-carotene, which is a common nutrient found in carrots, squash, and kale. The BCMO1 gene codes for the enzyme that converts beta-carotene into vitamin A.

History

Vitamin A was first associated with eye health in the 1800's. Almost a hundred years later a component was discovered in dairy products that was not a fat, protein, or carbohydrate. It was identified as vitamin A, which is essential for proper function of several different systems and continues to be researched today. Since the 1990's it has been studied for its role in the immune system and reproduction.

Prevalence

Vitamin A deficiency is relatively uncommon in the United States. Elderly people and those who are chronically sick are more likely to experience deficiency, as are those who live in developing countries. About 45% of people have your genotype at the SNP rs6420424. Roughly 45% of people have your genotype at the SNP rs6564851.

Folate

Normal Levels

Your DNA Says...

You do not have a risk of low folate levels.

Improve and Protect Your Body

Diet is the most important source of folate. Although you don't have a genetic risk factor for folate deficiency, make sure you follow dietary guidelines to prevent a diet based deficiency. Folate can be found in dark leafy green vegetables, peas, beans, nuts, and eggs.

SNP	Gene	Your Genotype
rs1801131	MTHFR	TT
rs1801133	MTHFR	GG

Science

Folate is a B-vitamin our bodies need for growth and metabolism. Having too little can lead to fatigue, anemia, and irritability. The MTHFR gene makes an enzyme that converts folate into its usable form. This enzyme also converts homocysteine into methionine. Having high homocysteine levels causes inflammation and heart issues. Your body needs methionine to grow new blood vessels.

History

Folate deficiency can lead to health problems including birth defects. In 1998, the FDA required US food manufacturers to fortify cereals and grains with the essential vitamin. Still, most women today are advised to take a multivitamin with folate during pregnancy. In recent years, doctors have tested this gene to determine if their patients' folate and homocysteine levels need to be monitored.

Prevalence

There are more than 200,000 cases of folate deficiency and 3,000 pregnancies affected by folate deficiency in the United States every year. About 57% of people have your genotype at the SNP rs1801131. Roughly 59% of people have your genotype at the SNP rs1801133.

Vitamin B12

High Levels

Your DNA Says...

You have an increased risk of high vitamin B12.

Improve and Protect Your Body

Try to reduce your intake of red meats and shellfish as they are very rich in vitamin B12. Although you have an increased risk of high B12, this is still an important nutrient and having slightly high levels is not cause for concern. Having high B12 rarely causes symptoms. If your doctor finds extremely high levels on a blood test, there may be something else going on that they can help you resolve.

SNP	Gene	Your Genotype
rs529634	TCN1	AG
rs602662	FUT2	AG

Science

Your genes influence vitamin B12 levels by impacting its metabolism and transportation through your body. Vitamin B12 is essential for red blood cell, brain, and DNA function. Our bodies absorb animal sources of vitamin B12, including fish, eggs, and meat, much better than plant sources. The SNPs we look at are directly associated with the level of vitamin B12 in the blood.

History

Vitamin B12 has been studied for more than 100 years. It was originally thought that deficiency of vitamin B12 always caused anemia. Recent research has shown that there are several other symptoms that may be less noticeable, and that not everyone deficient in B12 experiences anemia. These include fatigue, weakness, and tingling.

Prevalence

More than 3 million people in the United States experience vitamin B12 deficiency every year. Roughly 32% of people have your genotype at the SNP rs526934. Roughly 35% of people have your genotype at the SNP rs602662.

Iron

Low Levels

Your DNA Says...

You have an increased risk of low iron.

Improve and Protect Your Body

Try to consume extra iron through your diet by eating lean meats, eggs, kidney beans, dark chocolate, and spinach. If you feel symptoms of fatigue or dizziness, you may be experiencing deficiency. This can also cause chocolate cravings. You can supplement with iron as an individual tablet, or as part of a multivitamin.

SNP	Gene	Your Genotype
rs855791	TMPRSS6	AG

Science

We use iron to transport oxygen throughout our bodies. It is essential to making blood cells. In the brain, it helps make neurotransmitters that send messages so that you can think quickly, stay relaxed, and avoid mood swings. Your genes can affect your levels by influencing how your liver and body process iron. Having low iron can leave you feeling tired, but may be remedied through diet and supplementation.

History

Iron deficiency was not recognized as a cause of anemia until the 1930's. Around this time, supplementing with iron began. Anemia, which is the lack of red blood cells, has been documented for at least 4,000 years. Today, iron deficiency is described by the World Health Organization as the most common nutritional disorder in the world. It is more prevalent in developing countries and expecting mothers.

Prevalence

Roughly 3 million people in the US have iron deficiency anemia. Each year in the US, about 5,000 deaths and 200,000 visits to the emergency room are related to iron deficiency. Roughly 41% of people have your genotype at the SNP rs855791.

Supplements 101

What are supplements and why should you take them?

If I eat an organic diet high in vegetables, I'm set, right? Unfortunately, no. Each one of us is unique, and so is our optimal diet. But even with an optimal diet built from your DNA, it is extremely difficult to get the micronutrients we need from today's food. Farming practices now result in nutrient depleted soil, elevated sugar content, and foods that won't be fresh by the time they reach your table. In fact, it takes 8 oranges grown today to get the Vitamin A that was in 1 orange just 50 years ago.*

Other factors may be keeping you from getting the nutrients you need, too. Water filters remove toxins but also remove important minerals like magnesium. If you spend time on a low-calorie diet, you are also spending time consuming fewer micronutrients, which may be keeping you from reaching your health goals. When you exercise, you use up even more nutrients that are vital to restore. Several prescription medications deplete natural stores of essential nutrients. All of these nutrient depletions can be remedied with supplementation.

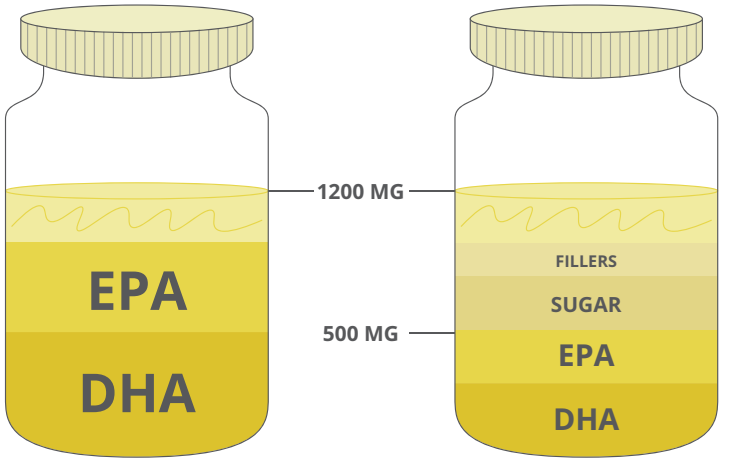
Not all supplements are created equal

"Supplements" are anything you take to supplement your diet with added nutrients, including vitamins, minerals, herbs, and extracts. But there are thousands of bottles on the shelves when you walk down the aisle at your grocery store. How do you know which one to choose?

*Davis, DR, et al. "Changes in USDA Food Composition Data…" *Journal of the American College of Nutrition.* 2004.

Quality matters

Most of what you find on the shelf contains an excessive amount fillers, coloring, and sugar. Fillers are a natural product that help bind the vitamins into a tablet or a capsule, but too much and it can interact with the availability of the vitamin itself. Bioavailability is how much of the active ingredient in a supplement is able to do its job. Even if the ingredient labels on two bottles match, they may have different amounts of the active ingredient.



VITAGENE APPROVED SUPPLEMENT

SOME COMMERCIAL BRAND SUPPLEMENTS

Personalization matters

You can walk into a grocery store and buy any supplement off the shelf, but that doesn't mean they are good for you, let alone safe. Taking the right vitamins, minerals, and herbs is an important part of your optimal health because they have powerful effects in your body. They can also have powerful interactions with medications and conditions you may have. That's why Vitagene gives you personalized supplement recommendations that take into account the full picture of who you are –your goals, your DNA, your lifestyle, and your medical and family history.

Our research database contains tens of thousands of research articles, reviewed and scored according to their scientific validity, to make sure you get the supplements that are safe, effective, and optimal for you.

Here is a brief description of our rating system:

★★★★★ Excellent, randomized clinical trials with strong, positive outcomes
★★★★☆ Small studies with strong, positive outcomes
★★★☆☆ Small studies with mixed evidence, but overall positive outcomes

Bartosz's Personalized Supplement Recommendation

A Smarter Way To Supplement

Supplement	Recommended Range	Why Is This Recommended For Me? *
Probiotics	10 - 40 Billion CFU	Stress (goals), Gut issues (lifestyle), Joint pain (genetics)
Vitamin B Complex		Mental health (lifestyle), Headache symptoms (genetics), Memory (genetics), Energy levels (lifestyle, goals)
Melatonin	1 - 3 mg	Mental health (lifestyle), Stress (goals), Memory (genetics), Sleep issues (genetics)
Vitamin D	800 - 2000 IU	Bone health (genetics), Joint pain (genetics)
Bromelain Quercetin Complex	150 - 500 mg	Joint pain (genetics), Gut issues (lifestyle)
Zinc	10 - 15 mg	Energy levels (lifestyle, goals)
Chromium	100 - 200 mcg	Blood sugar (genetics, lifestyle)
Glucosamine Chondroitin Complex	1000 - 1500 mg	Joint pain (genetics)
Inositol	500 - 650 mg	Hormone support (genetics)

Bromelain Quercetin Complex

Science

Quercetin is a pigment in plants that has anti-inflammatory and antioxidant effects in the body. It promotes healthy arteries and blood sugar function. Bromelain comes from pineapple stems and reduces pain and inflammation. Bromelain and quercetin are usually taken together, as bromelain supports optimal absorption of quercetin.

History

Quercetin was first researched for its ability to reduce histamine production and unwanted immune responses. Bromelain was first extracted from the pineapple plant in the late 1800s and used for swelling after sinus surgery. Pineapple plants are originally from South America and have been used there for hundreds of years to treat inflammation. Over 900 articles have been published on bromelain and quercetin.

Food Sources*

- Citrus fruits
- Apples
- Onions
- Parsley
- Sage
- Tea
- Red wine

Cardiovascular Health

Quercetin has been shown to improve cholesterol levels and decrease other risk factors for heart disease. It has antioxidant effects that protect the cardiovascular system from damage caused by free radicals. Quercetin is also important for circulation and blood pressure because it helps the cells lining arteries function properly.

Allergies

Quercetin works by reducing the levels of histamine the body releases. Histamine is what causes symptoms associated with allergies. In clinical trials, quercetin reduced itching and dry eye symptoms. Bromelain helps by reducing inflammation and improving breathing.

Sinus Irritation

As an antioxidant, quercetin protects the cells in the sinuses from damage. Bromelain has been shown to reduce coughing and improve swelling and inflammation associated with sinus infection and fever.

Arthritis

Research has shown that quercetin and bromelain reduce swelling, inflammation, and pain. Quercetin has also been associated with improved range of motion in people with osteoarthritis. They have been shown to help with joint problems of all types, including recovery from injury.

Emerging Research

Bromelain and quercetin may also help with blood pressure and exercise performance. Quercetin may also help with weight management because it has been shown to reduce the number of fat cells and prevent new ones from being made. It may also help with blood sugar.

Warnings and Side Effects
At high doses, individuals have reported increased heart rate, upset stomach, and asthma complications. The safety and effectiveness of bromelain and quercetin during pregnancy has not been evaluated, so do not use while pregnant.

Chromium

Science

Chromium is an essential mineral found in plants and grains that cannot be produced naturally in the body. This mineral is involved in the metabolism of carbohydrates, proteins, and fats. It has been shown to enhance the action of insulin in the body, allowing cells to uptake more sugar.

History

Chromium has been used as red, yellow, and green pigments in paints for centuries. In fact, the red color of rubies is due to trace amounts of chromium. In the 1950's it was identified as an essential nutrient. Since then, over 500 articles have been published on chromium supplementation.

Food Sources

- Meat
- Whole Grains
- Fruits
- Vegetables
- Spices

Weight Management

Multiple research studies have shown that daily chromium supplementation supports improvements in body composition. Along with exercise and diet, supplementing with chromium helps reduce body fat and build lean muscle. It works by suppressing appetite and stimulating body heat, which increases metabolism.

Sugar Metabolism

Research has shown that chromium can help improve blood sugar levels and insulin sensitivity. In fact, some studies have shown that chromium reduced the amount of insulin diabetics needed. HbA1c levels in the blood are used to measure long-term control of blood sugar, and are usually better in people who take chromium. It has also been shown to help women with gestational diabetes. There is strong research that shows chromium helps regulate blood sugar and insulin levels in women with PCOS.

Emerging Research

Chromium has demonstrated lipid-lowering effects in some research studies. It may increase good cholesterol while decreasing bad cholesterol. It also might help reduce blood pressure. Other traits that chromium may be beneficial towards include cognitive function and bipolar disorder.

Warnings and Side Effects
Side effects from chromium supplementation include headaches, insomnia, irritability or gastrointestinal irritation. Those currently on Levothyroxine should be cautious when taking chromium, as it may decrease its effects. Chromium is likely safe for consumption during pregnancy.

Glucosamine Chondroitin Complex

Science

Glucosamine and chondroitin are structural components of cartilage, the tissue that cushions joints in the body. Both glucosamine and chondroitin are produced naturally by the body. When taken as supplements, they can relieve symptoms of osteoarthritis and other joint diseases that destroy cartilage and cause pain.

History

Glucosamine was first made in 1876, but was not tested and available for oral supplementation until 1994. Historically it has been used in veterinary medicine through injections. In Europe, glucosamine and chondroitin is approved as prescription treatment for osteoarthritis. Over 400 articles have been published on glucosamine and chondroitin supplementation.

Food Sources

- Fish
- Flaxseeds
- Nuts
- Soybeans
- Spinach

Osteoarthritis

Osteoarthritis occurs when the protective cartilage in your joints wears down over time from normal activity, leading to pain and stiffness. The combination of glucosamine and chondroitin slows progress of osteoarthritis and has been shown to reduce symptoms. Supplementation improves not only pain scores but functionality of the joint.

Emerging Research

Preliminary research has shown that glucosamine and chondroitin may improve pain and physical function in adults with Kashin-Beck Disease. Glucosamine and chondroitin may help with overall pain and injury recovery, even if not focused at a joint.

Warnings and Side Effects
If you have diabetes or blood sugar issues, use caution when taking glucosamine and only use if instructed by your doctor. Glucosamine alone or in combination with chondroitin might increase the anticoagulant effects of warfarin (Coumadin). If you are taking warfarin, do not take glucosamine or chondroitin unless instructed by your physician. Research has not evaluated the safety and effectiveness of glucosamine or chondroitin during pregnancy so do not use if you are pregnant.

Inositol

Science

Inositol is a vitamin-like substance found in many foods. Structurally, it is similar to glucose. In our bodies, it helps cells send messages and supports several important processes. Inositol helps fat metabolism, insulin function, and nerve signaling. There is strong evidence that supports the role of inositol in alleviating mood issues and anxiety-related symptoms.

History

Inositol was first found in muscle tissue in 1850. In the 1940's scientists discovered that inositol might be an essential nutrient, so they classified it as a B-vitamin. Since then research has shown that the body can make inositol on its own, thereby removing it from the vitamin list. In 1988, research began to show the promise of inositol in regulating blood sugar and

Food Sources

— Cantaloupe
— Oranges
— Grapefruit
— Dried prunes
— Bran flakes

Hormone Management

Inositol is sometimes referred to as the "female health supplement," as it has been shown to help with female infertility issues. It may increase ovulation and fertility rates in women with PCOS. Inositol also appears to improve insulin sensitivity and decrease blood triglyceride and testosterone levels. It has also been shown to reduce anxiety and mood swings associated with hormonal changes.

Emerging Research

Other traits that inositol may be beneficial towards include ADHD, high blood sugar, depression and high blood pressure. Research studies have shown that high doses of inositol may decrease symptoms of anxiety.

Warnings and Side Effects
Side effects associated with inositol are usually mild gastrointestinal distresses, most common with high doses. Research has not yet evaluated the safety and effectiveness of inositol during pregnancy, so do not use while pregnant unless instructed by a physician.

Melatonin

Science

Melatonin is the hormone that the body uses to induce sleep. It is naturally produced in the brain when it is dark. This is important for maintaining sleep patterns and regulating other hormones. Melatonin plays a key role in reproductive function and development. Researchers also believe it may be related to aging, as melatonin levels drop throughout life.

History

In the early 1900's melatonin was discovered as a compound that reptiles and amphibians use to change colors. It was named in 1958 by a group of researchers from Yale who were hoping to find use in treating skin conditions. Melatonin use as a sleep aid began just 20 years ago, around the same time that it was discovered to be an antioxidant. Over 400 articles have been published on melatonin.

Food Sources

- Grapes
- Tomatoes
- Walnuts
- Olive oil

Sleep

Supplementing with melatonin before bed promotes sleep. Studies have shown that melatonin is particularly effective in resetting the body's internal "clock" after jet lag or night shifts.

Depression

If the body's natural sleep patterns are off, fatigue and depression might result. By regulating sleep and resetting the internal "clock," melatonin can improve symptoms of depression and increase overall energy levels. Research has shown that melatonin can also reduce mood swings.

Cognitive Function

Over time, our bodies produce less melatonin. Research has shown that people with more significant symptoms of memory loss also have lower levels of melatonin. Supplementation may replenish the body's levels of melatonin and slow age-related cognitive decline.

Emerging Research

Melatonin may be beneficial in treating endometriosis, which is heavily affected by hormone levels. Research also suggests that melatonin may be useful in lowering blood pressure and improving cholesterol. Either alone or in combination with other therapies, melatonin has been shown to protect against stomach ulcers. Melatonin is now being heavily researched for its strong antioxidant effects. It may help strengthen the immune system, improve symptoms of fibromyalgia, aid digestion, reduce eczema outbreaks and possibly even help treat multiple sclerosis. Preliminary studies also suggest that melatonin may help women with PCOS improve fertility. It's not surprising that melatonin has so many vast functions in the body, as hormones are key regulators of the body's function.

Warnings and Side Effects
Always review the use of supplements with your physician. Side effects of melatonin are uncommon but may include drowsiness, headache, dizziness, or nausea. People taking anti-hypertensive drugs should avoid taking melatonin, and should consult with a physician before supplementing with melatonin. Women that are pregnant or trying to become pregnant should not take melatonin, as its safety has not been thoroughly studied.

Probiotics

Science

Probiotics are live bacteria and yeasts that are beneficial for overall health and especially for the digestive system. The human body naturally has billions of bacteria cells that help break down food, destroy harmful toxins, and aid with vitamin absorption. There are a variety of ways our modern life depletes levels of these important organisms. Supplementing with probiotics helps replenish the supply of our bacterial helpers.

History

Even before they were identified, people consumed fermented foods and drinks that contained probiotics. People have been eating these products for 10,000 years. In 1899, bifidobacteria found in breast milk was discovered to be beneficial to the human gut. With modern use of antibiotics, supplementing with probiotics has become increasingly popular. Over 1,300 articles have been published on probiotics.

Food Sources*

- Yogurt
- Kefir
- Sauerkraut
- Kimchi
- Miso

Blood Pressure

Probiotics can lower blood pressure by producing different proteins and messengers in your body that impact blood pressure. These include hormones that are important in blood pressure regulation. Probiotics may also contribute to blood pressure levels by affecting cholesterol and weight.

Allergies

A large number of studies have shown that taking probiotics can help relieve allergy symptoms such as nasal congestion, itching, sneezing, and eye and throat symptoms. Some studies have also shown improvements in overall quality of life with probiotic supplementation.

Anxiety and Depression

More and more research has shown that there is a connection between gut health and brain function. There are actually receptors in the gut for messengers that control mood and behavior. Probiotics may help produce these messengers, which has been shown to increase happiness and stabilize mood. Probiotics can also help reduce symptoms of stress by affecting related hormones.

Irritated Skin

Multiple research studies have shown that taking probiotic supplements can help decrease redness, swelling, and itching in both children and adults. Probiotics can also lower markers of inflammation that are involved in skin irritation.

Cholesterol

Probiotics helps reduce the amount of cholesterol absorbed in the gut. They do this by binding to cholesterol from the diet so that it can't be absorbed into the blood.

Sinus Irritation

Probiotics have been shown to regulate the immune response. Sinus irritation is often caused by an overreaction of the immune system, causing swelling, redness, runny nose, and sneezing. Taking probiotics may help alleviate these symptoms by reducing the production of immune markers.

Digestion and GI Health

Research has shown that taking probiotics can help improve indigestion, constipation, abdominal pain, and diarrhea. They have also been shown to help with digesting foods and allergens you may be sensitive to. The healthy bacteria in probiotics attack toxins and regulate what gets absorbed by your body. Lactose and gluten tolerance seem to be improved while taking probiotics.

Weight Management

Probiotics play a large role in regulating what is absorbed in the gut. Fats and cholesterols are bound by the bacteria in probiotics so that they are not absorbed into the blood. This limits the fat and calories taken in and may help maintain healthy weight and body composition.

Arthritis

The pain and symptoms associated with arthritis are caused by inflammation. Probiotics have been shown to stabilize the gut and may lead to a reduction in inflammation. In rheumatoid arthritis in particular, the gut bacteria are altered. Probiotics can relieve symptoms of rheumatoid arthritis by helping return the gut bacteria to a healthy state.

Emerging Research

New research is being done on other species of bacteria that may be used in probiotics. Other traits that probiotics may be beneficial towards include irritable bowel syndrome and ulcerative colitis.

Warnings and Side Effects
Side effects, if they occur at all, usually consist only of mild digestive symptoms such as gas. If you are taking drugs that suppress the immune system, do not use probiotic supplements unless instructed by your physician. Probiotics are safe to take during pregnancy and may help provide nutrients in breast milk.

Vitamin B Complex

Science

B vitamins are found in cells throughout the human body. They play a critical role in metabolism. B vitamins help process sugar, protein, and fat. They are necessary for cell growth, DNA production, and the activation of other vitamins. Having too little of the B vitamins can lead to a variety of health conditions.

History

The first B vitamin was discovered in 1912 by Casimir Funk, who called it a 'vital amine.' In 1920, it was simplified to 'vitamin.' To be a vitamin, it must be essential for life but not made by our bodies. Some compounds that were originally thought to be vitamins have since been removed from the list. Over 5,000 articles have been published on the B vitamins.

Food Sources*

- Meat
- Eggs
- Beans
- Fortified cereals
- Peanut Butter

B1	Thiamine
B2	Riboflavin
B3	Niacin
B5	Panthothenic Acid
B6	Pyridoxine
B7	Biotin
B9	Folic Acid
B12	Cobalamin

Fatigue

The B vitamins are necessary for converting food into energy. Taking a B-complex daily has been shown to increase energy similar to caffeine in the presence of food. Being deficient in one of the B vitamins often leads to fatigue and sometimes even muscle weakness and reduced coordination.

Headaches

Vitamins B6, B9, and B12 have all been shown to reduce severity and occurrence of severe headaches. Some studies have also shown that vitamin B2 may help prevent migraines. The B vitamins are known to reduce blood levels of homocysteine, which is associated with headaches. Plus, vitamin B6 is important for using serotonin, which is typically lower in people with headaches.

Cognitive Function

Taking a B-complex has been shown to slow brain shrinkage as we age. Some studies have even shown that it reduces atrophy in areas of the brain that are particularly at risk for memory loss during aging. Being deficient in vitamin B6, B9, or B12 has been related to memory loss and poor brain function.

Emerging Research

Other traits that Vitamin B Complex may be beneficial towards include high blood pressure and stroke.

Warnings and Side Effects
The B vitamins used in this complex have been deemed likely safe to consume while pregnant or breastfeeding. B vitamins are generally well tolerated, and no severe side effects have been reported. Mild nausea, dysphasia, and cramps may occur.

Vitamin D

Science

Our bodies actually make vitamin D from cholesterol with the help of sun exposure. It is important for your immune system, heart, lungs, and bones. Vitamin D enhances the absorption of calcium from foods and supplements. It also supports muscle movements and helps nerves carry signals between the brain and other body parts. The immune system needs vitamin D to fight bacteria and viruses.

History

Although vitamin D was not discovered until the 1900's, the impact of vitamin D deficiency has been known for years. As far back as 400 BC, people had a sense that exposure to sunlight resulted in stronger bones. They noticed that warriors without head protection had much stronger skulls. Since the discovery of vitamin D in cod liver oil, over 7,000 articles have been published on its role in the human body.

Food Sources

- Mushrooms
- Tuna
- Salmon
- Fortified milk
- Fortified juices

Arthritis and Gout

Having low levels of vitamin D is associated with more severe symptoms of arthritis. In rheumatoid arthritis, osteoarthritis, and gout, people with higher levels of vitamin D may experience less pain. Vitamin D is important for immune function and may work to reduce inflammation in your joints, while simultaneously helping to strengthen your bones. Interestingly, symptoms of severe arthritis tend to be seasonal and vary with latitude. This demonstrates the relationship between sun exposure, vitamin D, and joint inflammation.

Osteoporosis

Taking vitamin D with calcium can decrease bone loss, help prevent osteoporosis, and decrease the risk of fractures. Vitamin D helps maintain strong bones by enhancing the absorption of calcium from foods and supplements.

Vitamin D Deficiency

Vitamin D deficiency can result in both muscle and bone weakness. Studies have also shown low levels of vitamin D to be associated with depression and reduced immune function. Because food supplies are limited, supplementing with vitamin D has been shown to be one of the most effective methods of correcting deficiencies.

Emerging Research

Vitamin D may reduce risk of cardiovascular disease. Other traits that Vitamin D may be beneficial towards include cancer, asthma, PCOS, hypertension, and diabetes.

Warnings and Side Effects
Taking high doses long-term can increase the risk of developing high calcium levels. The most common side effects of taking vitamin D are gastrointestinal issues. Vitamin D supplements are also considered safe when taken during pregnancy or breastfeeding, but should not exceed the upper limit of 4,000 IU.

Zinc

Science

Zinc is an essential mineral that the body needs to produce proteins and DNA. It acts as an antioxidant and can help the immune system fight off invading bacteria and viruses. Taking supplemental zinc may deplete copper, which is another essential mineral your body needs for antioxidant function. For this reason most zinc supplements come combined with copper.

History

Zinc was used to create brass weapons and decorations as far back as 100 BC. Zinc was also used to make the oldest known pills, which were found on a Roman ship and taken for sore eyes. The impact of zinc on immune function and growth was discovered more than 50 years ago. Over 4,000 articles have been published about zinc and human health.

Food Sources

- Oysters
- Beef
- Crab
- Chicken, dark meat
- Blueberries
- Chickpeas

Sugar Metabolism

★★★★☆

Zinc is found in at least 100 enzymes and is necessary for the formation of insulin in the pancreas. Several studies have shown that zinc supplementation improves blood sugar for diabetics. There is also some evidence that high doses of zinc may improve peripheral neuropathy associated with diabetes.

Emerging Research

Research shows that taking zinc in combination with antioxidant vitamins (vitamins C and E, and beta-carotene) might slow the progression of advanced macular degeneration. Zinc supplementation has also been researched as an alternative to traditional acne treatments. Depression, psoriasis, and osteoporosis may all benefit from zinc supplementation.

Warnings and Side Effects
Zinc is safe when consumed in amounts that don't exceed the tolerable upper intake level of 40 mg/day. There is some concern that higher doses might decrease copper absorption and result in anemia. Taking a zinc supplement along with certain antibiotics reduces the amount of both zinc and the antibiotic that the body absorbs. Reported side effects from zinc include altered perception of taste, nausea, and vomiting. Zinc and Copper supplementation has been deemed safe to consume when pregnant or breastfeeding as long as the dosage does not exceed the upper limit.

Glossary

Cell
A cell is the basic building block of living things. An adult human body is estimated to contain between 10 and 100 trillion cells.

Chromosome
A chromosome is an organized package of DNA found in each cell. Different organisms have different numbers of chromosomes. Humans have 23 pairs of chromosomes-22 pairs of numbered chromosomes, called autosomes, and one pair of sex chromosomes, X and Y. Each parent contributes one chromosome to each pair so that each offspring get half of their chromosomes from their mother and half from their father.

Gene
The gene is the basic physical unit of inheritance. Genes are passed from parents to offspring and contain the information needed to specify traits. Genes are arranged, one after another, on structures called chromosomes. A chromosome contains a single, long DNA molecule, only a portion of which corresponds to a single gene. Humans have approximately 20,000 genes arranged on their chromosomes.

DNA
DNA is the chemical name for the molecule that carries genetic instructions in all living things. The DNA molecule consists of two strands that wind around one another to form a shape known as a double helix. Each strand has a backbone made of alternating sugar and phosphate groups. Attached to each sugar is one of four bases--adenine (A), cytosine (C), guanine (G), and thymine (T). The two strands are held together by bonds between the bases; adenine bonds with thymine, and cytosine bonds with guanine. The sequence of the bases along the backbones serves as instructions for assembling proteins.

Nucleotide
A nucleotide is the basic building block of nucleic acids. DNA is made of long chains of nucleotides. A nucleotide consists of a sugar molecule attached to a phosphate group and a base. The bases used in DNA are adenine (A), cytosine (C), guanine (G), and thymine (T).

SNP
Single nucleotide polymorphisms (SNPs) are a type of polymorphism involving variation of a single base pair. Scientists are studying how single nucleotide polymorphisms, or SNPs (pronounced snips), in the human genome correlate with disease, drug response, and other phenotypes.

Allele
An allele is one of two or more versions of a gene. An individual inherits two alleles for each gene, one from each parent. If the two alleles are the same, the individual is homozygous for that gene. If the alleles are different, the individual is said to be heterozygous.

Genotype
A combination of alleles a specific person has that determines a trait.

Phenotype
The physical trait that somebody has. Two people with the same phenotype might have different genotypes that caused the trait.

Enzyme
An enzyme is a chemical substance found in the human body that helps natural processes, such as digestion.

Courtesy: National Human Genome Research Institute

About Vitagene

Vitagene is a new class of a health and wellness company that combines expertise in genomics, data analytics, and digital health to provide health-conscious consumers access to the latest scientific research in wellness and nutrition. Vitagene allows consumers to translate these insights into direct results.

Created by doctors and healthcare professionals in the field of genetics and nutrition, Vitagene uses accurate and scientifically proven research to support its genetic analyses.

Looking for more information on the genes we test for, background information on nutrigenomics, or simply for a healthy new recipe to try out? Head over to the Vitagene Blog at vitagene.com/blog to learn more about genetics, and how your genes relate to your everyday life.

Terms and Conditions

It is not the intention of Vitagene to provide specific medical advice but rather to provide you with information to better understand the health risks and benefits associated with your genetic results. Specific medical advice will not be provided and Vitagene urges you to consult with a qualified physician for diagnosis and for answers to your personal questions.

The information supplied to you does not confirm or replace any medical diagnosis or status conferred by a health care professional. The information provided to you is not a genetic diagnosis of disease, nor does it identify an existing medical condition. Individuals with specific concerns about their health status or genetic testing should consult with a doctor or a genetic counselor.

The information provided by Vitagene is neither comprehensive nor absolute, and may not be applicable to individual circumstances should the information be subsequently deemed inaccurate or out of date by virtue of new scientific advances. Once your report is provided to you, there will be no further information, feedback, or updates provided to you unless you conclude a separate arrangement for an update regarding new developments.

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