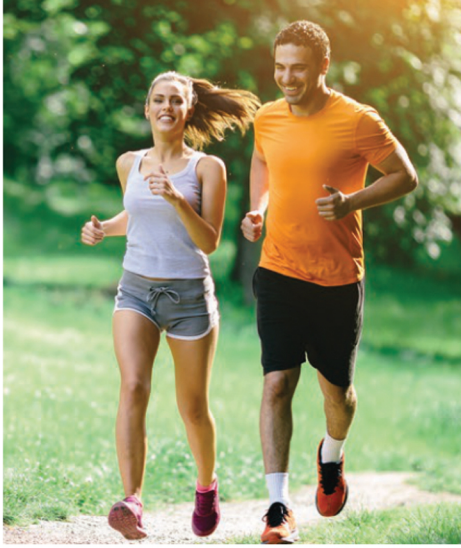
Love my Health™ PRO

LIFESTYLE GENETIC TEST



My health, explained

DNA Labs™

GENETIC TESTING SOLUTIONS

Gene Labs
Test date: 08/02/2023


Diet and Heart Health


Sensitivities


Specific Nutrient Needs


Physical Fitness


Brain Health


Detox


Obesity Risk


Hormonal Health


Diet, Nutrients and Fertility


Fertility Factors

My Genes. My Health.

We are delighted that you have chosen to purchase our LoveMyHealth Lifestyle Genetic Test so that you can begin to live the best life you can! In your personalized report, you will find very helpful and comprehensive information about you. We designed our report with you in mind; easy to use and understand, and actionable. The DNA Labs team is excited to present your unique results to you. Just click, explore, and learn how your very own "Owners Manual", your DNA, can reveal so much valuable information about you!

Using cutting edge genetic technology, we have analyzed your DNA, looking at 127 unique variants across 96 genes that collectively dictate how your “owners manual” helps to shape your personalized action plan. Based on this information, we have created actionable nutritional, exercise, and lifestyle recommendations for you related to dietary and nutrient needs, food sensitivities, fitness planning and physical health management, as well as cardiovascular and metabolic health. Each section of the report provides you with direct changes that you can make today and empowers you to improve your health and well-being!

Thanks for purchasing our Love My Health genetic test; we hope that you use the actionable information within your report to begin to live life great!

My Results: Diet and Heart Health

A one-size-fits-all approach does not provide for nutritional needs that vary by age, gender, genetic background and other factors. In this section, we focus on how consuming different types of fats and carbohydrates affects your risk of developing certain diseases such as obesity and diabetes. An individually tailored diet that strikes your delicate balance is key to optimizing your body's functionality and overall health.

Carbohydrate Consumption

Carbohydrates are the body's main source of fuel, needed for physical activity, brain function, and organ operation. Carbohydrates, for the most part, come in two "flavours": refined/white grains and whole grains. Whole grains are grains that have been left completely in tact, meaning that they have all of the good parts of the grain, including those with the most vitamins and minerals, which perform a variety of functions within the body, and fibre, which can help to control cholesterol and blood glucose levels in your body. The question is, what kind of carbohydrates should you consume and in what quantities? Here, with the help of your genetics, we shed light on this question.

Recommendation:

There are no gene-specific recommendations for you as you have the typical versions of the genes involved in carbohydrate metabolism.

- For your best health, it is always healthier to **consume whole grains** instead of refined, white carbohydrates.
  - Be sure to review your risk of gluten sensitivity in the 'Sensitivities' section and if you are likely to be sensitive to gluten, then you may want to choose gluten free whole grains.

Why?

In people with the same genotypes that you have, higher intake of carbohydrates and lower intake of whole grains have not been found to increase the risk of developing Type 2 Diabetes.

- Whole grains contain more fibre, are less likely to spike your blood sugar levels, and contain more essential micronutrients than refined carbohydrates.

It's in your genes

You have genetic variants in the CRY1 and TCF7L2 genes that are associated with a **lower risk of Type 2 diabetes when carbohydrate intake is high and whole grain intake is low**.

- Your insulin resistance is not likely to be impacted by the quantity of your carbohydrate intake.

Fat Consumption

There are many different types of dietary fats, including saturated fat, omega-3 fatty acids, omega-6 fatty acids, polyunsaturated fat, and monounsaturated fat, all classified by their chemical structure. Each type of fat plays unique and important biological roles (including energy storage, insulating and protecting our vital organs, and helping to control growth, immune function, reproduction, and other aspects of basic metabolism), and each is required in different quantities for optimal health. There are several genes that regulate the effects of different types of fat on your body. In this section, we look at these genes and based on your DNA, we shed light on the fats that are likely to be the healthiest for you to consume, and those that you should limit or avoid.

Take Action:

• **Reduce** saturated fat **intake** in your diet, trying to keep it to less than *10%* of your daily calories (22g/day, based on a 2000 calorie diet).
- Saturated fat is found in animal products such as beef, poultry skin, lard, cheese, and butter. It is also found in coconut oil.
- Instead, choose vegetable-based fats such as avocado oil, nuts and seeds, and lower fat meats and dairy products.
- check out your 'Lactose' section under 'Sensitivities' to see if you should limit lactose and/or consider lactose-free dairy products.

• Ensure that you are **consuming enough omega-3 fatty acids** in your diet. The recommended daily allowance for omega-3 is *1.6g/day*.
- Consume up to twice this amount (3g) daily to prevent metabolic syndrome.
- Sources of omega-3 fatty acids include fish, flaxseeds, walnuts, chia seeds, and avocados.
- In the 'Specific Nutrient Needs' section, check your ability to convert plant based omega-3 fatty acids (ALA) to active EPA and DHA before deciding on the best omega 3-sources for you.

• Also, **decrease your consumption of foods rich in** omega-6 fatty acids. These foods include safflower oil, grapeseed oil, sunflower oil, corn oil, soybean oil, and cottonseed oil.
• It is recommended that you **follow Health Canada's fat intake guidelines** and consume overall fat as *30%* of your daily caloric intake (approximately 65g based on a 2000 calorie diet).

Why?

According to your test results, you may be at an elevated risk of overeating, weight gain, obesity, insulin resistance and metabolic syndrome with higher saturated fat intake.
• You may also have an increased risk of obesity and metabolic syndrome, especially with low omega-3 and high omega-6 fatty acid intake and you may be more prone to inflammatory conditions.
- Ensuring you get enough omega-3 fatty acids can help to keep your triglycerides in check, which can in turn, reduce your risk of metabolic syndrome and improve associated features such as high blood pressure, waist circumference, insulin resistance, and dyslipidemia.

It's in your genes

• You have genetic variants in at least one of the genes that impact saturated fat intake, which may put you at a **higher risk of certain adverse health conditions when you consume higher amounts of saturated fat**.
• You also have variants in at least one of the genes that impacts your omega-3 fatty acid needs, which may put you at a **higher risk of certain adverse health conditions if you have insufficient omega-3 fatty acid intake**.

Eating for Heart Health

Whether you have a genetic predisposition to heart disease or not, your diet plays a central role in heart health. Your diet can influence your risk of Type 2 Diabetes and heart disease - for example, it's important to ensure that your diet is designed to help you maintain optimal triglyceride and cholesterol levels. With guidance based on your specific genetic predispositions, you can modify your diet to help minimize risk of cardiovascular disease. Find out the diet that is most heart-healthy for you!

Take Action:

• **See your Health Care Practitioner** about selecting the best diet for you to reduce your risk of heart disease and Type 2 diabetes.
• **Have your triglyceride and blood sugar levels tested**.

Why?

According to your genetic test results, you may have an increased risk of type 2 diabetes and cardiovascular disease.
• You may also be prone to having higher levels of triglycerides.

It's in your genes

• The MLXIPL gene is involved in the activation of triglyceride synthesis.
• The LPL gene encodes lipoprotein lipase, an enzyme that helps to break down the fat (triglycerides) travelling through our blood as well as promotes the uptake of lipoproteins into cells.
• The CLOCK gene is involved in the regulation of our body's circadian rhythm, which can affect our ability to synthesize and break down fats properly.
- You have genetic variants that are associated with **elevated risk of having high triglycerides** which can be reduced by following the Mediterranean diet, which is high in monounsaturated fat.
- You also have a genetic variant that is associated with a **reduced risk of type 2 diabetes and heart disease when you follow a low fat diet**.
- You are advised to discuss your specific risk factors and personal and family history with your Health Care Practitioner, along with having your triglyceride and blood sugar levels tested, to select the diet plan that's best for your health.

Risk for Heart Disease

Heart disease includes conditions that involve a narrowing or blockage of blood vessels, known as atherosclerosis, which can lead to a heart attack, chest pain (angina) or stroke. While many environmental factors influence development, particular genes are shown to significantly impact one's predisposition. These contribute to changes within the lining of the vasculature that lead to plaque development and eventually atherosclerosis. Prevention starts with knowing your risk. Find out your genetic risk profile and specific lifestyle interventions to address factors such as, oxidative stress and inflammation, that contribute to the onset of heart disease.

Recommendation:
Since you do not carry any risk alleles, there are no gene-specific recommendations for you based on your DNA test results.

Why?
Though there are several other factors that contribute to the development of coronary heart disease, specific variants in the chromosomal area 9p21 have been found to be associated with cardiovascular disease. The risk is significantly associated with the primary events of cardiovascular disease such as fatal and nonfatal myocardial infarction, angina as well as revascularization. Based on your test results, you are in the **low risk category** for developing cardiovascular disease in association with 9p21. Due to this, you are less likely to have a buildup of plaque, which would cause narrowed arteries and decreased blood flow to your heart. As you are not at an increased risk of developing cardiovascular disease there are no gene-specific recommendations.
If you are experiencing symptoms such as chest pain (angina) during physical activity, nausea, pain or discomfort in the arms or shoulders, and shortness of breath, it is recommended that you consult a physician.

It's in your genes
There are two common variants in the chromosomal area 9p21 that are associated with increased risk of coronary heart disease.
• According to your DNA test results, you have the **typical allele for both variants**. Due to this, you likely have a **reduced risk of developing coronary heart disease (0.78-fold).**
Note: there are additional factors that contribute significantly to the development of cardiovascular disease. Work with your healthcare provider to understand your individual risk factors and to overcome these predispositions.

My Results: Sensitivities

Food sensitivities are adverse reactions to specific foods which are usually due to the body's inability to absorb specific nutrients, or having too much or too little enzyme activity needed for normal digestion. Although not life-threatening, consuming foods that you are sensitive to can lead to uncomfortable symptoms, often including gastrointestinal upset, if not properly managed. Depending on your genetic make-up, you may have a predisposition to being sensitive or intolerant to certain foods and substances. In this section, we discuss some of the most common food sensitivities, your predispositions, and what you can do to ensure that you are managing your sensitivities properly.

Lactose

Lactose is the primary sugar found in dairy products, and is broken down by the enzyme lactase. Genes that control the amount of lactase the body produces can predispose some individuals to have difficulties digesting lactose. People who produce less lactase are not able to fully digest lactose, and can have lactose sensitivity or intolerance. They can experience cramps, bloating and diarrhea after consuming lactose-containing dairy foods. Overall, it is estimated that about 75% of the world's population experiences some form of lactose intolerance. Read on to find out what your genes say about how your body handles lactose.

Take Action:

See your healthcare professional about being tested for lactose intolerance. You can also try:

- Eliminating or reducing dairy products from your diet to see how this makes you feel
  - If you choose to reduce your dairy consumption, be sure to include other calcium-rich foods in your diet to make up for the calcium that you may be missing
  - Consuming lactose-free dairy products
- Taking lactase supplements when consuming dairy products
  - This may help with immediate digestion of lactose found in dairy products and help to mitigate gastrointestinal symptoms associated with lactose consumption

Why?

According to your DNA test results, you are likely to be deficient in lactase, the enzyme that breaks down the milk sugar lactose, and therefore, are more likely to be lactose intolerant, which can lead you to experience uncomfortable gastrointestinal symptoms and diarrhea when consuming dairy products.

It's in your genes

The MCM6 gene helps to regulate the production of lactase, an enzyme responsible for digesting lactose.

- You have a genetic variant that is associated with a **reduction in your production of lactase**, which may make it more difficult for you to digest lactose found in dairy products.
  - Approximately *75% of the population* shares your gene variant and may have trouble digesting lactose.

Gluten

Gluten is a protein found in wheat, barley, spelt, rye, and any products made from these grains. While many gluten-containing foods are considered good sources of whole grains, some people are unable to digest gluten. It is estimated that approximately 5-10% of people worldwide suffer from some form of gluten intolerance. In its milder form, gluten intolerance can lead individuals to experience gastrointestinal issues and headaches when they consume gluten. In its more extreme form, celiac disease, there is a strong immune reaction that the body mounts against the absorptive portion of the small intestine in response to gluten consumption. As a result, nutrients cannot be absorbed into the body properly, resulting in more severe gastrointestinal and general health problems such as fatigue, weight loss, depression, bloating, and joint and muscle pain. A group of genes called the HLA complex are largely responsible for the genetic basis of gluten intolerance. Read on to find out your genetic predisposition to gluten intolerance and whether or not you should be consuming gluten.

Recommendation:

Although your genetics point to a very low risk of gluten sensitivity, there is still a small chance of developing a sensitivity. If you experience any of the symptoms listed below, you may want to **consider removing** gluten **from your diet** to see if you experience any health improvements or you may want to consider getting tested, especially if there is a family history of Celiac disease or another autoimmune disease.

Why?

You have a very low/slight risk of celiac disease. Celiac is an autoimmune disorder in which gluten causes damage to the villi in the small intestines.

- The intestinal damage often causes diarrhea, fatigue, weight loss, bloating, and anemia, and can lead to more serious complications.

It's in your genes

The HLA genes provide instructions for making a group of related proteins known as the human leukocyte antigen (HLA) complex. The HLA complex helps the immune system distinguish the body's own proteins from the proteins made by foreign invaders such as viruses and bacteria.

- Your HLA genotypes put you at **very low risk of being sensitive to gluten**.

Caffeine

A compound found especially in coffee, tea, soft drinks and chocolate, caffeine is a stimulant of the central nervous system, and is consumed daily by millions of people worldwide. As a stimulant, caffeine has many health benefits associated with its consumption - with the right amount in your system, caffeine can reduce fatigue, improve reaction time, enhance short-term cognitive performance and concentration, and can even reduce your risk of cardiovascular disease. However, if you have too much, caffeine can elevate blood pressure and heartbeat, cause excessive jitteriness, and cause gastrointestinal disturbances. Your genetics play a large role in determining how you metabolize caffeine, how sensitive you are, and whether that one cup of coffee you had in the morning will leave you with the jitters or not. Read on to find out what your DNA says about how your body metabolizes caffeine, and how much is too much for you.

Recommendation:

- Even though you are likely able to consume as much caffeine as you want without experiencing any negative side effects, remember to keep your caffeine intake *at or below 400mg daily* (approximately three 8-ounce cups of regular coffee), or *below 300mg daily* for post-menopausal females, as per Health Canada Guidelines.
- You are **encouraged to consume *one or two 8-ounce cups of coffee daily*** to reduce your risk of heart disease.

Why?

According to your DNA test results, you likely process the caffeine that you consume quickly, meaning that it is broken down and cleared from your system relatively rapidly, making you less likely to experience negative side effects such as jitteriness or anxiety.

It's in your genes

The CYP1A2 gene encodes the CYP1A2 enzyme, a member of the cytochrome P450 family of enzymes involved in metabolism of drugs and other substances, including being the key enzyme responsible for primary caffeine metabolism. Variants in this gene impact the speed at which you metabolize caffeine, which ultimately changes how your body responds to it's stimulatory effects.

- You have a genetic variant that likely makes you a **"fast metabolizer"** of caffeine, meaning that you are able to clear it from your system rapidly well before bedtime.
- Individuals with your genetic variant are also likely to benefit from moderate caffeine intake.

Alcohol

Alcohol is consumed by people all over the world. Many people experience a feeling of euphoria and happiness when consuming alcohol in low doses, and difficulty thinking coherently and loss of coordination with higher doses. Some people are highly sensitive to the effects of alcohol, while others have a much higher tolerance and are less likely to experience many of the effects. Some find drinking pleasant, while others have extreme negative reactions and are unable to consume alcohol at all. Your genetics play a large role in determining how you metabolize alcohol, and how likely you are to experience some of the side effects associated with drinking. Read on to find out what your genes say about how alcohol is predicted to affect you, and whether you should consider limiting or avoiding that next drink.

Recommendation:

- For your best health, Canada's Low Risk Alcohol Drinking Guidelines recommends that females consume *no more than 10 drinks per week* (no more than 2 per day) and males consume *no more than 15 drinks per week* (no more than 3 per day).
- To avoid developing a habit, plan non-drinking days every week.

Why?

According to your DNA test results, when you consume alcohol, you are likely to experience typical effects such as slurred speech, drowsiness, emotional changes, sleep disruption, nausea and potentially vomiting, if alcohol is consumed in excess, as well as hangovers the following day, leaving you feeling unwell.

It's in your genes

The ALDH2, ADH1B and ADH1C genes all encode proteins involved in different steps in the alcohol metabolism pathway. Variants in ALDH2 affect the way that alcohol is metabolized, while variants in ADH1B/C relate more to the speed of alcohol metabolism, affecting your risk of increased alcohol consumption and alcohol use disorders.

- You have **typical variants** of all of these genes, meaning that you likely metabolize alcohol rapidly and effectively, which is protective against alcohol dependence and alcohol use disorders.
- Keep in mind that although you may not have any issues related to how you metabolize alcohol, you should still be alert to the various potentially negative impacts that alcohol use can have on your health including its effect on testosterone and triglyceride levels, as well as liver damage and your ability for detoxification.

Sodium

Sodium, the most common source of which is table salt, is an essential mineral in the human body. It helps to regulate fluid balance within our body and cells, and is used by the body for transmission of signals within the nervous system as well as for heart and other muscular contraction. Too much sodium can cause a number of adverse effects within the body, the most common of which is elevated blood pressure, or hypertension, which can predispose individuals to heart disease. People respond differently to sodium, with some individuals experiencing greater increases in blood pressure as a result of excess sodium consumption. Your DNA, specifically the ACE gene, is largely responsible for determining these fluctuations in blood pressure. Read on to find out which variant of ACE you possess and discover your sodium sensitivity.

Recommendation:

There are no specific recommendations for you based on this gene.

• For your best health, it is recommended to **limit your sodium intake** to Health Canada's Upper Limit of *2300mg/day*.

- This is equivalent to approximately 1 teaspoon of salt per day, which includes both salt found naturally in food as well as salt added to food during processing and preparation.

- Be sure to always read packaged food labels and choose foods lowest in sodium, as packaged foods tend to be high in sodium.

Why?

According to your DNA test results, you have a 'normal' or 'typical' risk of experiencing elevated blood pressure when your sodium intake is high.

It's in your genes

The ACE gene encodes Angiotensin-Converting Enzyme, a central component of the renin-angiotensin system (RAS) which controls blood pressure by regulating the volume of fluids in the body.

• You have a variant of this gene that is associated with a **reduced sensitivity to salt**, meaning that you are less likely to experience larger than normal blood pressure increases when your sodium intake is high.

My Results: Specific Nutrient Needs

Is visiting the health food store an overwhelming experience? There are so many nutrients - how are you supposed to keep track of them all and what do your genes say about how your body responds to them? In this section, we dive deeper into nutrition, looking at many of the nutrients, vitamins, and minerals that play major roles within your body. And armed with your genetic information, we help you create a diet and supplements plan tailored to your specific risk factors for nutritional deficiencies and enhanced nutrient needs.

Vitamin A

Vitamin A is a fat-soluble vitamin critical for eye health and vision, healthy skin, and immune function. Vitamin A exists in two major forms: active vitamin A (retinol), which can be found in high quantities in animal liver, and pro-vitamin A (most commonly beta-carotene), found in orange fruits and vegetables as well as green leafy vegetables. In order for the body to use pro-vitamin A, it must first be converted into retinol, which can then carry out its functions. The BCMO1 gene influences your ability to convert beta-carotene into retinol. Poor converters must rely on animal sources of vitamin A or vitamin A supplements to meet their recommended daily intake. Failure to consume adequate vitamin A can result in night blindness and other vision/eye problems. Read on to see what your genes say about your vitamin A conversion capacity and which sources of vitamin A are best for you.

Take Action:

• In order to meet your daily vitamin A requirements, **you will need to rely on animal sources of** Vitamin A in your diet such as poultry/beef liver, eel, tuna, herring, mackerel, and goat and cheddar cheese
  - check out your 'Lactose' section under 'Sensitivities' to see if you should limit lactose and/or consider lactose-free dairy products).
• Health Canada recommends a minimum of *900mcg* of RAE (retinol activity equivalents) daily for adult males and a minimum of *700mcg* of RAE daily for adult females.
  - Pregnant females should consume a minimum of *770mcg* of RAE daily and breastfeeding females should consume a minimum of *1300mcg* of RAE daily.
• You may choose to take a daily supplement including active Vitamin A at the minimum levels listed above.
  - Make sure that you are supplementing with no more than *3000mcg* RAE daily.

Why?

According to your DNA test results, you may be unable to effectively convert beta carotene to vitamin A, meaning that you need to rely on animal sources of vitamin A or vitamin A supplements to meet your recommended daily intake.

It's in your genes

• The BCMO1 gene is involved in the conversion of plant-sourced beta carotene into retinol, one of the active forms of vitamin A which is responsible for vision.
  - You have a variant in this gene that is associated with **reduced ability to convert beta carotene into active vitamin A**.

Vitamin B12, Folic Acid, Vitamin B2

Vitamin B2, B12, and folic acid (vitamin B9) are all molecules and cofactors that, in a series of complicated molecular pathways, are involved in the conversion of homocysteine to methionine within the body. Improper homocysteine metabolism can lead to a buildup of homocysteine which can result in a number of adverse health effects. In this section, we look at genes associated with B12 deficiency, as well as genes involved in metabolizing homocysteine and folate, and genes that shed light on what form of vitamin B12 you should consume. Read on to learn about your genetic variants, and what they mean in combination for your required intakes of vitamin B12, B2, and folic acid.

Take Action:

Supplement with *1000mcg* daily of vitamin B12 sourced from *methylcobalamin*. It is best for you to take this sublingually (under the tongue).

- As B12 is best taken along with folic acid, you are also recommended to take 480mcg of methylfolate daily.
- See your healthcare practitioner to **test your vitamin B12 levels.**

Why?

According to your DNA test results, you are more likely to have greater than normal vitamin B12 needs, meaning that you should supplement with vitamin B12 to prevent deficiency and prevent excess homocysteine accumulation.

- Excess homocysteine has been implicated in various cardiovascular disorders.

It's in your genes

- The MTHFR, MTRR, and MTR genes encode enzymes that use vitamins B2, B9 (folate), and B12 for the conversion of homocysteine into methionine, an amino acid required in the form of S-adenosylmethionine (SAMe) for the function of hundreds of processes in the body.
  - You have the **'typical'** or **'normal'** versions of all 3 of these genes, meaning that with proper consumption of vitamins B2, B12, and folate, your vitamin and homocysteine conversion are both likely to be normal.
- The FUT2 and COMT genes are involved in determining both your risk of vitamin B12 deficiency, as well as which form of vitamin B12 you should be consuming.
  - You have a variant in the FUT2 gene that is associated with **decreased vitamin B12 absorption**, meaning that you likely have higher than typical needs for vitamin B12 to prevent deficiency and to prevent excess homocysteine.

Vitamin C

Vitamin C, or ascorbic acid, is a water-soluble vitamin that plays many important roles within our bodies. As an antioxidant, vitamin C helps to protect our cells and DNA against the damaging effects of free radicals. Vitamin C is also essential for the synthesis of collagen, the major component of all of our connective tissues which makes up the majority of our skin, tendons and ligaments, blood vessels, bones, teeth, and cartilage. Great sources of vitamin C include several fruits and vegetables, especially bell peppers, citrus fruits, and guava. Variants in the GSTT1 gene have been shown to affect vitamin C processing, putting certain individuals at increased risk of vitamin C deficiency. Read on to find out what your genes say about how your body processes Vitamin C and learn about your recommended intake.

Take Action:

It is crucial that you **consume your recommended daily intake of** vitamin C.

- Health Canada recommends that adult males consume *90mg* daily and that adult females consume *75mg* daily.
  - Pregnant females should consume *85mg* daily and breastfeeding females should consume *120mg* daily.
  - Smokers should consume *35mg more* than their recommended daily intake to combat additional oxidative stress.
- You may also choose to take a vitamin C supplement daily to prevent deficiency.

Why?

According to your DNA test results, you may be prone to having lower than normal blood vitamin C levels which puts you at **risk for vitamin C deficiency**.

- It is thus crucial that you consume your daily recommended intake of vitamin C to avoid the health complications associated with vitamin C deficiency.

It's in your genes

- The GSTT1 gene is involved in detoxification and combating oxidative stress.
  - You have a version of this gene which is associated with a **reduced ability to combat oxidative stress**, which may lead to higher oxidative load, and can result in lower levels of vitamin C in your blood.

Vitamin D & Calcium

Vitamin D, a fat soluble vitamin, and calcium, the most abundant mineral in the body, are a pair of molecules that work together to help maintain our bone mineral density. Vitamin D, which can be synthesized by the skin upon exposure to sunlight or consumed in specifically enriched foods, promotes intestinal calcium and phosphate absorption, as well as regulating bone maintenance and remodelling. Calcium, primarily found in milk and other dairy products, is essential for muscle contraction, nerve transmission, and cell signalling. It is also the primary mineral component of bone, comprising 50% of their volume. Several genes are involved in the transport and activation of vitamin D, as well as the overall maintenance of bone mineral density, with both having implications for your dietary intakes of vitamin D and calcium. Read on to discover what your genes say about how your body handles vitamin D and what this means for your recommended intake of both vitamin D and calcium.

Take Action:

• Be sure to **supplement with *1000 IU* of cholecalciferol vitamin D daily**.
• Have your healthcare practitioner **test your serum vitamin D levels** as you may require supplementation with higher levels of vitamin D.
• You are **likely not at an increased risk of low bone mineral density** with adequate dietary calcium and vitamin D, but for your best health, you are still recommended to **try to meet Health Canada's** calcium **recommendations**.
  - Health Canada recommends that males under 70 and females under 50 consume *1000mg/day* and that males over 70 and females over 50 consume *1200mg/day*.

Why?

According to your DNA test results, your body may be less effective at converting vitamin D into its active form and transporting it throughout the body, meaning that you may have a higher risk of vitamin D deficiency, even with adequate sunlight exposure.
• It is thus crucial that you consume your daily recommended intake of vitamin D to avoid the health complications associated with vitamin D deficiency
• You also likely have a lower risk of lower bone mineral density when you consume adequate calcium and vitamin D in your diet.

It's in your genes

• The CYP2R1 gene produces Vitamin D Hydroxylase, an enzyme that converts vitamin D to its active form, 25-hydroxyvitamin D, in the liver. The GC gene produces a protein that helps maintain vitamin D levels within the blood.
  - You carry a genetic variant in at least one of these genes, meaning that you **may have issues converting vitamin D into its active form**, and as a result, your **vitamin D levels may be lower than normal**.
• The VDR gene provides instructions for making the Vitamin D Receptor, a protein which helps to regulate many functions in the body including bone formation.
  - You have the **'typical'** variant of this gene, meaning that you will likely have proper maintenance of bone density .

Vitamin E

Vitamin E is a fat-soluble vitamin found in plant oils from vegetables, nuts, and seeds, required for the proper functioning of many organs. It plays a vital role in our immune system as an antioxidant, helping to eliminate free-radicals, and it helps to prevent the formation of blood clots. Vitamin E deficiency is characterized by peripheral neuropathy (difficulty conducting nerve impulses from the brain to the rest of the body), ataxia, skeletal myopathy, damage to the retina (possibly leading to vision loss), and impairment of the immune response. As some people are at an increased risk of blood clots as a result of variants in their F5 gene, it is recommended that these individuals consume greater quantities of vitamin E. Read on to discover what your genes say about your risk of blood clotting disorders, as well as your recommended intake of vitamin E.

Recommendation:

There are no gene-specific recommendations for you as you have the typical version of this gene which **does not put you at risk** of having increased vitamin E needs.

• For your best health, however, Health Canada recommends that you **consume *15mg* of** Vitamin E daily.

Why?

According to your DNA test, you likely have a normal/low risk of blood clotting disorders.

• Vitamin E acts as a blood thinner and can help to manage blood clotting disorders, when present.

It's in your genes

• The F5 gene encodes coagulation factor V, a protein which works with other coagulation factors to form blood clots in response to any form of blood vessel damage is involved in the body's blood clotting system.

- You have the **'typical'** or **'normal'** version of this gene, meaning that you likely do not have an elevated risk for blood clotting disorders.

Iron

Found primarily in liver and red meat, iron is an incredibly important chemical element within the human body. Most importantly, iron is found at the core of hemoglobin, the primary component of red blood cells, and is essential for oxygen transport throughout the bloodstream to the lungs and tissues. It is also found at the core of our cytochrome P450 enzymes, a broad group of enzymes within our body responsible for drug metabolism, steroid hormone synthesis, and fatty acid metabolism. Iron balance within the body is extremely important. Too little iron can result in iron-deficiency anemia, characterized by extreme fatigue, weakness, chest pain, shortness of breath and poor appetite; too much iron (iron overload) can result in joint pain, abdominal pain, irregular heart rhythm, skin colour changes (bronze, grey, green), and other health complications. Certain genetic variants increase your risk of iron deficiency and others can put you at greater risk of iron overload. Read on to discover what your DNA says about the way your body handles iron, and whether more or less iron consumption is right for you.

Take Action:

Ensure that you are getting enough iron in your diet.

- Health Canada recommends that males (19+) and females (51+) should consume 8mg of iron daily, and females between 19-50 should consume 15mg of iron daily.
- If you are unable to meet this iron level via your diet, consider taking an iron supplement. Take this along with Vitamin C for enhanced absorption.

Why?

According to your DNA test results, your ability to transport iron to your tissues may be reduced, which can put you at an increased risk for developing iron deficiency anemia.

- It is thus critical that you are consuming your daily recommended intake of iron.

It's in your genes

- There are several genes involved in iron balance within the body, all of whom interact in some way to detect and regulate the levels of iron absorbed and transported throughout the body.
- Together, the TF, TFR2, TMPRSS6, and HFE genes help to ensure that your iron balance is in check.
  - You have an **'atypical'** version of at least one of the three genes involved in determining your risk of iron deficiency (TMPRSS6, TFR2, and/or TF), meaning that your iron transport to tissues may be reduced.
    - This may put you at **risk for iron deficiency anemia**.
  - You have the **'typical'** or **'normal'** version of the HFE gene, the gene involved in determining your risk of iron overload (hemochromatosis), meaning that you likely have normal levels of transferrin, a protein that limits the amount of free iron within the body.

Antioxidants

Your body is constantly encountering free-radicals, chemicals that are capable of damaging your cells and your DNA, either as byproducts of your body breaking down food or from environmental sources (ex. radiation, tobacco smoke). In large enough quantities, these free radicals generate oxidative stress that is capable of contributing to chronic diseases such as cancer, heart disease, and neurodegenerative diseases. Antioxidants, such as vitamins A, C, E, and selenium, are substances that combat oxidative stress, protecting your cells from the harmful effects of cell-damaging free radicals. When antioxidant intake is low, it can result in fatigue, poor memory, skin and hair changes, and impaired wound healing. Read on to discover what your genes say about your body's natural ability to quench free radicals as well as your antioxidant requirements.

Take Action:

It is recommended that you **increase your antioxidant intake by doing the following**:

- Add lots of dark-coloured fruits and vegetables to your diet such as purple, red and blue grapes, blueberries, red berries, dark green vegetables such as kale and collard greens, and orange vegetables such as carrots and sweet potatoes.
- Taking an antioxidant supplement including vitamins A, C, E, and selenium is also recommended.
- ALA (alpha-lipoic acid), L-carnitine, CoQ10, and manganese (as part of a mineral supplement) may also be considered.
- Curcumin and grape seed extract supplements have also been found to increase SOD2 levels.

Why?

According to your DNA test results, you may have a reduced ability to clear free radicals from your body, which may put you at risk of higher oxidative stress leading to cell damage.

- It is thus extremely important to consume lots of antioxidant-rich foods in your diet.

It's in your genes

The SOD2 gene encodes the SOD2 enzyme, which helps to eliminate free radicals and reduce oxidative stress within your cells.

- You have a genetic variant that is associated with **lower enzyme activity**, which may reduce your ability to clear free radicals, and may put you at risk of greater than normal oxidative stress and cellular damage.

Omega-3 Fatty Acids

Omega-3 fatty acids are 'good' types of fat that are important for lowering unhealthy blood fat (triglyceride) levels and for decreasing inflammation. Symptoms of omega-3 deficiency include dry skin and hair, attention and concentration problems, irritability and mood swings, fatigue, and joint discomfort. There are three types of omega-3s: ALA (found in plants such as nuts, seeds, and plant oils), and EPA and DHA (both of which are found most commonly in the oils of fish such as salmon, trout, cod, and herring). Most dietary ALA is converted into EPA/DHA. Your body's ability to convert ALA to EPA/DHA is largely genetically determined, and impacts which sources and types of omega-3s you should be consuming. Read on to learn what your genes say about how your body handles omega-3, and which sources are best for you.

Take Action:

Ensure that you are consuming enough omega-3 fatty acids in your diet.

• Sufficient omega-3 fatty acids can be obtained by consuming at least two *2.5 oz.* servings of fish weekly, which provides an average of *0.3-0.45g* of EPA/DHA per day

- You can also choose to take a daily fish oil supplement that provides at least *1000mg* of omega-3 fatty acids and at least *100mg* of EPA (eicosapentaenoic acid) + DHA (docosahexaenoic acid).

• You can also consume plant-based sources of omega-3 fatty acids that contain alpha-linolenic acid (ALA), including chia seeds and flaxseeds.

- Dietitians of Canada recommends that males consume a minimum of *1.6g* of ALA daily and females consume a minimum of *1.1g* of ALA daily.

- To meet this requirement, you can also choose to take a daily flaxseed oil supplement to provide you with your required ALA.

Why?

According to your DNA test results, you may have a higher risk of both metabolic syndrome and obesity when your omega-3 fatty acid intake is low, so it is especially important for you to consume adequate omega-3 fatty acids in your diet.

• You are, however, likely efficient at converting ALA (plant-based omega-3 fatty acids) to EPA/DHA (animal-based omega-3 fatty acids), meaning that it does not matter which omega-3 sources you consume.

It's in your genes

• The FADS2 gene encodes a portion of the D6D enzyme which converts between different types of fatty acids, including the conversion of ALA into EPA/DHA.

- You have the **'typical'** version of this gene, meaning that you are **likely able to efficiently convert dietary ALA into EPA/DHA** and can thus consume either plant-based sources or animal-based sources of omega-3 fatty acids to meet your daily omega-3 requirement.

• The IL6 gene encodes interleukin-6, a protein involved in the generation of inflammation within the body during immune responses. Variants in IL-6 are also associated with increased risk of certain metabolism-related disorders, specifically obesity and metabolic syndrome, in response to omega-3 fatty acid intake.

- You carry genetic variants that are associated with an **increased risk of metabolic syndrome and obesity** when you don't consume adequate omega-3 fatty acids.

Choline

Choline is an important vitamin-like nutrient found in eggs, seafood, meat, poultry, soy, peanuts, cruciferous vegetables, and some dairy products. Phosphatidylcholine, made from choline, is a lipid found in the membrane of each of our cells, and is necessary for cell structure and signalling. Choline itself can also be converted into acetylcholine, one of the primary neurotransmitters in our central nervous system, and is thus important for neurotransmission. Choline has also been linked to reducing the risk of fetal neural tube defects and fatty liver disease. As an essential nutrient, it cannot be synthesized by the body, and thus must be consumed in your diet. And though deficiency is rare, certain genetic variants can put you at increased risk of choline deficiency, which is characterized by low energy levels, memory loss, cognitive decline, muscle aches, and mood changes or disorders. Read on to learn what your genes say about your risk of choline deficiency and how much you should be consuming daily.

Recommendation:

There are no specific recommendations for you as your genetic variants are not associated with an increased risk of having low phosphatidylcholine levels.

• For your best health, **ensure that you meet your adequate intake for** choline as choline is a key component of phosphatidylcholine.

- Adult males should consume at least *550mg daily* and adult females should consume at least *425mg daily*.

Why?

According to your DNA test results, you likely have normal phosphatidylcholine levels.

• Phosphatidylcholine is a key component of all cell membranes, and thus affects all biological functions.

• It is also a precursor for the neurotransmitter acetylcholine, which plays a role in memory and other brain functions.

• Decreased phosphatidylcholine can also lead to fatty liver, as it is essential for fat removal from the liver.

It's in your genes

The PEMT gene encodes the PEMT enzyme which is responsible for the conversion of phosphatidylethanolamine, another membrane lipid, into phosphatidylcholine within the liver.

The FADS1 gene encodes the FADS1 enzyme which helps to convert between different forms of unsaturated fatty acids, which are found alongside phosphatidylcholine within our cell membranes.

• You have the **'typical'** or **'normal'** versions of both of these genes, meaning that you likely have normal phosphatidylcholine levels.

Probiotics

Did you know that we have more bacterial cells in our bodies than human cells?! Probiotics are living microorganisms that are very similar to ones already found in our bodies, and found in several foods and supplements including yogurt (with live cultures), tempeh, and kimchi. As living organisms, they play an important role in immune system function and in creating a healthy bacterial balance in the body, particularly in the gastrointestinal tract. Studies have linked probiotic consumption to therapeutic benefits for irritable bowel syndrome, as well as other gastrointestinal conditions. When probiotic intake is low and gut microflora are out of balance, it can result in constipation, gas, chronic diarrhea and chronic bad breath. Certain genetic variants have been linked with lower concentrations of specific gastrointestinal probiotics, which can affect your overall digestive health. Read on to learn how your genes influence your levels of gut microflora and whether or not you may need probiotic supplementation.

Recommendation:

There are no gene-specific recommendations for you as you have the typical version of this gene, meaning you are not at heightened risk of having lower than normal bifidobacterium levels in your gut.

Why?

According to your DNA test results, you are more likely to have normal concentrations of the gut microbe, bifidobacterium.

- Normal levels of microflora within your gut are important for immune and digestive health.

It's in your genes

The FUT2 gene helps to influence the composition of bacteria that live within your gut. Variants in this gene may affect various microorganisms and their relative quantities within your gut.

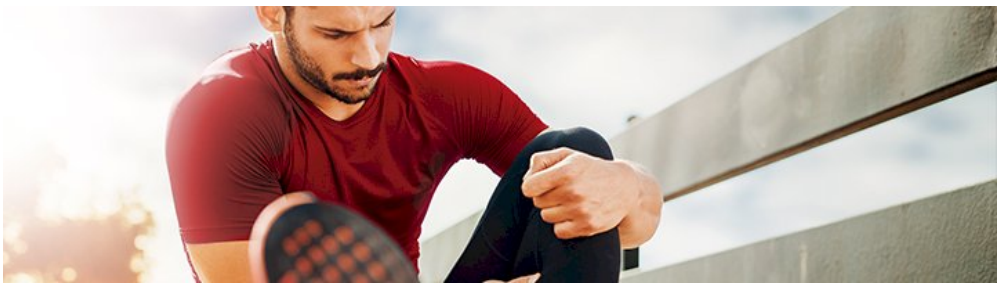
- You carry the **'typical'** version of this gene, meaning that you are more **likely to have normal concentrations of Bifidobacterium**.

My Results: Physical Fitness

It goes without saying: Exercise is good for you. It promotes strength, endurance, and flexibility, and can also help to reduce body fat and boost metabolism. There are many types of exercises, including endurance activities (such as cycling and running) and power exercises (like lifting weights). In this section, we take a thorough look at the exercise regimen best suited for your unique genetic makeup as well as how your genes influence your susceptibility to injury, how quickly you are able to recover after a workout, the impact of exercise on managing Type 2 Diabetes, your pain tolerance, your inherent inclination towards exercise, and your bone health profile.

Pain Tolerance

We all experience pain; it is an emotional and sensory experience in response to intense or damaging stimuli. While we all have the same nerves that signal pain, not everybody experiences the same sensation of pain, even in identical situations. Differences in pain tolerances (how much pain we can take), and pain thresholds (when we begin to feel pain), impact our overall experiences with pain. And of course, our genetics help to modulate our individual responses to pain. Read on to learn what your genes say about how you are likely to experience pain.



Recommendation:
There are no gene-specific recommendations for you as you carry a version of this gene which is commonly found in people having a **higher than typical pain tolerance**.

Why?
According to your test results, you may have an enhanced pain tolerance, meaning that you experience less pain when exercising and thus are likely to be able to exercise harder and longer.

It's in your genes
The COMT gene is involved in pathways that process pain signals.
• You have a version of this gene that is associated with higher pain tolerance, which may make you experience **less pain when exercising**.

Exercise Motivation

Do you have an itch to lace up and go for a run? Or do you just want to lay back with your feet up and read a book? While both of these are great uses of your time, believe it or not, your genetics may actually be influencing your decision to get up and be active... or not. Some individuals actually have a natural inclination to want to exercise, getting more pleasure following exercise and perceiving exercise as requiring less effort. Finding out your natural exercise motivation tendencies allows you to design an exercise plan that will work with, rather than against, your intrinsic motivations. Read on to learn what your genes say about your exercise motivation, and what you can do to make sure you're motivated to get up and get active!

Recommendation:

There are no gene-specific recommendations for you as you have versions of these genes which are associated with having a relatively high motivation to exercise. This means that you may be more likely to exercise regularly.

- Find an activity that you love to further motivate you to exercise.
- Try to get in at least 20-30 minutes per day of **moderate to high intensity cardiovascular exercise** (walking, running, spinning, swimming, etc.), and add in a **resistance training** session (eg. Weights, yoga, bands, etc.) 1-3 times per week .

Why?

According to your genetic test results, you may be more likely have a high motivation to exercise, making it more likely that you will exercise regularly.

It's in your genes

- The BDNF gene produces a protein that works in the brain to influence muscles, blood vessels, and the nervous system, ultimately influencing your response to exercise.
- The LEPR gene produces a protein called the leptin receptor, which is involved in the regulation of body weight and energy balance, and also impacts your motivation to exercise.
  - Your genetic variants may make you **more likely to want to exercise**.

Endurance vs. Power

Endurance activities, including long-distance cycling and running, are activities that require muscles to generate force consistently for long periods of time. Conversely, power activities, including sprinting, jumping and powerlifting, involves generating lots of force quickly. Endurance and power activities rely on a number of factors which are influenced by your genetics, including the dominant types of muscle fibres you possess (fast-twitch vs. slow twitch), as well as your cardiovascular efficiency. So are you more suited to endurance exercises, or are you more of a power athlete? Read on to learn what your genes say about the type of activities you are more likely to be adept at.

Take Action:

Power exercise including high intensity resistance training is recommended as your primary form of exercise. With power exercise, you generate force quickly.

• Examples of power activities include throwing a baseball, kicking a soccer ball, sprinting and jumping. Power exercises include strength training exercises (eg. weights) being done at a faster speed.

Why?

According to your genetic results, you are likely more suited to power exercise, meaning that this type of exercise is likely to give you the greatest fitness benefits. While you may be more suited to power exercises, keep in mind that a balanced exercise program that also includes endurance exercises (walking, jogging, swimming, biking, etc.) can have many beneficial effects on your health.

It's in your genes

• ACE is a gene involved with the regulation of blood pressure and it plays an important role in cardiorespiratory efficiency.

• ACTN3 is a gene involved with the production of a protein that is only found in fast-twitch muscle fibres, the fibres that you use for short bursts of intense activity.

- You have a version of the ACTN3 gene that may give you an **advantage in strength and power-based activities**.

Exercise Recovery

Physical activity, from weight-lifting to running, causes "good damage" to muscle fibers. A period of rest between exercise sessions is recommended for your muscles to keep on burning and to be able to properly strengthen and rebuild. The question is, what is your body's optimal recovery time for cardio and strength training exercises? Everyone is different, and your genetics have a large part to play in post-exercise inflammation and fatigue. Determining how long it takes for your body to recuperate is key to preventing injury and building an exercise regimen that is optimal for you. Read on to learn about what your genes say about how much rest you should be getting following exercise.

Take Action:

- It is essential that you **get adequate rest following exercise**.
- You are also encouraged to **consume omega-3 fatty acids**, either via your diet or by taking a fish oil supplement, to improve exercise recovery.
  - In the '*Specific Nutrient Needs*' section, check your ability to convert plant based omega-3 fatty acids (ALA) to active EPA and DHA before deciding on the best omega-3 sources for you.
- If you take part in vigorous or high intensity exercise (which can induce oxidative stress via free radical production), consider consuming curcumin and/or NAC (N-acetylcysteine) to help clean up free radicals with limited disruption of your oxidant/antioxidant balance.

Why?

According to your test results, you are more likely to experience inflammation and fatigue following exercise.
- Rest and consumption of omega-3 fatty acids can both be used to help reduce inflammation and support adequate muscle recovery.

It's in your genes

- The IL6, IL6-R, CRP, TNFa, and SOD2 genes are all involved in some aspect of your body's immune response and ultimately, the generation of inflammation. Collectively, they help to influence your body's level of muscular fatigue and inflammation following exercise.
  - You have genetic variants that place you in the **highest risk category for muscle damage, fatigue, and inflammation following exercise**.
    - This means that you likely need more time to recuperate before you can train again.
  - You also have a variant in the SOD2 gene which which may be associated with a **decreased natural ability to clean up free radicals produced during high intensity exercise**.

Exercise Benefits for Type 2 Diabetes

Type 2 Diabetes, a disease characterized by high blood sugar and insulin resistance, is a disease largely governed by lifestyle choices. While cures for diabetes are non-existent, it can be treated and controlled to a large extent with lifestyle modifications, including eating well and exercising regularly. While everybody enjoys regular health benefits associated with exercise, some individuals possess genetic variants that may allow them to reap extra benefits from exercise, such as more effectively managing high blood sugar levels associated with Type 2 Diabetes. Read on to discover what your gene say about your ability to manage Type 2 Diabetes with exercise.

Take Action:

Endurance exercise may be used to manage existing type 2 diabetes.

Why?

According to your DNA results, you may have enhanced responsiveness to the beneficial health effects of exercise associated with type 2 diabetes.

• Endurance exercise has been shown to improve overall glucose tolerance in people with this gene variant due to improved pancreatic beta cell function.

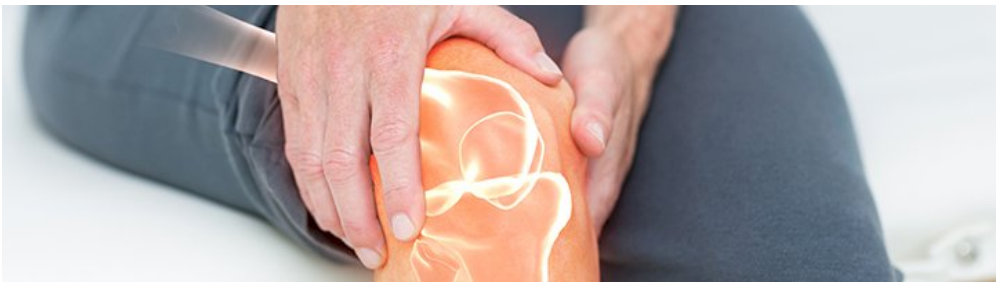
It's in your genes

The PPARG2 gene encodes a receptor expressed in the nucleus of most fat tissue cells. It is involved in the regulation of fatty acid storage and glucose metabolism.

- Studies have shown that for individuals with your version of the gene, **endurance exercise has a greater than normal impact on managing type 2 diabetes**.

Bone Health

Bones are literally the skeleton of our bodies, providing structure and support for our nervous system, blood vessels, organs, and muscles. They are constantly being built up and broken down in a process called remodelling, which is vital to keeping bones strong and healthy. Various types of exercise, including balance training, weight bearing aerobic activity, and strength training, are important to ensure that bone remodelling is occurring properly, and to help prevent major falls which can further damage your bones. In this section, we look at two genes that influence your bone health, which includes your bones' strength (resistance to fracture), mineral density, structure, and quality. Read on to learn about what your genes say about your predisposition to bone loss and how you should exercise to optimize the health of your bones!



Take Action:

In order to protect your bones, Osteoporosis Canada recommends that you participate in an exercise program that incorporates various elements:

• **Strength training** at least 2 days/week using free weights, machines, bands, or body weight for resistance. Two sets of 8-12 repetitions per exercise.
  - Include all major muscle groups: biceps and triceps (arms), deltoids (shoulders), pectoralis major (chest), latissimus dorsi (back), hamstrings, quadriceps, and glutes (major leg muscles), and abdominals (core).
• **Balance training** every day (approximately 15-20 minutes daily), totalling at least 120 minutes/week (eg. tai chi, dancing).
• **Weight bearing aerobic physical activity** most days of the week (walking, dancing, jogging, stair climbing, step aerobics, and running) for 20-30 minutes/day for at least 10 minutes per session.
• **Posture training** every day to strengthen your back muscles.

Why?

According to your DNA test results, you may be more prone to bone loss, meaning that you should be performing some form of exercise daily.

• Exercise is an important step towards preserving your bone health as it helps to protect your spine, slows the rate of bone loss, and builds muscle strength which can prevent falls.

It's in your genes

• The VDR gene provides instructions for making the Vitamin D receptor, a protein which helps to regulate many functions in the body including bone formation.
• The IL6 gene encodes interleukin-6, a protein involved in the generation of inflammation within the body during immune responses. This gene also impacts your bone homeostasis and rate of bone resorption.
  - You have a variant in at least one of these genes which has been associated with being **more prone to bone loss and a higher risk of fracture**.

Injury Risk

While exercise has a multitude of benefits, there is always a risk of injury if not done properly or safely. Thankfully, there are many steps you can take towards preventing injury, including warming up your muscles, stretching before and after exercise, and improving overall strength and flexibility. Based on genetics, not every individual is equally susceptible to injury, with some having a naturally higher risk of exercise-related injury. Are you at increased risk of an exercise-related injury? Read on to learn about what your genes say about your vulnerability to injury and specific steps you can take to protect yourself from getting hurt.

Recommendation:

There are no gene-specific recommendations for you as you carry the typical version of this gene. This means that you are **not likely at increased risk of exercise-induced injury**.

Why?

You have a typical risk for achilles tendon injury and other general injuries related to exercise.

It's in your genes

The COL5A1 gene is involved in the production of a type of fibrillar collagen found in many tissues within your body.

- You have the typical version of this gene which is associated with a **normal risk of exercise-related injury**.

Exercise Preference

As with nutrition, exercise is definitely not one-size-fits-all. Thankfully, there are lots (and lots) of different activities you can do to stay in shape, build muscle, or just feel good. Some may love going for an "easy" fast 10K run, while others may get the same enjoyment from some slow-paced city cycling. Your preference for more or less vigorous activity is partially influenced by your genetics. Are you likely to enjoy some fast-paced spinning, or does a walk around the block do it for you? Read on to learn what your genes say about your innate exercise preference, as well as activities that are best suited to you.

Take Action:

You are likely to be happier with an exercise program that includes lighter activities such as walking, slow cycling, light water aerobics, gentle yoga, and pilates.

Why?

According to your DNA test results, you may have an innate preference for less vigorous intensity activity.

It's in your genes

NOS3 is involved in the production of nitric oxide, which helps your blood vessel walls to relax.

- You carry a version of this gene that results in **decreased production of nitric oxide**. Individuals with this gene version have reported an **increased preference for less vigorous exercise**.

My Results: Brain Health

Mental wellbeing is a key component of overall health, encompassing our emotional, psychological, and social states. The status of our mental wellbeing is affected by our life experiences, family history, socioeconomic condition, and biological factors such as brain chemistry and of course... genetics. Many genes play important roles in influencing various aspects of mental wellness. In this section, we specifically focus on four genes that collectively impact your mood, cognition, stress resilience, emotional states, and risk of substance addiction. Read on for some genetically-tailored recommendations to improve your overall mental wellbeing.

Predisposition to Addiction - Nicotine/Cocaine

Cocaine, a strong recreational stimulant, and nicotine, a stimulant found in cigarettes, are both substances with a high risk of dependence and abuse with regular use. There are several adverse health effects of both smoking cigarettes and cocaine, including altered psychological states, long-term respiratory disease and increased risk of developing cancer. While the best way to avoid addiction is to not start substance use in the first place, your genetics can also be a contributing factor to addiction vulnerability. Read on to learn about what your genes say about your risk of addiction.

Recommendation:

There are no specific recommendations for you based on this gene as you carry a version of the CHRN gene that is associated with being least likely to become addicted to nicotine.

• Of course, you are encouraged to **avoid cigarettes** as they are associated with many health conditions such as lung cancer and COPD.

Why?

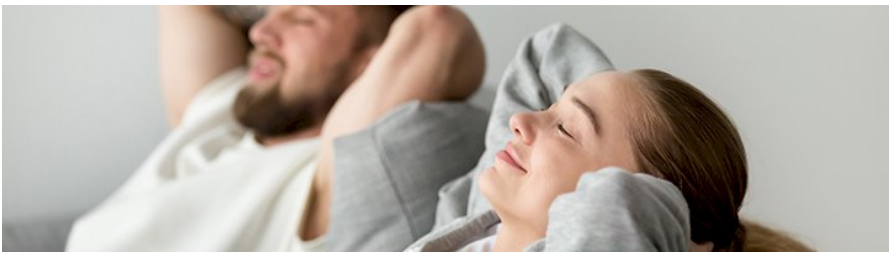
According to your DNA test results, you do not likely have a higher than normal risk of becoming addicted to nicotine or cocaine.

It's in your genes

The CHRN gene encodes the nicotine receptor. You carry the **'typical'** or 'normal' version of this gene which is associated with **low susceptibility to nicotine addiction**.

Mood

Neurotransmitters are the chemical messengers of the nervous system, used to send messages within the brain and all over the body. Many of these neurotransmitters and their signals affect our physiological and psychological states, including our mood, (highly influenced by serotonin levels), stress response (influenced by levels of epinephrine and norepinephrine), and impulse control (affected by dopamine levels). The MAOA gene encodes an enzyme involved in the breakdown of all of these neurotransmitters, and is therefore important in helping to determine our mood balance and stress response. If MAOA levels are too high or too low, it can lead to mood disturbances which can be countered by certain dietary changes to alter MAOA activity. Read on to find out what your genes say about your levels of MAOA, how that might impact your mood balance, and what you can do to optimize your MAOA activity.



Take Action:

Reduce your MAOA activity via the following:

- **Exercise,** which leads to lower MAOA activity in the brain as well as increased norepinephrine and dopamine levels
- **Take natural MAOA inhibitors** including curcumin, quercetin, passion flower and caffeine
  - Note: Quercetin and caffeine also inhibit COMT and may have an effect on your neurotransmitters. Refer to your "*Cognitive Performance and Stress Resilience*" and "*Caffeine*" sections to optimize your caffeine intake and quercetin supplementation.

Why?

According to your DNA test results, you carry a version of the MAOA gene that is associated with higher than normal MAOA activity, meaning that you may have lower levels of the "feel good" brain chemicals serotonin, dopamine, epinephrine, and norepinephrine.

- This can lead to mood disturbances, anger, depression, and sleep disturbances.
- Reducing your MAOA activity may help you maintain a proper neurotransmitter balance and reduce the likelihood of you having issues with stress and mood balance.

It's in your genes

MAOA is an enzyme that breaks down the neurotransmitters serotonin, dopamine, epinephrine and norepinephrine. This function is very important to our mood balance and how we handle stress.

- You have a genetic variant that is associated with an **increase in MAOA activity**, which may cause increased breakdown of these neurotransmitters, leading to imbalances in mood and difficulties coping with stress.

Memory

Your memory refers to your ability to store, retain, and remember information. Although seemingly simple, your memory is an extremely complex psychological processing system, with several working parts involved in encoding and recalling memories. There are also several types of memory, including short-term memory, which helps you recall recent experiences, and long-term memory, which allows you to remember that conversation you had a month, a year, or even a decade ago. Your genetics have a role to play in the strength of your memory consolidation and recall, as well as your attention span. Specifically, we focus on the DRD2 gene, which encodes a protein that regulates the action of dopamine within the brain, which ultimately affects your cognition. Read on to learn what your genes say about your memory and attention and what steps you can take to improving your memory.

Recommendation:

There are no specific recommendations for you based on this gene as your genetic variant is not associated with risk for memory difficulties.

Why?

According to your DNA test results, you have a version of the DRD2 gene that is associated with normal dopamine levels, meaning that you likely have a low risk of dopamine-associated cognitive deficits.

It's in your genes

The DRD2 gene regulates dopamine levels within the brain, which ultimately impacts cognition.

- You have a variant of this gene associated with **normal function**, which likely results in normal levels of dopamine in your brain.

Cognitive Performance and Stress Resilience

Stress is a normal part of everyday life. Regulated by the nervous system, it helps us respond to any form of external or internal stressor, including acute stress, trauma, and more chronic adversity, and can be healthy, even beneficial, in moderate amounts. However, when stress resilience is poor, it can interfere with both physical and mental wellbeing, including our cognitive performance. Our memory and cognition are important programs used by our brain to make decisions and process acquired information. Genetics play a role in altering both our ability to respond to stressful situations and our overall cognitive performance. Read on to find out what your genes say about your cognitive performance and stress resilience, and steps you can take to improve your overall mental performance.

Take Action:

• **Support COMT activity** to enhance your mental health, memory and cognitive function.
- Dopamine precursors (L-tyrosine and L-DOPA) and cofactors (zinc, vitamin B6, folate) promote the production of dopamine to support daily cognitive function and performance on mental tasks.
• Also, consider supplementing with rhodiola, which maintains healthy catecholamine (epinephrine/norepinephrine) activity.

Why?

According to your DNA test results, you may be prone to having lower levels of the neurotransmitters epinephrine, norepinephrine, and dopamine, thereby enhancing your likelihood of being a **"warrior"**.
• You may have a higher pain threshold and better stress resilience despite a modest reduction in executive cognitive performance under most conditions.
• You may also have reduced memory.

It's in your genes

The COMT gene, often referred to as the "warrior/worrier" gene, encodes the COMT enzyme, which metabolizes and detoxifies dopamine, norepinephrine, epinephrine and estrogens.
• You have the **"warrior"** variant of this gene, which is associated with higher COMT activity meaning that more neurotransmitters and estrogen may be metabolized, leaving lower levels in your body.

Alzheimer's Disease Risk

The APOE gene encodes apolipoprotein E, which is essential for the proper transportation of cholesterol, and the growth, maintenance, and repair of neurons in the brain after injury. This protein binds cholesterol to form lipoproteins, which allows for cholesterol to be moved around the body and to be taken to the liver for breakdown. It also binds to LDL receptors to remove cholesterol from the blood. Variations in cholesterol metabolism are associated with many disorders associated with the cardiovascular system, such as heart attacks and strokes. In addition, due to APOE's function in neuronal repair, variations in APOE are implicated in brain health, particularly the risk for late-onset Alzheimer's disease (AD). Studies have shown that approximately 15-20% of Alzheimer cases are attributable to the APOE E4 allele; that the risk of AD increases and age of onset decreases with increasing number of E4 alleles (i.e., carriers of E4/E4 are at greater risk than E3/E4); and that the risk effect on AD decreases as patients age. Variations of the APOE gene affects cholesterol transport and thus accumulation within the blood to influence risk of high cholesterol. Read on to find out what your genes say about your ability to metabolize cholesterol, and use cholesterol for neurological repairs.

Take Action:

• Following the **MIND diet**, which combines the Mediterranean and DASH (Dietary Approaches to Stop Hypertension) diets can help improve brain function. This involves the incorporation of the following foods into your diet: green leafy vegetables, berries, nuts, whole grains, fish and beans.
• Be sure to include **flavonoid-rich foods** (berries, citrus fruits, coffee, cocoa, red wine, tea) to reduce the accumulation of A plaques.
• Maintaining optimal levels of the following will help to maintain cognitive performance: vitamin D, vitamin C, vitamin B12 and lutein.
• The following natural products may be beneficial in **decreasing the negative impacts of A proteins**: curcumin, EGCG (found in green tea) and resveratrol.
• To decrease the risk of late-onset Alzheimer's disease manifestation, it is recommended that you **limit saturated fats and avoid the following**: trans fats, smoking, as well as excess iron and copper.
• Stay active. Participating in at least **30 minutes of physical activity** daily can help in reducing hippocampal deterioration. To decrease the risk of cardiovascular disease as well as late-onset Alzheimer's disease, try to walk and stand when possible and avoid sitting for long periods of time.
• Maintaining your ideal body weight as well as managing diabetes and hypertension are helpful in preventing the progression of Alzheimer's Disease.
• Additional guidelines can be found through the Canadian Institute of Health Research.

Why?

According to your test results, you are in the **high risk** category for insufficient APOE activity, which is associated with a decreased proficiency in binding LDL to form lipoproteins, accumulation of LDL in the bloodstream, and a decreased ability to transport cholesterol to sites of injury. Inside the brain, ApoE plays a role in breaking down amyloid beta (A) plaques, which are involved in the development of late-onset Alzheimer's disease. Due to this, you have a 8-12-fold increased risk of developing cardiovascular disease and neurological disorders such as late-onset Alzheimer Disease.
If you are experiencing symptoms such as memory loss, difficulty speaking or writing, difficulty completing familiar tasks, or trouble with understanding visual images and spatial relationships, it is recommended that you consult a physician.

It's in your genes

The APOE gene functions in the metabolism of cholesterol and the transport of cholesterol to sites of the body which need them for repair such as the brain. There are three common allelic variations of the APOE genes including E2, E3, and E4. The E2 allele is neuroprotective and reduces the levels of brain amyloid beta (A). This variation binds poorly to LDL receptors. The E3 variation is the most common, and expresses higher levels of antioxidative protective proteins. The E4 variation is the second most common variation worldwide and is associated with impaired ability to transport cholesterol effectively and break down amyloid-beta (A) peptides, which are associated with the development of late-onset Alzheimer's disease.
• You have **two copies of ApoE4 (E4/E4)**, which is associated with an **increased risk (8-12 fold) of developing sporadic late-onset Alzheimer's Disease** due to the accumulation of A plaques. It is important to note that increased risk does not guarantee that this disease will manifest. Likewise, the absence of risk alleles does not exclude the possibility of disease. You may also have an increased risk of developing cardiovascular disease, but there are a number of other factors which contribute significantly to such illnesses.

My Results: Detox

Our bodies are constantly exposed to harmful toxins found in the foods we eat, in the air we breathe, and in the by-products of our own internal metabolic processes. Thankfully, our body also has lots of mechanisms in place to dispose of these toxins. In this section, we look at several of your body's detoxification pathways, and ask: how quick and effective are they at removing these toxins? Your genes play a key role in determining the efficiency of your detox pathways, and depending on your genetic variants, there are some minor nutritional and lifestyle adjustments that can make a major difference in helping your body achieve a healthy balance.

Sulfur Removal

Sulfur is an extremely important element in of all of our body's cells, found in the majority of the proteins in our body as a part of the amino acids methionine and cysteine. Sulfur and sulfur-containing amino acids are extensively metabolized within the body, producing a wide variety of compounds including the amino acid homocysteine, which is metabolized into either cysteine or methionine. In this section, we look at a gene involved in that conversion. Individuals with reduced conversion may have too much homocysteine and would be at risk of various health complications. Read on to learn what your genes say about the efficiency of your sulfur metabolism and steps you can take to stabilize your homocysteine levels.

Recommendation:

• **Ensure that you are consuming adequate Vitamin B6** as this is an essential cofactor for this detoxification pathway. Health Canada recommends that adult females consume *1.5 mg* of vitamin B6 daily and adult males consume *1.7 mg* daily.
• Alternatively, you may choose to take a daily vitamin B6 supplement, either on its own or as part of a multi-vitamin/mineral complex.
  - When looking for a product, you may find larger amounts in daily supplements. Health Canada states that the Upper Tolerable Limit for vitamin B6 is *100 mg* per day.

Why?

According to your test results, you are more likely to metabolize sulfur efficiently.
• If your vitamin B6 intake is not adequate, this detoxification pathway may produce by-products which can put you at risk of having higher levels of ammonia and lower levels of glutathione and homocysteine than what is desirable for optimal health.

It's in your genes

• The CBS gene encodes an enzyme that helps with the conversion of homocysteine into cysteine, a key step in the sulfur metabolism pathway.
  - You carry a version of the CBS gene that should function efficiently, meaning that you likely experience optimal sulfur metabolism.

Glutathione Detox

Glutathione (GSH) is an antioxidant produced naturally in your liver and found in every cell in your body. It is also found in fruits, vegetables, and meat. GSH helps your body remove toxins by quenching reactive free radicals, and is involved in repairing and preventing damage to tissues and important cellular components. In this section, we look at genetic variants associated with your ability to remove toxins using GSH.

Take Action:

Be sure to include **cruciferous vegetables** (7g/kg body weight; such as broccoli, cauliflower, kale, brussels sprouts, and arugula) in your diet to support glutathione expression in a variety of tissues.

The following natural products will **support your production of glutathione** and will **increase glutathione transferase enzyme function**: N-acetyl-l-cysteine (NAC), alpha lipoic acid (ALA), glycine, selenium, magnesium, vitamin B6, lipoic acid, whey protein, sulforaphane, curcumin, milk thistle.

Since you may be more susceptible to the negative effects of toxins, it is recommended that you:

- Refrain from smoking;
- Reduce sugar, fat and alcohol consumption;
- Avoid using charcoal or wood for cooking and heating;
- Limit exposure to paint strippers, spray paint, aerosol products, pesticides and fumigants.

In order to reduce the accumulation of toxins in the body, **biannual detoxification support** with your healthcare provided is recommended.

Why?

You may have a **reduced ability to remove toxins from your body using glutathione**, and thus should consume foods and natural products that support your production of glutathione.

- The key ingredients in cruciferous vegetables, sulforaphane and diindolylmethane (DIM), promote both GSTP1 expression and glutathione biosynthesis.

It's in your genes

The GPX1 gene encodes the glutathione peroxidase 1 protein, which is a member of the glutathione peroxidase family. This set of enzymes protect the cell from oxidative damage, by converting reactive oxidative species into hydrogen peroxide.

- You have the typical version of this gene and are thus likely to have **normal GPX1 activity**, which does not put you at an increased risk for oxidative damage.

GSTM1, GSTT1, and GSTP1 are all members of the GST (glutathione-S-transferase) family of enzymes involved in phase II detoxification, which increase the solubility of compounds for excretion from the body. Both the GSTM1 and GSTT1 genes are important in detoxifying common environmental carcinogens found in cigarette smoke, vehicle exhaust as well as fumigants. While a majority of the population carry two copies of every gene, deletions of GSTM1 and GSTT1 are relatively common, resulting in some individuals carrying fewer than two copies of these genes. Another member of the GST family is GSTP1, which plays an important role in cell function and detoxification.

- According to your DNA test results, you have **zero copies of GSTM1** and **zero copies of GSTT1**. Due to this you likely have **no GSTM1 and no GSTT1 activity**. In addition, you are likely to have **normal GSTP1 activity**. Taken together, this may put you at an increased risk of developing:
  - chronic pulmonary obstructive disease (COPD) (3.13-fold; PMID 19664521) and larynx cancer (2.9-fold; PMID 9456238) with exposure to cigarette smoke;
  - chronic kidney disease (1.8-fold; PMID 24216264) with exposure to organopesticides; and
  - certain types of cancer including colon (4.55-fold), rectal (4.60-fold) (PMID 15777499), bladder (1.44-fold; PMID 12117698), oral (1.43-fold, in those of Asian descent; PMID 21436184), and esophageal (1.33-fold in those of Asian descent; PMID 29599931).

Note: there are additional environmental factors that contribute significantly to the development of diseases associated with abnormal GST and GPX enzymes. Work with your healthcare provider to understand your individual risk factors and to overcome these predispositions.

Ability to Remove Chemicals in Smoked and Charred Meats

There's something appealing about a nice, juicy piece of grilled meat. The flame gives it a nice flavour, and a little bit of a char gives it a smokey taste. Unfortunately, when we smoke and grill meats at high temperatures, we also generate toxic chemicals, namely heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs). If these toxins are not cleared from our body quickly enough, they are capable of damaging our DNA, leading to longer term health issues. Our genetics influence how rapidly we are able to clear these toxins from our body, which ultimately determines our risk of health concerns from consuming smoked and charred meats. Read on to learn what your genes say about how your body processes these toxic chemicals and what it means for your meat consumption.

Take Action:

Limit your consumption of charred and smoked meats.

• Dietitians of Canada recommends to *eat less than 500 grams of red meat each week* and to eat little, if any, processed meats such as deli meats, bacon or hot dogs to reduce your risk of cancer.
  - 500 grams of red meat is equivalent to approximately two 8 oz. steaks or four ¼ pound hamburgers.
• Also:
  - Avoid direct exposure of meat to an open flame or a hot metal surface and avoid prolonged cooking times (especially at high temperatures).
  - Continuously turn meat over on a high heat source.
  - Remove charred portions of meat and refrain from using gravy made from meat drippings.

Why?

You may be more likely to experience DNA damage and health issues from toxic compounds such as heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs) that are produced by smoking and grilling meats.
• Reducing your consumption of smoked, charred, and deli meats can help you avoid excess toxic compounds and DNA damage.

It's in your genes

The CYP1A2 gene encodes the CYP1A2 enzyme, a member of the cytochrome P450 family of enzymes involved in metabolism of drugs and other substances, including PAHs and HCAs.
• You have a genetic variant that makes you a **"fast metabolizer"**, which has been shown to be associated with increased risk to toxic compounds found in smoked and grilled meats.

Histamine Removal

Allergic responses are the result of your body's immune system reacting to harmless substances. During an allergic response, specific cells in your body produce and release histamines, molecules that are part of your body's natural defense system and are ultimately responsible for producing common allergy symptoms including itching, sneezing, inflammation, and anaphylaxis. Usually, two enzymes within your body, DAO and HNMT, metabolize histamines quickly, alleviating you of your annoying allergy symptoms. However, specific genetic variants cause underproduction of these enzymes, resulting in excess histamine within your body and ultimately, histamine intolerance, which is characterized by consistent allergic symptoms. Certain foods contain high levels of histamines, and avoidance of these foods can help with the treatment of histamine intolerance. Read on to learn what your genes say about how your body processes histamines and your risk of histamine intolerance.

Take Action:

• **Focus on foods that are** low in histamine, such as fresh meat, fish, fruits (except strawberries and citrus fruits) and vegetables (except tomatoes, spinach, avocado, and eggplant) among others.
• **Limit your consumption of** histamine rich foods**,** histamine releasing foods**, and** diamine oxidase (DAO) blocking foods.
- Remember that with histamine intolerance, the effects of histamine are cumulative so although it may be difficult to completely reduce your consumption of all of the foods listed, it is helpful to consume fewer histamine containing products at once.
- Grilling and frying foods has been found to increase histamine in food, whereas boiling has been found to have no effect, or to even possibly reduce the histamine content of food.
• Many people who have switched to a diet lower in histamines have found that they need to take less antihistamines.
- Several drugs also release histamine or inhibit DAO. Talk to your doctor if you are currently taking any of these medications.

Why?

According to your results, the histamine that is released when you are exposed to environmental allergens may not be broken down effectively, and thus you may be more likely to have a histamine intolerance and experience intense histamine reactions.
• This can be characterized by a variety of health concerns such as headaches, trouble sleeping, digestive distress, anxiety, flushing, congestion, sneezing, difficulty breathing, hives, fatigue, swelling, and chronic urticaria (skin rash with red, raised, itchy bumps).
Avoiding foods that are rich in histamine can help you to manage histamine intolerance and avoid intense reactions.

It's in your genes

The DAO and HNMT genes both encode enzymes responsible for the breakdown of histamine within your body.
• You have genetic variants in the HNMT gene associated with reduced function, meaning that you may have reduced ability to break histamines down effectively following exposure to environmental allergens.

My Results: Obesity Risk

Obesity is a disease characterized by excess body fat that may have negative effects on overall health, including increased risk of Type 2 Diabetes, hypertension, cardiovascular disease, cancer, and depression. While some cases of obesity are caused by poor lifestyle choices, many cases are caused by a complex combination of environmental and genetic elements. An analysis of your diet, lifestyle and DNA can help you recognize risk factors and take steps to put a personalized prevention and treatment strategy in place. In this section, we focus on several factors that impact your obesity risk, and provide recommendations on what you can start to do today to minimize your risk and optimize your health.

Preference for Dietary Fat

There is something tempting about a big plate of french fries, a bar of chocolate, or a handful of almonds; all foods high in dietary fat. Everybody has a different perception of fatty foods, which, in certain quantities, are necessary for our diets in order to absorb certain vitamins. However, It's important to balance fat intake in your diet, as fats are more caloric than either carbohydrates or proteins, and consumption in excess can cause various health complications. In this section, we look at a gene involved in the transport of fat into our cells. Certain variants of this gene are associated with the ability to perceive the taste of fats within food and the enjoyment of eating high-fat foods. Read on to find out what your genes say about your taste sensitivity to and preference for dietary fat, and whether you are at risk of consumption of excess fat.

Recommendation:

There are no gene-specific recommendations for you based on your CD36 gene, as the version of the gene that you carry does not indicate an increased risk of obesity as a result of your preference for dietary fat.

• For your best health, try to **stay within Health Canada's recommended daily fat intake** of *65g/day (30% of your daily caloric intake)*.

Why?

According to your DNA test results, you are more likely to have typical taste sensitivity to (and preference for) dietary fat, which means you likely do not have elevated risk for excess fat consumption and obesity.

It's in your genes

CD36 is involved in fatty acid uptake from the blood into cells and fatty acid metabolism. It also affects your ability to perceive fats within the foods that you are eating.

• You have the typical version of this gene that is associated with **reduced sensitivity to the taste of dietary fat** and may also decrease your preference for consuming fats.

Genetic Risk Score for Obesity

The development of obesity is an incredibly complex process, with environmental factors, lifestyle choices, and genetics all playing a major role. There are many, many genes that have direct and indirect effects on your obesity risk. Here, we analyze 14 genes involved in energy metabolism and obesity susceptibility to determine your unique overall Genetic Risk Score (GRS) for obesity. Your unique combination of variants in these 14 genes is a strong overall genetic predictor of your obesity risk. Read on to see your GRS results, learn about your susceptibility of becoming obese, and get tips on how best to avoid obesity.

Take Action:

- According to your genetic risk score, you may have a high risk of obesity and certain eating patterns will exacerbate this risk.
- To reduce your obesity risk, you are encouraged to reduce your overall caloric intake (including proteins, fats, and carbohydrates), as well as to reduce your consumption of fried food and sugar sweetened beverages.

Why?

Your genetic risk score for obesity puts you in the high risk category.

It's in your genes

- As you possess a relatively large number of genetic risk variants for obesity, your obesity risk is more likely to be impacted by higher intake of calories, protein, fat, carbohydrates, fried food, and sugar sweetened beverages.

Eating Behaviour

Your body has a natural internal clock that regulates many of your conscious choices and unconscious physiological functions throughout the day. Among these many functions, your internal clock can have an impact on both your fat cells and how the timing of food consumption can impact your tendency to gain weight. Based on your genetics, the timing of your meals may have a stronger impact on your risk of gaining weight, as well as your ability to lose and keep off excess weight and fat. Based on your individual tendencies, you may also want to consider a supervised weight loss program. Read on to find out what your genes say about how much the timing of your meals matters, and how your eating schedule can impact your weight.

Recommendation:

There are no gene-specific recommendations for you based on your results for the PLIN1 and PER2 genes, as they don't point towards you being at increased risk of obesity as a result of the timing of your meals.

- You are encouraged to follow a healthy lifestyle including exercise and a balanced diet to prevent you from becoming overweight or obese
- The timing of your lunch is not likely to influence your ability to lose weight.

Why?

According to your DNA test results, you may be less likely to be overweight or obese, and weight loss intervention strategies are more likely to work effectively for you.

It's in your genes

The PLIN1 gene encodes PLIN, a protein that acts as a regulator of lipid storage within your body by coating lipid droplets until they are ready to be broken down.

The PER2 gene, a member of the Period family of genes, encodes the PER2 protein which helps to regulate your daily rhythm of activity, metabolism and behaviour.

- You have versions of these genes that are associated with a **low risk of being overweight or obese as a result of eating patterns**.
- Your weight loss efforts are also likely not negatively affected by the timing of your meals

Regulation of Appetite and Food Intake

Why is it that some people can constantly eat and still be hungry, while others get full on smaller meals? What leads some people to the fruits and veggies, and others to the chips and cookies? Many of our eating habits, including our overall appetite, satiety following eating, snacking patterns, and types of food we choose to eat have a genetic component. Your genes also play a role in determining your risk of obesity and Type 2 Diabetes in response to your eating habits. Knowing your genetic risk of certain diseases as a result of your dietary choices may help you become more aware of the food choices that you are making, as well as help you to alter your diet and routines accordingly. Read on to find out what your genes say about about your eating and what you can do today to reduce your risk of disease.

Recommendation:

There are no specific recommendations for you as the genetic variants you carry in these two genes do not put you at increased risk of obesity.

Why?

According to your DNA test results, you may be less prone to having an increased appetite leading to excess snacking, higher intake of overall calories and dietary fat, and not feeling full after eating.

• You may also be less likely to have poor food choices and uncontrolled eating habits leading to consuming more unhealthy foods.

It's in your genes

The MC4R and FTO genes play an important role in the regulation of appetite and food intake, and can impact your ability to successfully lose weight and keep it off.

• You have the 'typical' or 'normal' versions of both of these genes which are associated with a **'typical'** (i.e. not increased) **risk of obesity**.

My Results: Hormonal Health

Hormones, the body's "chemical messengers", are used to communicate between distant organs and tissues, and help to regulate a variety of functions within the body, including growth and development, metabolism, fertility, and mood. A number of key hormones need to be precisely balanced in order to ensure that your body operates with optimal efficiency. Certain genes involved in hormone synthesis and balance can reveal if you are predisposed to having suboptimal hormone levels, which can be detrimental for your health. In this section, we focus on some key hormones, look at the wide array of physiological functions that they govern, and summarize steps that you can take to ensure that your hormones are in the necessary equilibrium.

Thyroid Health

The thyroid gland, a small butterfly-shaped gland at the base of your throat, is one of the most powerful parts of your body, generating the thyroid hormones that are responsible for regulating most metabolic processes, from appetite and energy to internal temperature. Even minor imbalances in the gland's production of thyroid hormone can have a big influence on your health; and in most cases, fairly minor nutritional and lifestyle adjustments have the power to support your overall thyroid health and work towards restoring hormonal balance. Read on to find out what your genes say about your risk of an overactive or underactive thyroid gland and what steps you can take to mitigate your risks.

Take Action:

• **See your healthcare practitioner about having your thyroid hormone levels tested**.
• As you may be at risk for having an underactive thyroid (hypothyroidism), it is recommended that you take steps to support the health of your thyroid and promote its optimal function:
- **Eat foods rich in iodine**, a mineral used to make thyroid hormone. This includes sea vegetables such as kelp, arame, hiziki, kombu, wakame and dulse flakes that you can sprinkle on to your foods.
- Consider taking a multi-vitamin/mineral including B-vitamins, zinc, and selenium to support the health of your thyroid.

Why?

According to your DNA test results, you may be prone to having higher TSH levels than normal (especially during pregnancy) and underactive thyroid function (hypothyroidism).
• With reduced thyroid function, you may experience symptoms such as poor ability to tolerate cold, a feeling of tiredness, constipation, depression, and weight gain.

It's in your genes

You have gene variants associated with having **higher than normal TSH levels**. TSH regulates thyroid hormone release from the thyroid gland.
• Reduced thyroid function allows for the production of more TSH; thus elevated TSH is a sign of hypothyroidism.

Testosterone

Testosterone is the primary male sex hormone, responsible for libido and secondary sex characteristics, as well as muscle mass and energy levels. Testosterone is also present in women, where it plays a role in the growth, maintenance, and repair of reproductive tissues, as well as in bone mass. The SHBG gene encodes a protein that influences the amount of "free" testosterone. Reduced amounts of free testosterone is associated with reduced libido, sexual dysfunction, infertility, reduced physical strength, weight gain, emotional changes, and changes in sleep patterns. Read on to find out if you are at risk of low testosterone and if so, how this can be remedied.

Take Action:

• **See your healthcare practitioner about having your testosterone levels tested**.
• It is recommended that you take steps to ensure that your levels of testosterone are optimized, as you may be prone to having lower testosterone levels. To boost testosterone levels, it is recommended that you:
- Exercise including high intensity interval training (HIIT) and weight lifting
- Eat a whole foods diet including balanced carbs, proteins, and healthy fats. Undereating or overeating can decrease testosterone levels
- Use stress management techniques such as exercise and deep breathing to reduce your stress levels. Consistently high stress can lower your testosterone
- Try to get as much sleep as possible; 7-10 hours per night is ideal
- Take supplements that have been proven to improve testosterone levels:
- Vitamin D3: *1000 IU* or more daily , as recommended by your health care practitioner.
- Zinc: up to *50mg* daily , or as recommended by your health care practitioner.
- Take herbs that have been proven to improve testosterone levels (including ginger and ashwagandha)
- Engage in a healthy sex life
- Avoid estrogen-like chemicals such as those found in plastics (BPA, phthalates, parabens)
- Limit alcohol and drug use
- Strive for lots of laughter, happiness and success!

Why?

According to your genetic test results, you may be at an increased risk of having lower testosterone levels. Symptoms of low testosterone include:
• Change in sleep patterns
• Reduced sex drive (low libido)
• Sexual dysfunction
• Infertility
• Emotional changes
• Decreased strength
• Weight gain

It's in your genes

The SHBG gene encodes a protein produced in your liver that binds tightly to the hormones dihydrotestosterone (DHT) and testosterone and carries them throughout your blood.
• You have a version of this gene that has been shown to be associated with **lower levels of free circulating, usable testosterone**. This association has been established in studies of men, but may also be applicable to women.

Fertility Report

Conception and pregnancy can be influenced by both female and male fertility factors, including egg and sperm quality and lifestyle disease. In this section, we focus on genetic variations that influence nutritional and environmental factors that impact normal gamete (egg and sperm) production and embryo development. An individually tailored diet and nutrient guide based on genetic risk factors aim to improve fertility and promote a healthy pregnancy.

Diet, Nutrients and Fertility

Understand how specific genetic variations influence the following:

Male

- Risk for deficiency of nutrients that impact male infertility, spermatogenesis, sperm quality, aneuploidy and DNA fragmentation (including nutrients related to methylation, vitamins A, B6, C, D; choline, iron and omega-3)
- Dietary impact of total fat, saturated fat, carbohydrates, and protein on risk for obesity, metabolic disease and diabetes and subsequent effects on sperm count, concentration, and DNA damage
- Predisposition to gluten sensitivity

Female

- Risk for deficiency of nutrients that impact female infertility, egg quality, hormone balance, ovulatory disturbances, pregnancy rate, fetal and maternal health (including nutrients related to methylation, vitamins A, B6, C, D; choline, iron and omega-3)
- Dietary impact of a total fat, saturated fat, carbohydrates, and protein on risk for pre-pregnancy weight gain, insulin resistance, gestational diabetes, and metabolic disease
- Caffeine sensitivity and pregnancy loss
- Predisposition to gluten sensitivity

Fertility Factors

Genetic factors may reduce chances of conception and increase the risk for pregnancy complications. In this section understand how specific genetic variations influence the following:

- Risk for oxidative stress, environmental sensitivity, detoxification, clotting, dysbiosis, high cholesterol and hemochromatosis

My Results: Diet, Nutrients and Fertility

Conception and pregnancy can be influenced by both female and male fertility factors, including egg and sperm quality and lifestyle disease. In this section, we focus on genetic factors that influence requirements for nutrients and vitamins essential for normal gamete (egg and sperm) production and high-quality embryo development. An individually tailored diet and nutrient guide based on genetic risk factors will help to ensure optimal nutrient intake to improve fertility and promote a healthy pregnancy.

Fertility and Total fat

Variations in a number of genes influence one's risk for weight gain and obesity in response to dietary changes. In males, a high-fat diet is associated with hormone dysregulation, increased oxidative stress and inflammation, increased sperm DNA fragmentation, and impaired sperm structure and function. In females, a high-fat diet is associated with anovulation, decreased fertility rates, depletion of the egg reserve, and overall impaired ovarian function due to increased inflammation.

Recommendation:

There are no gene-based recommendations for you as you carry the "typical" version of all genes tested.

It's in your genes

Variations in a number of genes influence one's risk for weight gain and obesity in response to dietary changes. A high-fat diet is associated with hormone dysregulation, increased oxidative stress and inflammation, and increased sperm DNA fragmentation, impaired sperm structure and function. The LIPC gene influences levels of HDL cholesterol. When LIPC is more active, the levels of HDL decline, which is associated with a reduction in LDL clearance and blood vessel protection from atherosclerosis. The TCF7L2 gene is associated with risk for insulin resistance in response to dietary fat intake.

- You carry two 'typical' copies of each gene, which is associated with **normal LIPC and TCF7L2 activity**.

Fertility and Saturated fat

Genetic variations can impact our risk for weight gain, obesity and insulin resistance in response to dietary fat intake and the ratio between unsaturated to saturated fat. In men, saturated fat content in sperm membranes has been shown to be higher in those who are infertile, specifically in those with asthenozoospermia and oligozoospermia. Furthermore, high fat diets are linked to an increase in serum and semen triglyceride levels and metabolic changes, which contribute to testicular oxidative stress and hormonal disruption, impaired sperm motility and function, and male infertility. In women, increased saturated fat is associated with increased oxidative stress in the oocyte environment and has been shown to be associated with fewer viable oocytes retrieved for IVF. A high trans-fat diet is also associated with decreased embryo quality. The ADIPOQ gene encodes the protein adiponectin, which modulates several functions of both somatic and germ cells, such as steroidogenesis, proliferation, apoptosis, and oxidative stress. Specifically, adiponectin plays an important role in controlling steroidogenesis of ovarian granulosa and theca cells, in addition to oocyte maturation and embryo development. Adiponectin receptors are also found in placental and endometrial cells, suggesting that adipokine might play a crucial role in embryo implantation, trophoblast invasion and fetal growth. The TCF7L2 gene encodes a transcription factor that regulates the expression of several genes, thereby influencing a large variety of functions. Individuals with one or two copies of the TCF7L2 'T' variant who consume a high proportion of dietary fat may be more likely to be overweight and experience insulin resistance compared to those with the CC genotypes. Both of these outcomes can have negative implications on fertility due to hormonal imbalances, increased inflammation and oxidative stress causing oocyte damage. The APOA2 gene encodes apolipoprotein A-II, which plays an important role in insulin secretion and influences plasma levels of free fatty acids. Individuals with the APOA2-CC genotype had a stronger correlation between saturated fat intake and BMI, relative to those with the TC or TT genotypes. Overall, higher BMI is a risk factor for infertility.

Recommendation:

According to the genes tested in this section, you carry a combination that is NOT associated with an increased risk of lifestyle-based metabolic diseases related to dietary saturated fats. Thus, there are no gene-specific recommendations for you based on your DNA test results.

It's in your genes

Responses to dietary saturated fats and risk of lifestyle-based metabolic disease are affected by multiple genes and environmental factors. Specifically, genetic variations in the genes TCF7L2, FTO, LTA, TNFA, IL6, ADIPOQ and APOA2 influence response to dietary fat. Consuming a high fat diet is linked with an increase in serum and semen triglyceride levels and metabolic changes, which contribute to testicular oxidative stress and hormonal disruption, impaired sperm motility and function, and male infertility. Furthermore, an increase in saturated fat content in sperm membranes are found in those with asthenozoospermia and oligozoospermia.

- You carry versions of the LTA, TNFa and IL6 genes that together, are **NOT associated with an increased risk** of developing metabolic syndrome with high saturated fat intake.
- You also carry the 'typical' or **'normal' function version of each of the TCF7L2**, **FTO**, **ADIPOQ**, and **APOA2 genes**.

Fertility and Carbohydrate

Genetic variations interact with the dietary intake of carbohydrates and sugars to influence the risk of insulin resistance and type 2 diabetes. In males, excessive carbohydrate intake may result in sustained elevated blood sugar levels, which is linked to altered hormone levels, oxidative damage to sperm, disrupted mitochondria, low sperm count and an increase in sperm DNA fragmentation. Furthermore, an increase in DNA fragmentation is associated with lower implantation rates, decreased embryo quality, and infertility. In females, insulin resistance is associated with an increased risk for anovulation, lower egg quality, delay in embryonic development and recurrent pregnancy loss.

Recommendation:

There are no gene-specific recommendations for you based on your DNA test results.

It's in your genes

Genetic variations interact with the dietary intake of carbohydrates and sugars to influence the risk of insulin resistance and type 2 diabetes. Excessive carbohydrate intake may result in sustained high blood sugar, which is linked to altered hormone levels, oxidative damage to sperm, disrupted mitochondria, low sperm count and an increase in sperm DNA fragmentation. Furthermore, an increase in DNA fragmentation is associated with lower implantation rates, decreased embryo quality, poor semen parameters and infertility. Variants in the TCF7L2 and CRY1 genes are linked to an increased risk of type 2 diabetes and insulin resistance in response to carbohydrate intake.

- You carry **the 'typical' version of both the TCF7L2 and CRY1 genes**, which are NOT associated with an increased risk for insulin resistance or type 2 diabetes.

Fertility and Protein

Protein consumption can aid in moderating eating habits by stabilizing levels of hormones such as ghrelin and leptin and mediating feelings of satiety, thereby aiding in the avoidance of overeating and weight gain. In men, increased weight is associated with lower testosterone levels, poorer sperm quality as well as reduced fertility. In fact, for every excess 9 kg of body weight a man's risk of infertility increases by 10%. In women, both low and high protein diets can slow embryonic growth, and in turn can result in low birth weight and increased risk of preterm labor. Therefore, consuming an optimal quantity of protein is of paramount importance.

Recommendation:

There are no gene-specific recommendations as you carry the "typical" version of the FTO gene.

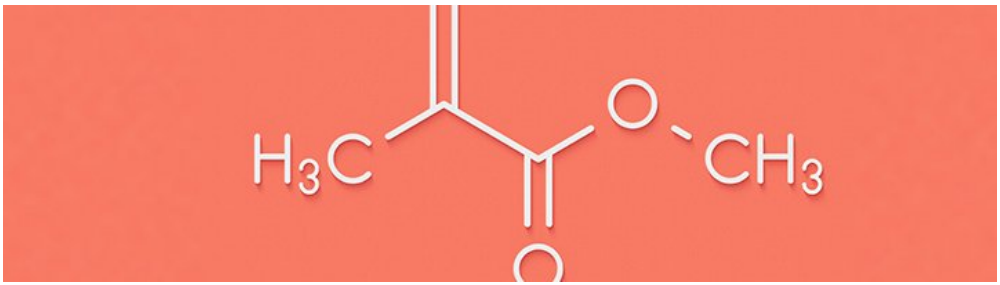
It's in your genes

The FTO gene is important in maintaining levels of leptin and ghrelin, which help to control hunger and satiety. Protein consumption can aid in moderating eating habits and can help to avoid overeating. Increased weight is associated with lower testosterone levels, poorer sperm quality as well as reduced fertility. With every 9 kg a man is overweight, the odds of infertility increase by 10%.

- You carry **two 'typical' copies of the FTO gene**, which is associated with normal levels of leptin and ghrelin. Due to this, you are NOT at an increased risk of overeating.

Fertility and Methylation

The bioactive forms of folate and vitamin B12 are used to reduce homocysteine levels, repair RNA and DNA, maintain the cell membrane and produce energy. Variations in these genes increase risk for low folate levels and high homocysteine. In males, this is associated with decreased sperm count and motility, while consumption of folate and B12 enhance sperm motility and reduce sperm DNA damage in males. In women, low folate levels and high homocysteine is associated with ovulatory disturbances, diminished responses to ovarian stimulation, lower serum estrogen, pregnancy loss and decrease in pregnancy outcome in IVF.



Take Action:

Ensure optimal consumption of antioxidants and vitamin B12, in addition to methylcobalamin, the bioavailable form, as clinically indicated.

It's in your genes

Active folate, L-MTHF, and vitamin B12 are essential for spermatogenesis and normal sperm function. Together, the genes MTHFR, MTRR, MTR and FUT2, ensure proper absorption, transportation, recycling and bioavailability of folate and vitamin B12. The bioactive forms are used to convert homocysteine into S-adenosylmethionine (SAMe). SAMe is an essential amino acid required for RNA and DNA synthesis, cell membrane maintenance and energy production. Variations in these genes increase risk for low folate levels and high homocysteine, which is associated with decreased sperm count and motility, while consumption of these vitamins enhance sperm motility and reduce sperm DNA damage.

• You carry the **'typical' version of the MTHFR gene** and **at least one 'atypical' version of the MTR, MTRR and/or FUT2 genes**, meaning that you are at an **increased risk for vitamin B12 deficiency**. Vitamin B12 deficiency is associated with an increased risk for sperm DNA damage and a reduction in sperm count and motility.

Fertility and Vitamin A

Carotenoids are natural antioxidants that protect cell membrane integrity and provide the essential precursor to vitamin A, which regulates cell proliferation and is essential for gene expression, spermatogenesis, egg maturation and embryonic development. Retinol, the active form of vitamin A, is a key marker for fertility outcomes. Low retinol levels in the follicular fluid is associated with reduced pregnancy rates during IVF in those with endometriosis, and may reduce time to conception. In addition, high beta-carotene levels are seen in patients with hypothyroidism and amenorrhea.

Take Action:

• Reduce consumption of beta-carotene rich foods in those with beta-carotenemia. Increase dietary sources of retinol and consider supplementation in those with deficiency, especially vegans and vegetarians. In addition, an increase in dietary poly-unsaturated fatty acids and protein (40% of total caloric intake), and decrease in gluten consumption has been shown to improve vitamin A stores.
• Labs: beta-carotene, retinol

It's in your genes

Carotenoids are natural antioxidants that protect cell membrane integrity and provide the essential precursor to vitamin A, which regulates cell proliferation and is essential for spermatogenesis. BCMO1 is found within the Leydig and Sertoli cells in the testis. The BCMO1 gene encodes the enzyme Beta-Carotene Monooxygenase, which is a key player in the metabolism of beta-carotene into retinol, the active form of vitamin A. Variations in this gene lead to a reduction in this conversion, and ultimately decreased bioavailability of retinol.
• You carry two 'atypical' copies of this gene, which is associated with a **reduction in BCMO1 activity by 69%**. Thus, you may have reduced retinol levels, which has been shown to be associated with decreased sperm count.

Fertility and Vitamin B6

Vitamin B6 is important for carbohydrate and amino acid metabolism, estrogen and progesterone homeostasis, libido, cervical mucus production, reducing toxic homocysteine levels and the production of neurotransmitters. Vitamin B6 can be found in the seminal fluid, acting to reduce oxidative damage, lower homocysteine levels, and enhance hormone production. Low levels of seminal vitamin B6 are found in men with poor sperm motility.

Take Action:

Consider vitamin B6 supplementation, especially if you are using medications that increase risk for vitamin B6 deficiency, including anti-seizure medication (dilantin, valproic acid), gabapentin, minocycline, thyroid medication, or corticosteroids.
Lab: plasma pyridoxal 5-phosphate (PLP)

It's in your genes

The NBPF3 gene (Neuroblastoma Breakpoint Member 3) is closely linked to the alkaline phosphatase (ALPL) gene, which produces the main enzyme in the liver that is responsible for clearance of vitamin B6. Vitamin B6 is found in the seminal fluid, acting to reduce oxidative damage, lower homocysteine and enhance hormone production. Low levels of seminal vitamin B6 are found in men with poor sperm motility.

- You carry **two 'atypical' copies of the NBPF3 gene**, which is associated with **2.90 ng/mL lower vitamin B6 levels**. Lower plasma vitamin B6 levels are found to be associated with an increased risk for reduced sperm motility.

Fertility and Vitamin C

Vitamin C is an important antioxidant that protects cells from damage, improves blood flow, and immunity. In men, vitamin C is found in high concentrations within the seminal fluid. In women, higher intakes of vitamin C are linked to an increase in mature eggs and IVF fertilization rates as well as a reduction in placental oxidative stress under low oxygen levels. In addition, vitamin C is necessary for maintenance of collagen and is important in the placental membrane. Serum levels of vitamin C are modulated by the sodium-dependent vitamin C transporter 1 proteins (SVCT1 and SVCT2) which work to absorb and distribute vitamin C to the body's organs.

Take Action:

Ensure optimal levels of vitamin C. In men with low sperm count, vitamin C supplementation for 2-months improved sperm count, motility, and morphology.

To improve vitamin C recycling and **levels,** consider increasing antioxidants with natural products and supplements such as NAC, vitamin E, CoQ10, resveratrol and melatonin, as clinically indicated.

It's in your genes

The GSTT1 and SLC23A1 genes are associated with serum levels of vitamin C, which is an important antioxidant that protects cells from damage, improves blood flow and is found in high concentrations within the seminal fluid. The SLC23A1 gene encodes an ascorbate transporter (SVCT1), which works with SCVT2 to maintain regular circulation and absorption of vitamin C levels throughout the body. The GSTT1 gene is involved in detoxification and combating oxidative stress which modifies the serum ascorbic acid response to dietary vitamin C levels.

- You carry **two 'typical' copies of SLC23A1** which is associated with normal function; and **zero copies of GSTT1**, which is associated with a **3.20-fold increased risk of vitamin C deficiency and a reduced ability to combat oxidative stress**.
- A reduction in the circulation of vitamin C is associated with an increased risk for spermatic DNA fragmentation and a reduction in sperm count, motility, and morphology.

Fertility and Vitamin D

Vitamin D is important for calcium homeostasis, bone health, immunity, hormone balance and embryo implantation. In females, sufficient levels of vitamin D are linked to improved success in IVF and reduced risk of endometriosis, while deficiency is associated with lower birth weight, low immunity, respiratory tract infections, and asthma in the baby, and risk for maternal pre eclampsia, gestational diabetes mellitus, cesarean section, preterm delivery and postpartum depression. Vitamin D deficiency also negatively impacts insulin resistance in women with PCOS and increases risk for pregnancy loss. In males, the vitamin D receptor (VDR) and the enzymes that metabolize vitamin D are found in the Sertoli and Leydig cells, spermatozoa, and in the cells lining the male reproductive tract, where they influence local vitamin D levels and male fertility. Low vitamin D status in males is associated with impaired semen quality, lower sperm production and motility, and lower levels of inhibin B, a marker for spermatogenesis.

Take Action:

Ensure optimal serum vitamin D. Levels between **75-125nmol/L** has been shown to be associated with improved sperm concentration, acrosome reaction, progressive movement, motility and morphology. Recommended dosing of up to **10,000IU per day** may be required to reach optimal levels according to multiple at-risk genetic variants.

It's in your genes

The **vitamin D receptor (VDR)** and the enzymes that metabolize vitamin D are found in the Sertoli and Leydig cells, spermatozoa and in the cells lining the male reproductive tract, influencing local vitamin D levels and male fertility. The **CYP2R1 gene produces vitamin D hydroxylase**, an enzyme that converts vitamin D to its active form, 25-hydroxyvitamin D, in the liver, while the **GC gene** produces a protein that helps maintain vitamin D levels within the blood. Low vitamin D status in men is associated with impaired semen quality, lower sperm production and motility and lower levels of inhibin B, a marker for spermatogenesis.
The CYP2R1, GC and VDR genes are responsible for vitamin D metabolism, transport and vitamin D receptor function, respectively, and in combination,modifies risk for vitamin D deficiency and response to vitamin D supplementation. Vitamin D deficiency is associated with reduced sperm motility and disruption in sperm morphology.

- You carry **atypical versions of the GC and/or CYP2R1 genes**, which are associated with an **increased risk of vitamin D deficiency**.
- You carry a **typical version of VDR**, which is associated with a **decreased risk of low bone mineral density**.

Fertility and Choline

Choline is a key component of cell membranes, cholinergic neurotransmission, and fat transport. In females, choline is critical during fetal brain development, impacting memory and cognitive function and in males, is critical for sperm motility and is found in high concentrations within the sperm membrane. Those with low estrogen are at an increased risk for choline deficiency as estrogen acts to upregulate the gene that encodes the enzyme to endogenously produce phosphatidylcholine.

Recommendation:

Since you carry **'normal' function versions** of the genes tested here related to choline, there are no gene-specific recommendations for you based on your DNA test results.

It's in your genes

The PEMT gene encodes the PEMT enzyme, which is responsible for the production of phosphatidylcholine from choline. The FADS1 gene encodes the enzyme delta 5 desaturase which plays a role in the metabolism of polyunsaturated fatty acids (PUFAs), found alongside phosphatidylcholine within our cell membranes. Genetic variations in PEMT and FADS1 impact the risk for choline deficiency. Choline is a key component of cell membranes, cholinergic neurotransmission, fat transport and is found in high concentrations within the sperm membrane and is critical for motility. Expression of the PEMT gene is stimulated by estrogen, therefore men are at an increased risk for choline deficiency with low dietary intake. Choline deficiency can lead to decreased sperm motility, male infertility, non-alcoholic fatty liver disease, and metabolic syndrome.

• According to your test results, you have the 'typical' or 'normal' function versions of the FADS1 and PEMT genes, and you are therefore **NOT at increased risk for choline deficiency**.

Fertility and Omega 3

In males, long chain polyunsaturated fatty acids (LC-PUFAs) are found within the sperm membrane where they influence membrane fluidity, flexibility, and receptor function, and ensures higher sperm motility. Higher levels of LC-PUFAs are associated with normal spermatic concentrations and motility, whereas lower levels are seen in those with oligozoospermia, asthenozoospermia, and oligoasthenozoospermia (OAT). In females, LC-PUFAs are important for the regulation of inflammation, clotting, cell proliferation, folliculogenesis and membrane function within the oocyte, and are imperative for fetal brain development. In response to low omega-3 fatty acid levels, interleukin 6 (a protein involved in the generation of inflammation within the body during immune responses) levels change thereby increasing risk of certain metabolism-related disorders, specifically obesity and metabolic syndrome. In males, low levels of LC-PUFAs, metabolic syndrome and obesity are associated with decreased sperm count, quality and motility.

Take Action:

You are encouraged to **increase dietary omega-3 fatty acids** (either from plant- or animal-based dietary sources) to reduce your risk of metabolic syndrome - consume the equivalent of 3g of fish oil per day that contains 540 mg of EPA and 360 mg of DHA.
Lab: Omega-3 panel

It's in your genes

The FADS2 gene encodes the enzyme fatty acid delta-6 desaturase, which is responsible for the conversion of alpha-linolenic acid (ALA) into long-chain polyunsaturated fatty acids (LC-PUFAs), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These LC-PUFAs are found within the sperm membrane, influencing membrane fluidity, flexibility, and receptor function, and assures higher sperm motility. Higher levels of LC-PUFAs are associated with normal spermatic concentrations and motility, whereas lower levels are seen in those with oligozoospermia, asthenozoospermia, and oligoasthenozoospermia (OAT). The IL6 gene encodes interleukin-6, a protein involved in the generation of inflammation within the body during immune responses. Variants in IL-6 are also associated with increased risk of certain metabolism-related disorders, specifically obesity and metabolic syndrome, in response to omega-3 fatty acid intake. Low EPA levels, metabolic syndrome and obesity are associated with decreased sperm count, quality and motility.
Variations in the FADS2 gene decrease the conversion of ALA to EPA, while variations in the IL-6 gene are associated with increased risk metabolic syndrome and obesity with low omega 3-intake.

- You carry **two 'typical' copies of the FADS2 gene** and an **'atypical' verion of IL6**, which is associated with **increased risk of metabolic syndrome and obesity** with low omega-3 intake, which may lead to reduced sperm count and motility.

Fertility and Iron

Iron deficiency has been shown to be associated with various fertility complications. In males, insufficient serum iron leads to low oxygen levels in the testes and a reduction in spermatogenesis. In females, low iron levels are associated with an increased risk of anovulation, pregnancy loss, premature birth, low birth weight, and postpartum depression. Thus, understanding your specific risk profile for iron, and following your practitioner's dietary/supplement recommendations, can go a long way towards minimizing risk.

Take Action:

• Health Canada recommends that adult males over 50 should consume 8mg of iron daily.
• Increase iron rich foods. If you are unable to meet this iron level via your diet, consider taking a heme-based iron or iron bisglycinate supplement along with vitamin C for enhanced absorption.

It's in your genes

There are several genes responsible for regulating and maintaining balanced absorption and transportation of iron serum levels throughout the body. The TF gene encodes the protein transferrin; The TFR2 gene encodes for transferrin receptor 2 protein; and the TMPRSS6 gene encodes the protein matriptase-2 which controls levels of hepcidin. Together, these three genes are responsible for maintaining iron homeostasis. Individuals with variants of these genes may experience increased risk of iron deficiency, which is linked to low oxygen levels in the testes and a reduction in spermatogenesis.

• You carry an 'atypical' version of at least two of these three genes which may put you at an **increased risk of iron deficiency**. A reduction in the circulation of iron to tissue is linked to low oxygen levels in the testes and a reduction in spermatogenesis.

Fertility and Gluten

Celiac disease is an autoimmune disorder that affects the small intestine where the villi gets damaged from the immune response to gluten. In women, celiac disease causes an increase in malabsorption and incidence of reproductive changes have been reported, including delayed onset of menarche, amenorrhea, recurrent miscarriage, reduced rates of pregnancy, premature delivery, low birth weight, and abnormal placental function. In men, celiac disease is associated with androgen resistance, abnormal sperm morphology and motility and infertility in males. In addition, carriers of celiac disease may pass on these genes to their offspring. Undiagnosed celiac disease and non-celiac gluten sensitivity may increase risk for fertility issues.

Take Action:

- Consider seeing your health care practitioner about being tested for celiac disease and gluten sensitivity.
- Also consider removing gluten from your diet to see if you experience any health improvements.

It's in your genes

Human leukocyte antigen (HLA) genes are related to a complex of proteins, which are encoded by the major histocompatibility complex (MHC) genes in humans. These genes are responsible for immune system regulation. Variations in these genes are associated with risk for celiac disease and non-celiac gluten sensitivity. Celiac is an autoimmune disorder in which gluten causes damage to the villi in the small intestines. Celiac disease is associated with androgen resistance, abnormal sperm morphology and motility and infertility in males. In addition, carriers of celiac disease may pass on these genes to their offspring.

- According to your test results, your HLA genotype indicates you have a **very low risk of celiac disease**.

My Results: Fertility Factors

In this section, we focus on how certain genetic risk factors related to oxidative stress, environmental sensitivity, detox, clotting, dysbiosis, and genetic based diseases (hemochromatosis) may reduce your chances of conceiving and increase the risk for pregnancy complications. Consuming the right supplements, nutrients and making healthy lifestyle choices that are right for you can help to minimize such impacts and improve your overall fertility.

Clotting factors - carrier status

Factor V Leiden is an inherited gene mutation that is associated with abnormal formation of blood clots, called thrombophilia. The F5 gene encodes coagulation factor V, which is a key player in clotting blood through interactions with clotting factor X. Variations in this gene lead to an increased risk of blood clotting.

Recommendation:
There are no gene-specific recommendations for you as you are not at an increased risk of blood clotting based on your DNA test results.

It's in your genes
Factor V Leiden is an inherited gene mutation that is associated with abnormal formation of blood clots, called thrombophilia. The F5 gene encodes coagulation factor V, which is a key player in clotting blood through interactions with clotting factor X. Variations in this gene lead to an increased risk of blood clotting.
• You do not carry the factor V Leiden mutation, and are thus **NOT at increased risk for blood clots**.

Hemochromatosis - carrier status

Hereditary hemochromatosis is an autosomal recessive disorder that results from a variation in the hemochromatosis gene (HFE), and can increase risk of iron overload. Iron overload is associated with iron deposits in the pituitary gland and gonads, and increased risk of oxidative stress and sperm DNA damage. The HFE gene encodes the homeostatic iron regulator, which plays a role in regulating iron levels. A variation in this gene can lead to an increased risk of hemochromatosis (iron overload).

Recommendation:

There are no gene-specific recommendations for you as you carry the 'typical' version of the HFE gene according to your DNA test results.

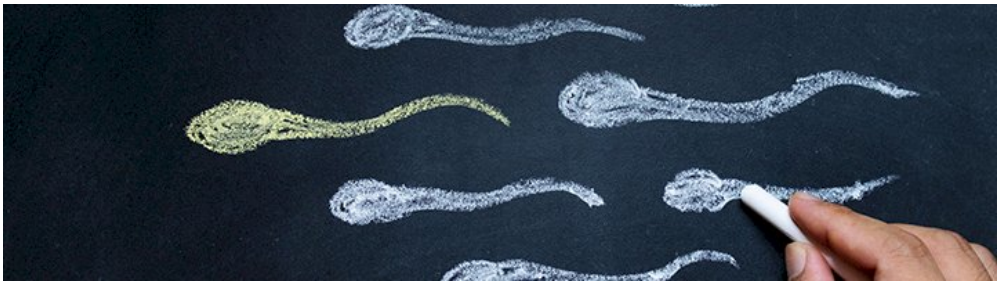
It's in your genes

Hereditary hemochromatosis is an autosomal recessive disorder that results from a variation in the hemochromatosis gene (HFE), and can increase risk of iron overload. The HFE gene encodes the homeostatic iron regulator, which is responsible for regulating iron levels in the body. A variation in this gene can lead to an increased risk of hemochromatosis (iron overload). Iron overload is associated with iron deposits in the pituitary gland and gonads, and increased risk of oxidative stress and sperm DNA damage.

- You carry **two 'typical' copies of the HFE gene**, and thus you are not at increased risk of iron overload.

Male infertility (NOS3)

Nitric oxide (NO) is an important antioxidant and mediator of oxidative stress in the testis and seminal fluid. Excess levels of oxidative stress may result in DNA damage. Levels of NO are mediated by the endothelial NOS synthase (NOS3) enzyme. Variations in the NOS3 gene alter NOS3 function and lower NO levels, which is associated with an increase in oxidative stress, interfering with sperm motility, morphology and egg penetrance.



Take Action:

Consider ways to improve nitric oxide production, including L-arginine, L-citrulline and pycnogenol (pine bark extract).

It's in your genes

The main source of nitric oxide (NO) in testicular tissue and spermatozoa is from the endothelial NOS synthase (NOS3) enzyme, which is encoded by the NOS3 gene. NO is an important antioxidant and mediator of oxidative stress in the testis and seminal fluid. Excess levels of oxidative stress may result in DNA damage. Variations in the NOS3 gene alter NOS3 function and lower NO levels, which is associated with an increase in oxidative stress, and can interfere with sperm motility, morphology and egg penetrance.

- You carry **two 'atypical' copies of the NOS3 gene**, which is more common in men with idiopathic oligoasthenozoospermia (OAT) and is associated with lower nitric oxide (NO) levels, and a **6-fold increased risk for oxidative stress damage, DNA fragmentation and male infertility (OR=3.62)**.

Environmental sensitivity (CYP1A2, CYP1A1)

The male reproductive system is sensitive to environmental pollutants, including polycyclic aromatic hydrocarbons (PAH). PAHs are widespread pollutants commonly found in air, food, and drinking water. PAHs create reactive oxygen species (ROS) and bind directly to and damage DNA, reducing meiotic division during spermatogenesis. Men who smoke, or are exposed to PAHs are found to have reduced sperm count and motility and alterations in morphology.

Take Action:

Identify and reduce specific sources of PAH exposure, including smoking; foods, such breads and cereals, grains, and smoke-cured or barbequed meats; air pollution, such as near industrial or high automotive traffic areas; solid fuel burning cook stoves; and diesel exhaust.
Consider broccoli sprouts, sulforaphane and resveratrol to protect sperm from PAH induced DNA damage.

It's in your genes

The male reproductive system is sensitive to environmental pollutants, including polycyclic aromatic hydrocarbons (PAH). PAHs are wide-spread pollutants commonly found in air, food, and drinking water. CYP1A1 and CYP1A2 play a role in the metabolism PAHs. Genetic variation in these genes influence susceptibility to the adverse effects of PAHs. PAHs create reactive oxygen species (ROS) and bind directly to and damage DNA, reducing meiotic division during spermatogenesis. Men who smoke, or are exposed to PAHs are found to have reduced sperm count and motility and alterations in morphology. According to studies, the AG genotype of the CYP1A1 gene is associated with highest risk to male infertility.

- You carry the **AG genotype of the CYP1A1 gene** and the **'atypical' version of the CYP1A2 gene**. Together, this is associated with increased enzyme activity and may lead to a **7-fold increase in risk of environmental sensitivity** to PAHs and oxidative stress and DNA damage, with smoking and exposure. Due to this, you are at risk of having low sperm count and mobility.

Male infertility (glutathione)

The glutathione system, which includes glutathione, and the glutathione-based enzymes glutathione-S-transferase and glutathione peroxidase, is one of the main chemical defence mechanisms in semen that protect spermatozoa cells and DNA from oxidative injury. Oxidative stress is a common cause in male infertility. Studies show that the intracellular glutathione system in spermatozoa is lower in those with infertility. Glutathione is especially important to the survival of sperm and proper chromatin condensation during meiosis.

Take Action:

Be sure to include cruciferous vegetables (7g/kg body weight) (such as broccoli, cauliflower, kale, brussels sprouts, and arugula) in your diet to support glutathione expression in a variety of tissues.
The following natural products will support your production of glutathione and will increase glutathione transferase enzyme function: N-acetyl-l-cysteine (NAC), alpha lipoic acid (ALA), glycine, selenium, magnesium, vitamin B6, whey protein, sulforaphane, milk thistle.
As you may be more susceptible to the negative effects of toxins, it is recommended that you:
• Refrain from smoking;
• Reduce sugar, fat and alcohol consumption;
• Avoid using charcoal or wood for cooking and heating;
• Limit exposure to paint strippers, spray paint, aerosol products, pesticides and fumigants.
For more information on these chemicals and how to avoid them, click HERE.

It's in your genes

The glutathione system, which includes glutathione, and the glutathione-based enzymes (glutathione-S-transferase and glutathione peroxidase), is one of the main chemical defence mechanisms in semen that protect spermatozoa cells and DNA from oxidative injury. Oxidative stress is a common cause in male infertility. Studies have shown that intracellular glutathione activity in spermatozoa is reduced in those with infertility. Glutathione is especially important to the survival of sperm and proper chromatin condensation during meiosis.
While a majority of the population carry two copies of every gene, deletions of GSTM1 and GSTT1 are relatively common, resulting in some individuals carrying fewer than two copies of these genes.
• According to your DNA test results, you have **0 copies of the GSTM1 gene**, **0 copies of the GSTT1 gene**, and the 'typical' or **'normal' function version of the GSTP1 gene**. Together, this puts you at a **high risk for low glutathione levels and DNA damage**. This genotype is also associated with a **2.99-fold increased risk of infertility** compared to those with the 'typical' versions of all three genes.

Report summary

LoveMyHealth™ analyzes the following 127 genetic markers within 96 genes. These genes were selected based on their clinically relevant impact on the body's various metabolic pathways, including the absorption and metabolism of nutrients, detoxifying mechanisms, the functioning of muscles, and others. Also, their association as risk factors, such as for vitamin deficiencies, obesity and other metabolic diseases, have been well established. **NOTE:** Your overall health is influenced not only by these factors, but also by additional genetic and non-genetic (environmental, diet, etc.) factors; thus, carrying a risk variant associated with a certain deficiency does not necessarily mean that you will experience that deficiency, especially if you are already following a healthy diet and lifestyle. The recommendations provided in this report may be especially helpful if you are experiencing certain symptoms or looking to optimize your health through informed lifestyle choices.

Diet and Heart Health

Carbohydrate Consumption

Genes (SNPS)	Typical	Atypical	Your Results
TCF7L2 (rs12255372)	G	T	GG
CRY1 (rs2287161)	G	C	GG

Action Plan:
Typical version of genes associated with Type 2 Diabetes risk and carbohydrate intake.

Follow guidelines outlined in your report for carbohydrate intake and consume whole grains instead of refined, white carbohydrates.

Fat Consumption

Genes (SNPS)	Typical	Atypical	Your Results
FADS1 (rs174537)	T	G	GG
LIPC (rs1800588)	C	T	CC
TNFa (rs1800629)	A	G	GG
IL6 (rs1800797)	A	G	GG
ADIPOQ (rs266729)	G	C	GG
LEPR (rs3790433)	A	G	GG
APOA2 (rs5082)	T	C	TT

Action Plan:
Increased risk of certain adverse health conditions when you consume higher amounts of saturated fat and insufficient omega-3 fatty acids.

Reduce saturated fat intake and consume adequate omega-3 fatty acids.

Eating for Heart Health

Genes (SNPS)	Typical	Atypical	Your Results
LPL (rs328)	G	C	CG
MLXIPL (rs3812316)	G	C	CC
CLOCK (rs4580704)	G	C	CC

Action Plan:
Increased risk of elevated triglycerides and reduced risk of Type 2 Diabetes and cardiovascular disease when you follow a low fat diet.

See your healthcare practitioner about testing your blood-sugar levels. Consider the mediterranean diet or a low fat diet for heart disease prevention.

Risk for Heart Disease

Genes (SNPS)	Typical	Atypical	Your Results
9p21 (rs10757274)	A	G	AA
9p21 (rs10757278)	A	G	AA

Action Plan: You do not carry the genetic variants in 9p21 that are associated with cardiovascular disease and thus have a reduced risk of developing coronary heart disease. There are no gene-specific recommendations for you based on your test results.

Sensitivities

Lactose

Genes (SNPS)	Typical	Atypical	Your Results
MCM6 (rs4988235)	A	G	GG

Action Plan:
Version of gene associated with reduced lactase production, resulting in higher risk for lactose intolerance.

See your healthcare practitioner about being tested for lactose intolerance. Also reduce or eliminate dairy products from diet to improve gastrointestinal health. Ensure calcium is consumed through other food sources.

Gluten

Genes (SNPS)	Typical	Atypical	Your Results
HLA (rs2395182)	G	T	TT
HLA (rs7454108)	T	C	TT
HLA (rs7775228)	A	G	AG
HLA (rs4713586)	G	A	AG
HLA (rs2187668)	G	A	GG
HLA (rs4639334)	G	A	GG

Action Plan:
Versions of human leukocyte antigen (HLA) genes resulting in very low risk of gluten sensitivity.

Consider being tested for gluten sensitivity and removing gluten from diet to see if health improves.

Caffeine

Genes (SNPS)	Typical	Atypical	Your Results
CYP1A2 (rs762551)	A	C	AA

Action Plan:
You have a version of this gene that is associated with being a fast caffeine metabolizer.

Keep consumption of caffeine to less than 400mg daily (three 8-ounce cups of regular coffee).

Alcohol

Genes (SNPS)	Typical	Atypical	Your Results
ADH1B (rs1229984)	T	C	TT
ALDH2 (rs671)	C	T	CC
ADH1C (rs698)	A	G	AA

Action Plan:
Typical versions of genes involved in alcohol metabolism. No risk of alcohol flush and reduced risk of alcohol use disorders.

Follow guidelines outlined in your report for healthy alcohol consumption.

Sodium

Genes (SNPS)	Typical	Atypical	Your Results
ACE (rs4343)	C	T	CC

Action Plan:
Version of gene associated with reduced sensitivity to salt. Lower risk of blood pressure increases when sodium intake is high.

There are no gene-specific recommendations based on your test results. Follow guidelines outlined in your report for sodium intake to ensure best health.

Specific Nutrient Needs

Vitamin A

Genes (SNPS)	Typical	Atypical	Your Results
BCMO1 (rs11645428)	A	G	GG
BCMO1 (rs12934922)	A	T	TT
BCMO1 (rs7501331)	G	A	AG

Action Plan:
Version of gene associated with reduced conversion of beta carotene into vitamin A.

Follow recommendation outlined in your report for daily vitamin A intake from animal sources or through daily supplements. Plant sources rich in beta carotene may be inadequate to meet nutritional needs.

Vitamin B12, Folic Acid, Vitamin B2

Genes (SNPS)	Typical	Atypical	Your Results
MTHFR (rs1801131)	A	C	AA
MTHFR (rs1801133)	G	A	GG
MTRR (rs1801394)	T	C	TT
MTR (rs1805087)	A	G	AA
COMT (rs4680)	C	T	CC
FUT2 (rs602662)	T	C	CC

Action Plan:
Typical version of genes associated with normal vitamin conversion and use for conversion of homocysteine to methionine. Version of gene associated with risk of decreased vitamin B12 absorption.

See your healthcare practitioner to test your vitamin B12 levels. Consider taking daily vitamin B12 supplements and follow recommendations for daily intake of methylfolate, outlined in your report.

Specific Nutrient Needs

Vitamin C

Genes (SNPS)	Typical	Atypical	Your Results
GSTT1 (rs2266633)	C	0	0

Action Plan:
You have the version of a gene associated with a reduction in glutathione detoxification through GSTT1. This can result in an increase need for antioxidants, lower levels of serum vitamin C and is associated with risk for vitamin C deficiency.

Consume your recommended daily intake of vitamin C, according to guidelines outlined in your report. Consider taking a vitamin C supplement daily to prevent deficiency.

Vitamin D & Calcium

Genes (SNPS)	Typical	Atypical	Your Results
CYP2R1 (rs10741657)	A	G	GG
VDR (rs1544410)	C	T	CC
CYP2R1 (rs2060793)	C	T	CC
GC (rs2282679)	A	C	CC
GC (rs7041)	G	T	TT

Action Plan:
You have the version of genes associated with risk of vitamin D deficiency and proper maintenance of bone mineral density.

Supplement with cholecalciferol vitamin D daily. See your healthcare practitioner to test your serum vitamin D levels. For your best health, meet the daily calcium intake recommendations outlined in your report.

Vitamin E

Genes (SNPS)	Typical	Atypical	Your Results
F5 (rs6025)	C	T	CC

Action Plan:
You have the typical version of the gene associated with normal risk for blood clotting disorders.

No gene-specific recommendations for you based on your test results. For your best health, follow guidelines outlined in your report for daily vitamin E intake.

Iron

Genes (SNPS)	Typical	Atypical	Your Results
HFE (rs1799945)	C	G	CC
HFE (rs1800562)	C	T	CC
TF (rs3811647)	G	A	GG
TMPRSS6 (rs4820268)	A	G	GG
TFR2 (rs7385804)	A	C	CA

Action Plan:
Typical version of gene leading to normal risk of iron overload (hemochromatosis). Atypical version of gene/s, resulting in higher risk for iron deficiency anemia.

Consume enough iron in diet by following guidelines outlined in your report. If unable to meet requirements by diet, consider taking an iron supplement and Vitamin C for enhanced absorption.

Antioxidants

Genes (SNPS)	Typical	Atypical	Your Results
SOD2 (rs4880)	C	T	TT

Action Plan:
Version of gene associated with lower enzyme activity, leading to increased risk of oxidative stress and cellular damage.

Increase antioxidant intake through diet or with the help of supplements.

Omega-3 Fatty Acids

Genes (SNPS)	Typical	Atypical	Your Results
FADS2 (rs1535)	T	C	TT
IL6 (rs1800795)	C	G	GG
IL6 (rs1800797)	A	G	GG

Action Plan:
Typical version of genes leading to efficient conversion of dietary ALA into EPA/DHA. Version of gene resulting in increased risk of obesity and metabolic syndrome when omega-3 fatty acid intake is low.

Consume enough omega-3 fatty acids in diet through either plant- or animal-based sources to meet daily requirements outlined in your report. Fish oil or flaxseed oil supplements may help meet daily needs.

Choline

Genes (SNPS)	Typical	Atypical	Your Results
FADS1 (rs174548)	G	C	GG
PEMT (rs7946)	G	A	GG

Action Plan:
Typical versions of genes leading to normal phosphatidylcholine levels.

Follow recommendations outlined in your report for daily choline intake.

Specific Nutrient Needs

Probiotics

Genes (SNPS)	Typical	Atypical	Your Results
FUT2 (rs602662)	C	T	CC

Action Plan:
Typical version of gene associated with normal concentrations of Bifidobacterium.

There are no gene-specific recommendations for you based on your test results.

Physical Fitness

Pain Tolerance

Genes (SNPS)	Typical	Atypical	Your Results
COMT (rs4680)	C	T	CC

Action Plan:
You have a version of the gene associated with higher pain tolerance. You are likely to experience less pain when exercising.

No gene-specific recommendations for you based on your test results.

Endurance vs. Power

Genes (SNPS)	Typical	Atypical	Your Results
ACTN3 (rs1815739)	C	T	CT
ACE (rs4343)	C	T	CC

Action Plan:
You have the version of genes associated with an advantage in strength and power-based activities.

Engage in power activities (i.e. throwing a baseball, kicking a soccer ball, sprinting, jumping) and power exercises (i.e. lifting weights), including high intensity resistance training.

Exercise Benefits for Type 2 Diabetes

Genes (SNPS)	Typical	Atypical	Your Results
PPARG (rs1801282)	C	G	CG

Action Plan:
You have a version of the gene associated with greater than normal impact of endurance exercise on managing type 2 diabetes.

Engaging in endurance exercise may be used to manage existing type 2 diabetes. Exercising regularly will provide health benefits, including reducing risk of developing type 2 diabetes.

Exercise Motivation

Genes (SNPS)	Typical	Atypical	Your Results
LEPR (rs12405556)	A	C	AA
BDNF (rs6265)	A	G	AG

Action Plan:
You have a version of genes associated with higher motivation to exercise.

No gene-specific recommendations. Find an activity that you love to further motivate you to exercise. Try to engage in 20-30 minutes/day of moderate to high intensity cardiovascular exercise and add in resistance training 1-3 times/week.

Exercise Recovery

Genes (SNPS)	Typical	Atypical	Your Results
CRP (rs1205)	T	C	CT
TNFa (rs1800629)	G	A	GG
IL6 (rs1800795)	C	G	GG
IL6-R (rs2228145)	T	G	TG
SOD2 (rs4880)	C	T	TT

Action Plan:
You have the versions of the genes associated with highest risk for muscle damage, fatigue, and inflammation following exercise. Your variant is also associated with a decreased natural ability to remove free radicals produced during high intensity exercise.

It is essential for you to get adequate rest following exercise. Consider adding omega-3 fatty acids to your diet to improve exercise recovery. Consider consuming curcumin and/or N-acetylcysteine (NAC) if you engage in high intensity exercise.

Bone Health

Genes (SNPS)	Typical	Atypical	Your Results
VDR (rs1544410)	C	T	CC
IL6 (rs1800796)	G	C	CG

Action Plan:
You have a version of the genes associated with higher risk of bone loss and of fracture.

Follow exercises recommended in your report to protect your bones. These include strength training, balance training, weight-bearing aerobic physical activity, and posture training.

Physical Fitness

Injury Risk

Genes (SNPS)	Typical	Atypical	Your Results
COL5A1 (rs12722)	C	T	CC

Action Plan:
You have the typical version of the gene associated with normal risk of exercise-related injury.

There are no gene-specific recommendations for you based on your test results.

Exercise Preference

Genes (SNPS)	Typical	Atypical	Your Results
NOS3 (rs1799983)	G	T	TT

Action Plan:
You have a version of the gene associated with lower production of nitric oxide and an increased preference for less vigorous exercise.

Consider exercise programs that include lighter activities (i.e. walking, slow cycling, light water aerobics, gently yoga, and pilates).

Brain Health

Predisposition to Addiction - Nicotine/Cocaine

Genes (SNPS)	Typical	Atypical	Your Results
CHRN (rs16969968)	C	T	CC

Action Plan:
You have the typical version of the gene associated with low susceptibility to nicotine addiction.

No gene-specific recommendations. You are encouraged to avoid cigarettes, as they are linked to many health conditions, including lung cancer and COPD.

Mood

Genes (SNPS)	Typical	Atypical	Your Results
MAOA (rs6323)	A	C	CC

Action Plan:
You have a version of the gene associated with an increase in MAOA activity, which may lead to imbalances in mood and difficulties coping with stress.

Reduce your MAOA activity through exercise and by taking natural MAOA inhibitors (curcumin, quercetin, passion flower, and caffeine).

Memory

Genes (SNPS)	Typical	Atypical	Your Results
DRD2 (rs6277)	C	T	CC

Action Plan:
You have a version of the gene associated with normal function and levels of dopamine in your brain. You likely have a low risk of dopamine-associated cognitive deficits and memory difficulties.

There are no gene-specific recommendations for you based on your test results.

Cognitive Performance and Stress Resilience

Genes (SNPS)	Typical	Atypical	Your Results
COMT (rs4680)	C	T	CC

Action Plan:
You have the "warrior" version of this gene, associated with higher COMT activity and lower levels of serum neurotransmitters and estrogen. You may have a higher pain threshold and better stress resilience. You also likely have reduced memory.

Dopamine precursors (L-tyrosine and L-DOPA) and cofactors (zinc, vitamin B6, folate) promote the production of dopamine, supporting cognition and mental task performance. Consider supplementing with rhodiola to maintain healthy catecholamine activity.

Alzheimer's Disease Risk

Genes (SNPS)	Typical	Atypical	Your Results
APOE (rs7412)	C	T	CC
APOE (rs429358)	T	C	CC

Action Plan: You have two copies of ApoE4 (E4/E4), which is associated with an increased risk (8-12 fold) of developing sporadic late-onset Alzheimer's Disease due to the accumulation of A plaques. For dietary and lifestyle recommendations, see the detailed action plan within the Brain Health section.

Detox

Sulfur Removal

Genes (SNPS)	Typical	Atypical	Your Results
CBS (rs4920037)	G	A	GG

Action Plan:
You carry a version of the CBS gene that should function efficiently, meaning that you likely experience optimal sulfur metabolism.

Ensure that you are consuming adequate Vitamin B6 as this is an essential cofactor for this detoxification pathway.

Glutathione Detox

Genes (SNPS)	Typical	Atypical	Your Results
GSTP1 (rs1138272)	C	T	CC
GSTP1 (rs1695)	A	G	AA
GPX1 (rs1050450)	C	T	CC
GSTT1 (gstt1)	2N	-	0
GSTM1 (gstm1)	2N	-	0

Action Plan:
You have genetic variants associated with reduced glutathione activity that may put you at an increased risk for cardiovascular disease and some cancers.
Limit your exposure to toxins (charcoal, paint strippers, pesticides and fumigants) and refrain from smoking. Reduce sugar, fat and alcohol consumption. Biannual detox and support of glutathione via natural products is recommended.

Ability to Remove Chemicals in Smoked and Charred Meats

Genes (SNPS)	Typical	Atypical	Your Results
CYP1A2 (rs762551)	C	A	AA

Action Plan:
You have version of the gene associated with being a "fast metabolizer", linked to increased risk to toxic compounds found in smoked and grilled meats.

Limit your consumption of charred and smoked meats to decrease your risk of cancer. Reduce processed meats (i.e. deli meats, bacon, hot dogs) and consume less than 500g of red meat, according to weekly intake guidelines.

Histamine Removal

Genes (SNPS)	Typical	Atypical	Your Results
DAO (rs10156191)	C	T	CC
HNMT (rs1050891)	G	A	AA
HNMT (rs11558538)	C	T	CC

Action Plan:
You have genetic variants associated with reduced function, meaning that you may have reduced ability to break histamines down effectively following exposure to environmental allergens. This may lead to allergenic symptoms.

Consume foods that are low in histamine, and limit your consumption of histamine rich foods, histamine releasing foods, and diamine oxidase (DAO) blocking foods. Also, several drugs release histamine or inhibit DAO. Talk to your doctor if you are currently taking any of these medications.

Obesity Risk

Preference for Dietary Fat

Genes (SNPS)	Typical	Atypical	Your Results
CD36 (rs1761667)	G	A	GG

Action Plan:
You have the typical version of this gene which is associated with reduced sensitivity to the taste of dietary fat and may also decrease your preference for consuming fats.

There are no gene-specific recommendations for you based on your CD36 gene, as the version of the gene that you carry does not indicate an increased risk of obesity as a result of your preference for dietary fat.

Genetic Risk Score for Obesity

Genes (SNPS)	Typical	Atypical	Your Results
GCKR (rs1260326)	C	T	TT
CELSR2 (rs12740374)	G	T	GG
MC4R (rs17782313)	T	C	TT
NOS3 (rs1799983)	G	T	TT
PPARA (rs1800206)	G	C	GG
LIPC (rs1800588)	C	T	CC
CETP (rs1800777)	G	A	GG
MTHFR (rs1801133)	G	A	GG
PPARG (rs1801282)	C	G	CG
LPL (rs328)	G	C	CG
LIPG (rs4939833)	G	A	AA
APOA5 (rs662799)	A	G	GG
PLIN1 (rs894160)	C	T	CT
FTO (rs9939609)	A	T	AA

Action Plan: According to your genetic risk score, you may have a high risk of obesity and certain eating patterns will exacerbate this risk. To reduce your obesity risk, you are encouraged to reduce your overall caloric intake (including proteins, fats, and carbohydrates), as well as to reduce your consumption of fried food and sugar sweetened beverages.

Obesity Risk

Eating Behaviour

Genes (SNPS)	Typical	Atypical	Your Results
PLIN1 (rs1052700)	T	A	AT
PER2 (rs2304672)	C	G	CC

Action Plan:
There are no gene-specific recommendations for you based on your test results, as they don't point towards you being at increased risk of obesity as a result of the timing of your meals.

You are encouraged to follow a healthy lifestyle including exercise and a balanced diet to prevent you from becoming overweight or obese. The timing of your lunch is not likely to influence your ability to lose weight.

Regulation of Appetite and Food Intake

Genes (SNPS)	Typical	Atypical	Your Results
MC4R (rs17782313)	T	C	TT
FTO (rs9939609)	A	T	AA

Action Plan:
According to your DNA, you may be less prone to having an increased appetite leading to excess snacking, higher intake of overall calories and dietary fat, and not feeling full after eating.

There are no specific recommendations for you as the genetic variants you carry in these two genes do not put you at increased risk of obesity.

Hormonal Health

Thyroid Health

Genes (SNPS)	Typical	Atypical	Your Results
CAPZB (rs10917469)	T	C	TT
PDE8B (rs4704397)	G	A	AA

Action Plan:
Genes associated with higher than normal TSH levels (especially during pregnancy) and underactive thyroid function (hypothyroidism).

See your healthcare practitioner about having your thyroid hormone levels tested, and take steps to support thyroid function (eat foods rich in iodine; consider a supplement including B-vitamins, zinc and selenium).

Testosterone

Genes (SNPS)	Typical	Atypical	Your Results
SHBG (rs12150660)	T	G	GG
SHBG (rs6258)	G	A	GG

Action Plan:
You have a version of the SHBG gene that is associated with lower levels of free circulating, usable testosterone. This association has been established in studies of men, but may also be applicable to women.

See your healthcare practitioner about having your testosterone levels tested and consider taking steps to boost testosterone.

Diet, Nutrients and Fertility

Fertility and Total fat

Genes (SNPS)	Typical	Atypical	Your Results
TCF7L2 (rs12255372)	G	T	GG
LIPC (rs1800588)	C	T	CC

Action Plan:
You carry the **'normal' function version of both genes** tested here, which together are associated with 'normal' function; thus, there are no gene-specific recommendations.

Fertility and Saturated fat

Genes (SNPS)	Typical	Atypical	Your Results
TNFa (rs1800629)	A	G	GG
IL6 (rs1800797)	A	G	GG
ADIPOQ (rs266729)	G	C	GG
APOA2 (rs5082)	T	C	TT
FTO (rs9939609)	A	T	AA
TCF7L2 (rs7903146)	C	T	CC
LTA (rs915654)	A	T	AA

Action Plan:
According to the genes tested here related to dietary saturated fats and risk of lifestyle-based metabolic diseases, you are **NOT at increased risk**. Thus, there are no gene-specific recommendations for you.

Fertility and Carbohydrate

Genes (SNPS)	Typical	Atypical	Your Results
TCF7L2 (rs12255372)	G	T	GG
CRY1 (rs2287161)	G	C	GG

Action Plan:
According to your DNA test report, you have **typical versions of both the TCF7L2 and CRY1 genes**. There are no gene specific recommendations for you based on your DNA test results.

Fertility and Protein

Genes (SNPS)	Typical	Atypical	Your Results
FTO (rs9939609)	A	T	AA

Action Plan:
According to your DNA test report, you have **two 'typical' copies of the FTO gene**, which is NOT associated with an increased risk of overeating.

Diet, Nutrients and Fertility

Fertility and Methylation

Genes (SNPS)	Typical	Atypical	Your Results
MTHFR (rs1801131)	A	C	AA
MTHFR (rs1801133)	G	A	GG
MTRR (rs1801394)	T	C	TT
MTR (rs1805087)	A	G	AA
COMT (rs4680)	C	T	CC
FUT2 (rs602662)	T	C	CC

Action Plan:
Your DNA test results indicate that you carry the 'typical' version of the MTHFR gene, and an 'atypical' version of at least one of the MTR, MTRR and/or FUT2 genes. Together, this is associated with an **increased risk for vitamin B12 deficiency**. Ensure optimal consumption of antioxidants and vitamin B12, and consider supplementation in the form of methylcobalamin, as clinically indicated.

Fertility and Vitamin A

Genes (SNPS)	Typical	Atypical	Your Results
BCMO1 (rs11645428)	A	G	GG
BCMO1 (rs12934922)	A	T	TT
BCMO1 (rs7501331)	G	A	GA

Action Plan:
You have genetic variants associated with a **69% reduction in BCMO1 activity**, which may put you at a **risk for vitamin A deficiency**. According to your results, increase dietary sources of retinol, poly-unsaturated fatty acids and protein as well as decrease consumption of gluten and beta-carotene rich foods.
Suggested lab tests include beta-carotene and retinol.

Fertility and Vitamin B6

Genes (SNPS)	Typical	Atypical	Your Results
NBPF3 (rs4654748)	T	C	CC

Action Plan:
According to your DNA test, you have **two 'atypical' copies of the NBPF3 gene**, which is associated with **2.90ng/mL lower vitamin B6 levels**. Be sure to take vitamin B6 supplementation, especially in those using medications that increase risk for vitamin B6 deficiency, including, anti-seizure medication (dilantin, valproic acid), gabapentin, minocycline, thyroid medication, or corticosteroids.
Lab: plasma pyridoxal 5-phosphate (PLP)

Fertility and Vitamin C

Genes (SNPS)	Typical	Atypical	Your Results
SLC23A1 (rs33972313)	C	T	CC
GSTT1 (gstt1)	2N	-	0

Action Plan:
According to your DNA test, you have **two 'typical' or 'normal' function copies of SLC23A1**, and **zero copies of GSTT1**, which is associated with a **3.20-fold increased risk of vitamin C deficiency**. Be sure to maintain optimal vitamin C levels and consider increasing antioxidants to improve vitamin C recycling, such as NAC, vitamin E, CoQ10, resveratrol and melatonin, as clinically indicated.

Fertility and Vitamin D

Genes (SNPS)	Typical	Atypical	Your Results
CYP2R1 (rs10741657)	A	G	GG
VDR (rs1544410)	C	T	CC
CYP2R1 (rs2060793)	C	T	CC
GC (rs2282679)	A	C	CC
GC (rs7041)	G	T	TT

Action Plan:
According to your DNA test report, you carry **'atypical' versions of the CYP2R1 and GC genes**, and the **'typical' version of the VDR gene**. Together, this is associated with an **increased risk for vitamin D deficiency**. Ensure vitamin D levels are between 75-125nmol/L, and daily doses of up to 10,000IU per day of vitamin D may be required.

Fertility and Choline

Genes (SNPS)	Typical	Atypical	Your Results
FADS1 (rs174548)	G	C	GG
PEMT (rs7946)	G	A	GG

Action Plan:
According to your DNA test, you have **typical or 'normal' function versions of the FADS1 and PEMT genes**. Thus, there are no gene-specific recommendations for you based on your DNA test results.

Fertility and Omega 3

Genes (SNPS)	Typical	Atypical	Your Results
FADS2 (rs1535)	T	C	TT
IL6 (rs1800795)	C	G	GG
IL6 (rs1800797)	A	G	GG

Action Plan:
According to your DNA test, you have **two 'typical' copies of the FADS2 gene** and an **'atypical' version of the IL6 gene**, which is associated with an **increased risk for obesity and metabolic syndrome**. Be sure to increase dietary omega-3 fatty acids to reduce your risks and consume the equivalent of 3g of fish oil per day that contains 540mg of EPA and 360mg of DHA.

Fertility and Iron

Genes (SNPS)	Typical	Atypical	Your Results
HFE (rs1799945)	C	G	CC
HFE (rs1800562)	C	T	CC
TF (rs3811647)	G	A	GG
TMPRSS6 (rs4820268)	A	G	GG
TFR2 (rs7385804)	A	C	CA

Action Plan:
According to your DNA test report, you have **'atypical' versions of genes associated with iron deficiency**. Reduced circulation of iron to tissues is associated with a reduction in spermatogenesis.

Diet, Nutrients and Fertility

Fertility and Gluten

Genes (SNPS)	Typical	Atypical	Your Results
HLA (rs2395182)	G	T	TT
HLA (rs7454108)	T	C	TT
HLA (rs7775228)	A	G	AG
HLA (rs4713586)	G	A	AG
HLA (rs2187668)	G	A	GG
HLA (rs4639334)	G	A	GG

Action Plan:
According to your DNA test report, you have an HLA genotype that is associated with a **very low risk for celiac disease**. Consider seeing your health care practitioner about being tested for celiac disease and also consider removing gluten from your diet to see if you experience any health improvements.

Fertility Factors

Clotting factors - carrier status

Genes (SNPS)	Typical	Atypical	Your Results
F5 (rs6025)	C	T	CC

Action Plan:
You **do NOT carry the factor V Leiden gene mutation**. There are no gene specific recommendations for you based on your DNA test results.

Hemochromatosis - carrier status

Genes (SNPS)	Typical	Atypical	Your Results
HFE (rs1799945)	C	G	CC
HFE (rs1800562)	C	T	CC

Action Plan:
According to your DNA test results, you are **NOT at increased risk for iron overload** (hemochromatosis). There are no gene specific recommendations for you based on your DNA test results.

Male infertility (NOS3)

Genes (SNPS)	Typical	Atypical	Your Results
NOS3 (rs1799983)	G	T	TT

Action Plan:
According to your DNA test report, you have **two 'atypical' copies of the NOS3 gene**, which is associated with low NO levels. **increased risk for oxidative damage, DNA fragmentation and male infertility (OR=3.62)**. Be sure to consider ways to improve nitric oxide production, including L-arginine, L-citrulline and pycnogenol (pine bark extract).

Environmental sensitivity (CYP1A2, CYP1A1)

Genes (SNPS)	Typical	Atypical	Your Results
CYP1A2 (rs762551)	A	C	AA
CYP1A1 (rs1048943)	A	G	AG

Action Plan:
According to your DNA test report, you have the **AG genotype of the CYP1A1 gene** and the **'atypical' version of the CYP1A2 gene**, which is associated with an **increase in risk for environmental sensitivity**. Be sure to identify and reduce specific sources of PAH exposure, and consider broccoli sprouts, sulforaphane and resveratrol to protect sperm from PAH induced DNA damage.

Male infertility (glutathione)

Genes (SNPS)	Typical	Atypical	Your Results
GSTP1 (rs1695)	A	G	AA
GSTT1 (gstt1)	2N	-	0
GSTM1 (gstm1)	2N	-	0

Action Plan:
You have genetic variants that have been shown to be associated with **reduced glutathione activity** and may put you at an **increased risk for infertility (2.99-fold)**. Limit your exposure to toxins (charcoal, fumigants, paint strippers, pesticides and fumigants) and refrain from smoking. Reduce sugar, fat and alcohol consumption. Support of glutathione via natural products is recommended (NAC, ALA, selenium, magnesium).

LoveMyHealth - LoveMyHealth-PRO

The *LoveMyHealth* CLINICAL PANEL is an add-on to the base LoveMyHealth test, and includes genotype results for an additional 44 genetic markers within 38 genes. These additional markers were selected based on their reported associations with various clinical outcomes related to diet, detoxification, heart health, hormonal health, mental wellness, obesity risk, physical fitness, and specific nutrient needs. **NOTE:** This CLINICAL PANEL add-on is designed for (and available only to) practitioners that are familiar with the clinical impact of these genetic variants - it is up to the practitioner to make their own interpretations and recommendations to their patients based on these results and considered in the context of a global assessment of the patient.

Detoxification

Genes (SNPS)	Typical	Atypical	Your Results
GSTM1 (gstm1)	2N	-	0
GSTT1 (gstt1)	2N	-	0
GPX1 (rs1050450)	C	T	CC
CBS (rs234706)	G	A	GG

Diet

Genes (SNPS)	Typical	Atypical	Your Results
AMY1 (rs4244372)	T	A	TT
TCF7L2 (rs7903146)	C	T	CC

Heart Health

Genes (SNPS)	Typical	Atypical	Your Results
9P21 (rs10757274)	A	G	AA
9P21 (rs10757278)	A	G	AA
SLCO1B1 (rs4149056)	T	C	TT
APOE (rs429358)	T	C	CC
APOE (rs7412)	C	T	CC

Hormone Health

Genes (SNPS)	Typical	Atypical	Your Results
GSTM1 (gstm1)	2N	-	0
GSTT1 (gstt1)	2N	-	0
CYP19A1 (rs10046)	C	T	CT
CYP1A1 (rs1048943)	A	G	AG
GPX1 (rs1050450)	C	T	CC
CYP1B1 (rs1056836)	C	G	CC
TCN2 (rs1801198)	C	G	CG
UGT2B15 (rs1902023)	T	G	TT
SHMT1 (rs1979277)	G	A	GG
CBS (rs234706)	G	A	GG
CYP19A1 (rs2470158)	G	A	GG
CYP1A2 (rs2472299)	G	A	GG
CYP1A2 (rs2472300)	G	A	GG
CYP3A4 (rs2740574)	T	C	TT
SRD5A2 (rs523349)	C	G	GG
FAM9B (rs5934505)	C	T	TT
CYP17A1 (rs743572)	A	G	GG
UGT2B17 (ugt2b17)	2N	-	1N

Mental Wellness

Genes (SNPS)	Typical	Atypical	Your Results
5-HTTLPR (httlpr5)	L	S	LS
DRD2 (rs1799732)	C	D	CC
ADRA2B* (rs28365031)	12	-	12/12

** The number here lists the total number of glutamine residue repeats in ADRA2B - 12 is the `typical` value.*

Obesity Risk

Genes (SNPS)	Typical	Atypical	Your Results
UCP1 (rs1800592)	T	C	CT
SLC2A2 (rs5400)	C	T	CC

Physical Fitness

Genes (SNPS)	Typical	Atypical	Your Results
NRF2 (rs12594956)	A	C	CC
NFIA-AS2 (rs1572312)	G	T	GG
UCP1 (rs1800592)	T	C	CT
ADRB3 (rs4994)	G	A	AA
GABPB1 (rs7181866)	A	G	AA

Specific Nutrient Needs

Genes (SNPS)	Typical	Atypical	Your Results
CYP2R1 (rs12794714)	C	T	CT
SLC17A1 (rs17342717)	C	T	CC
TCN2 (rs1801198)	C	G	CG
SHMT1 (rs1979277)	G	A	GG
SLC23A1 (rs33972313)	C	T	CC
GC (rs4588)	G	T	TT
NBPF3 (rs4654748)	T	C	CC
FUT2 (rs492602)	A	G	AA
FUT2 (rs601338)	G	A	GG
LTA (rs915654)	A	T	AA