VITAGEN-X

PRECISION NUTRITION

Your DNA-based Diet and Lifestyle Prescription

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Understanding your genetic report

What is DNA?

DNA is your body's instruction manual, controlling every single function from when you were only made up of a few cells, until now. It looks like a twisted ladder, made up of two halves - you inherit one half from your mother, the other from your father. This combination is what makes you, you.

Each 'rung' of the ladder contains two 'letters' of DNA code called ***nucleotides*** which bond together in pairs: **A (adenine)** and **T (thymine)** bond together**,** as do **C (cytosine)** and **G (guanine).**

Genes are portions of the ladder which use combinations of the nucleotide code to perform specific functions.

SNPs

Over time, due to environmental and lifestyle factors, minor changes called **single nucleotide polymorphisms (SNPs)** occur in the DNA code and are passed down from parent to child, from generation to generation. Remember the nucleotides? Well, a C might be replaced by a T, changing the instructions given to a gene.

Some changes are positive, making us stronger and more resilient (like being able to digest milk after infancy), some negative (like being likely to store more fat as a result of past famine or food shortage) and some make no difference at all. SNPs can be passed down on just one side of your ladder, from one parent, or from both, enhancing the effect.

SNPs are generally what we are looking for when we test your DNA.

Results

Your results are shown by a combination of the letters **ATCG** along with a traffic light system to indicate if your result is good, neutral or bad.

Identical letters (e.g. GG or AA) mean you are either what is called the **"wild type"** with no genetic variants (SNPs) OR you have **both** genetic variants (from both parents). A combination of letters (e.g. AG) means you have one inherited genetic variant.

A green result indicates either no variants or a positive genetic variant

An amber result usually indicates one genetic variant present and a mildly negative impact

A red result indicates a negative impact either due to both variants being present or a "wild type" result that is not as beneficial as the variant

Example of your genetic results table

GENE DESCRIPTION	RESULT	IMPACT & ADVICE
GENE CODE - Gene Effect Explanation of the role the gene plays and what effect genetic variants might have, symptoms etc.	**GG**	An explanation of your result, how you might be affected along with specific diet and lifestyle advice
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8 Pillars of Health & Wellbeing

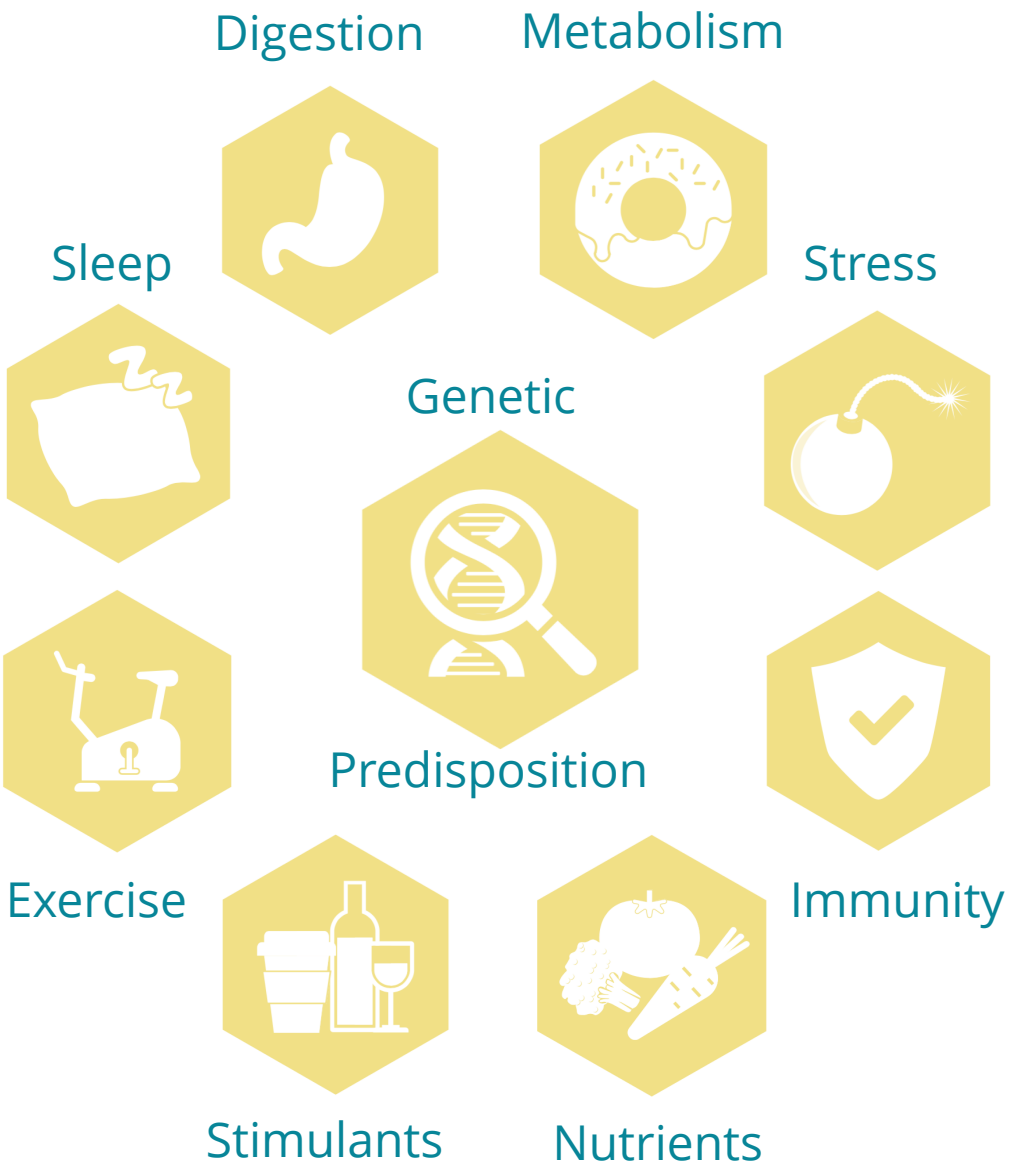
Welcome to your unique DNA-based diet and lifestyle prescription. Please be assured that your genes are ***NOT*** your destiny. There is a two-way interaction between your DNA and your lifestyle. Many health concerns can be reversed and/or prevented by assessing risk factors and implementing appropriate nutrition and lifestyle measures.

In this report we examine your personal genetic profile within the context of 8 pillars of health and wellbeing: **digestion, metabolism and blood sugar, stress, immunity, nutrients, stimulants, exercise and sleep.**

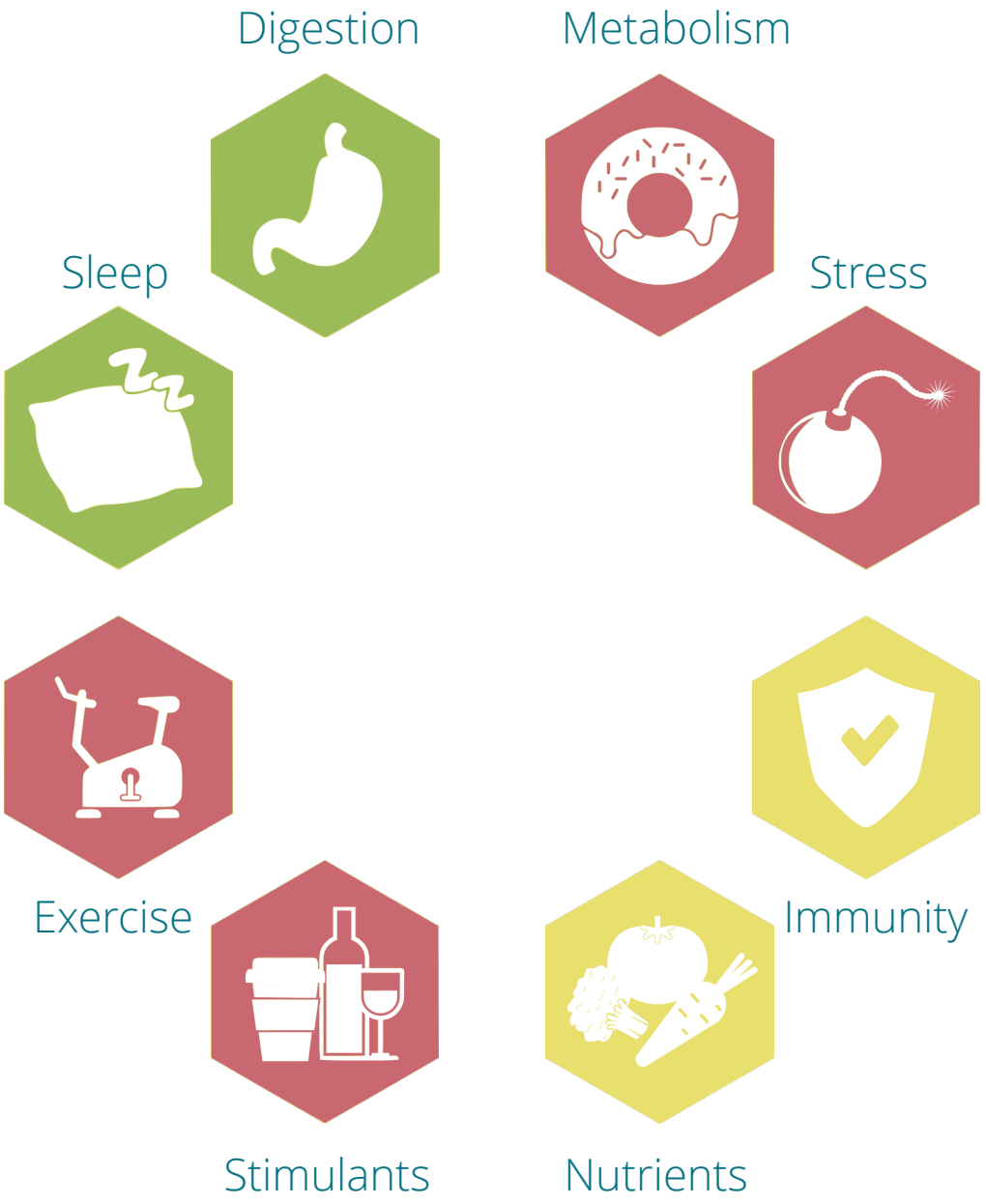
Our advice is based on your specific genotype in each of these areas. We have also supplied a separate **Nutrition & Lifestyle Guide** designed to help you make the most out of the advice given.

We invite you to come along on this journey to reaching optimal health and wellbeing - one ***YOU*** can be in control of.

Let's get started!



Your genotype summary:



Red or amber icons on the left indicate your genetically susceptible pillars to which you should pay attention and follow the advice offered. These are likely to be the areas where you need particular support.

The green icons represent your genetic 'pillars of strength' but that doesn't mean you should ignore the areas completely.

Below is a key to help you understand the colour coding of your results throughout this report:

Protective or non-detrimental genotype

Mildly negative or detrimental genotype

Negative or detrimental genotype

Pillar 1: Digestion

Have a gut feeling? How about “trusting your gut”?

Most often we only pay attention when our digestive system acts up - such as feeling queasy, bloated, ‘gassy’ or constipated.

Healthy digestion is crucial when it comes to our overall health. It ensures we absorb nutrients from the food we eat and get rid of the waste created in the process. The gut is also one of our main sites of immunity and houses neurotransmitters - the chemical messengers that carry signals to our brain. There is a two-way communication system known as the 'gut-brain axis' between the mind and body - which is why poor digestive health can impact your mood and mental state. ***Serotonin*** is one of the neurotransmitters responsible for stabilising your mood and sleep patterns, gut motility (constipation is a sign of low serotonin) and sensitivity to pain.

As they say, you are what you eat!

*The **5-HT2A** gene is activated by serotonin and impacts anxiety, appetite, learning, memory, mood, sleep and temperature regulation, as well as digestive activity. Your digestive health can also be impacted by intolerance to components in food such as gluten and lactose, influenced by the **HLA** and **LCT** genes respectively, causing damage to the intestinal lining and knock-on digestive and immune problems. Check page 7 to see if you have any of these genetic variants.*

Your digestion genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
5-HT2A - Serotonin Sensitivity The serotonin receptor is activated by contact with serotonin causing an excitatory effect and stimulating smooth muscle contraction in the GI tract (increasing gut motility). Genetic variants are associated with increased excitatory effects causing anxiety, restlessness, insomnia, and gastrointestinal upsets. On a more positive note, it is reported to have anti-inflammatory effects.	**AA**	You are among the 50% of the population more likely to be sensitive to serotonin and to experience irritation to the digestive system resulting in diarrhoea and IBS. This can also impact the central nervous system, via the 'gut-brain axis', causing anxiety, agitation, restlessness and insomnia (see pg. 4 of your Nutrition & Lifestyle Guide (NLG)). Imbalanced gut bacteria (intestinal dysbiosis) can make symptoms worse (see pg. 3 NLG).
HLA-DQA1 - Gluten Intolerance The HLA genes help the immune system distinguish between the body's own proteins and proteins made by foreign invaders (such as viruses and bacteria). Genetic variants are associated with increased susceptibility to auto-immune conditions, particularly celiac disease - a condition where the immune system becomes abnormally sensitive to gluten (a naturally occurring protein found in wheat, barley and rye). A family history of celiac disease or other autoimmune conditions increases risk.	**CC**	You are the 'wild type' (no genetic variants) which confers low to no risk of celiac disease and/or other autoimmune conditions due to genetic predisposition. If you do experience joint pain, inflammation, or migraines after eating gluten this may indicate non-celiac gluten sensitivity which is typically a result of intestinal permeability ("leaky gut"). If you experience symptoms you may do well to avoid gluten (pg. 5 NLG) for a period of time and follow a gut healing diet (pg. 3 NLG) to see if your symptoms improve.
LCT/ MCM6 - Lactose Intolerance Controls the levels of an enzyme called lactase needed to digest lactose, the sugar found in milk and dairy products. This enzyme normally stops being produced after infancy, however, in some populations (particularly Caucasians), the gene has evolved to produce lactase into adulthood.	**GG**	You are the 'wild type' (no genetic variants) and most likely to be lactose intolerant in adulthood due to low levels of lactase. Consuming milk and other dairy products may cause you uncomfortable side effects such as gas, bloating and diarrhoea. If you do experience such side effects, avoid lactose-containing products completely or as much as possible (pg. 6 NLG).

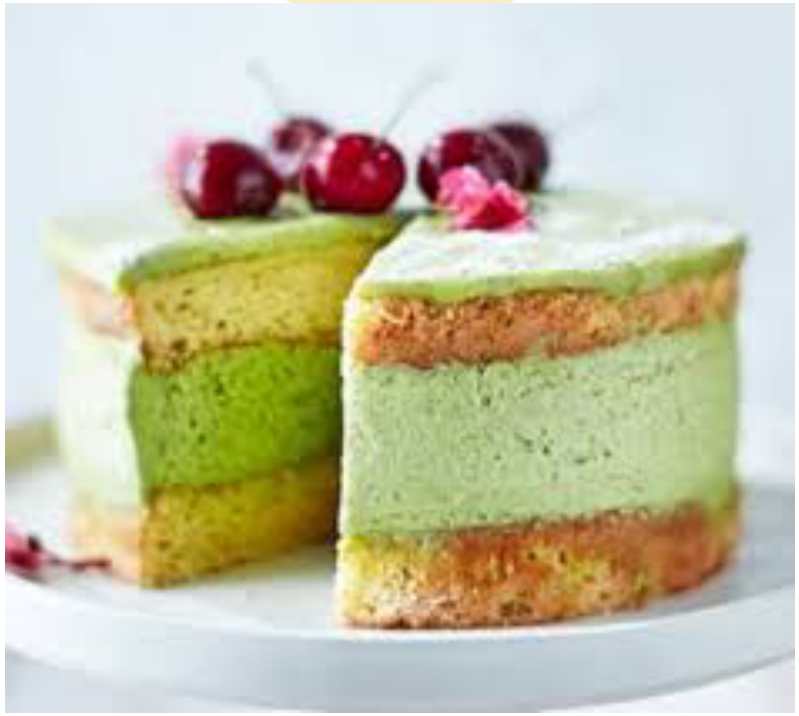
Pillar 2: Metabolism & Blood Sugar Balance

Always craving that next piece of cake or bowl of pasta?

Fluctuating blood sugar plays havoc on your metabolism. It also disrupts hormone balance and causes us to store fat, put on weight and suffer from low energy, food cravings, poor concentration and irregular moods while increasing risk of obesity and type 2 diabetes.

The modern high sugar and carbohydrate diet derails our blood sugar creating a 'rollercoaster' - short bursts of energy followed by a crash an hour or so later. High blood sugar means less fat metabolism, whereas, low blood sugar causes the body to release cortisol and adrenaline in response to a need to eat. Poor sleep has also been linked with blood sugar imbalance, low levels of the 'satiety' hormone ***leptin*** and high levels of the 'hunger' hormone ***ghrelin*** - making you crave sugary snacks and repeating the cycle!

*The tendency to reach for a second or third helping is governed by 3 key genes: **TCF7L2, LEPR** and **FTO.** They are instrumental in determining when you feel hungry, your likelihood of overeating and your propensity for weight gain. Check page 9 to see if any of these variants may be disrupting your metabolism!*



Your metabolism genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
TCF7L2 - Insulin Secretion Regulates blood sugar by influencing the production of insulin, a hormone responsible for promoting the absorption of glucose (sugar) from the blood into our cells where it is needed for energy. Genetic variants on TCF7L2 may cause decreased insulin secretion leading to risk of glucose intolerance and of developing type 2 and gestational diabetes in females.	**TC**	You are among the 20% of the population with decreased TCF7L2 activity associated with decreased insulin secretion and increased risk of developing type 2 diabetes. To reduce your risk aim to get between 7-9 hrs of sleep per night (pg. 21 NLG), engage in regular physical activity and swap simple for complex carbohydrates (pg. 8 NLG) which will help balance blood sugar levels (pg. 9 NLG).
LEPR - Leptin Receptor Regulates the body's receptivity to the 'satiety' hormone, leptin, which is produced mainly by our fat cells and is responsible for controlling appetite by signalling to the body that it feels full after eating, and is also involved fat metabolism. Leptin works in opposition to the 'hunger hormone' - ghrelin. Variants are associated with lower levels of leptin leading to increased hunger, likelihood of overeating and obesity.	**AA**	You are less likely to experience increased appetite, overeating and obesity due to healthy genetic leptin response. Lack of sleep will affect your leptin levels regardless of genotype since sleep deprived individuals have been found to have low leptin and high ghrelin levels. Aim to get 7-9hrs of sleep each night (pg. 21 NLG) to encourage leptin production.
FTO - Obesity and Type 2 diabetes Commonly called the “fat gene” due to its connection with appetite regulation, metabolic rate and increased calorie intake. FTO is present in high levels in the brain and other areas affecting metabolism such as the heart, kidneys and fat cells. Variants increase likelihood of overeating, enjoying larger food portions, having a preference for higher calorie foods and snacking more frequently due to low satiety and resulting in risk of increased body mass, obesity and type 2 diabetes.	**AA**	You are one of the 30-50% of the population likely to feel less full after meals increasing your likelihood of overeating/ eating larger portions and your risk of higher body fat, waist circumference and obesity (up to 3kgs heavier than those without FTO variants). Overweight individuals are at increased risk of insulin resistance and type 2 diabetes. Low physical activity increases risk of obesity and type 2 diabetes further. We recommend that you eat protein with every meal to help maintain satiety, swap simple for complex carbohydrates (pg. 8 NLG), and practice portion control. Physical activity has been shown to be particularly beneficial for reducing the effect of FTO variants - so get

Pillar 3: Stress Response

Are you more worrier than warrior?

We have all been negatively affected by a stressful day, event or situation, however, long term 'chronic' stress has an immense impact on our health and wellbeing and is one of the main contributing factors to many conditions and diseases.

Cortisol, one of the the body's main 'stress hormones', is produced naturally in moderate amounts to promote daytime wakefulness and in larger amounts in response to stress (physical and emotional). Chronic stress leads to abnormally high cortisol levels which can effect immune function, bone and muscle growth, fertility, insulin resistance, blood pressure, sleep and makes us more sensitive to adrenaline, another stress hormone.

Unfortunately, eliminating stress completely is almost impossible but there are many techniques we can employ to improve our management and resilience. Managing cortisol levels is important for decreasing the negative effects that long-term stress can have on our mental and physical health.

Your capacity to cope with stress is influenced by your lifestyle, genes and early life factors. Three key genes involved in modulating your response to stress by controlling cortisol levels, blood pressure and the break down of stress hormones are: ***FKBP5, ACE*** *and* ***COMT.*** *Check page 11 to see if any of these variants may be impacting the way your body handles stress.*

Your stress genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
COMT - Stress and pain resilience Responsible for breaking down and inactivating many compounds including dopamine and adrenalin. Adrenalin is responsible for increasing our heart rate and blood pressure in response to stress. Variants in COMT lead to slower breakdown of compounds causing a prolonged stress response, irritability, anxiety, heightened pain sensitivity and mood disorders.	**AA**	You are a 'worrier type' (decreased genetic stress resilience) due to slower breakdown of compounds (including adrenalin) and increased susceptibility to irritability, anxiety, pain, mood disorders and disturbed sleep. See pg. 10 of your NLG for tips on effective stress management. Check pg.18 of this report to see whether you should avoid caffeine in order to reduce anxiety, achieve better sleep and improve stress resilience.
FKBP5 - Cortisol regulation An important stress-regulating gene responsible for modulating cortisol levels by signalling for the lowering of cortisol after a stress response. Variants in FKBP5 are associated with prolonged and increased stress response due to impaired lowering of cortisol levels after a stressful event. Carriers of the variant are more susceptible to stress-related disorders such as depression, anxiety and post traumatic stress disorder (PTSD) in adulthood particularly as a result of childhood trauma.	**CC**	You are more likely to be stress resilient due to healthy cortisol regulation. Prolonged chronic stress or traumatic life events along with diet and lifestyle factors such as obesity, lack of exercise and poor diet can cause decreased stress resilience (pg. 10 NLG) regardless of genotype. Check pg. 18 below to see whether you should avoid caffeine to reduce anxiety and achieve better sleep.
ACE - Blood pressure and electrolyte balance Found mainly in the blood vessels and lungs and plays one of the most important roles in regulating blood pressure and the balance of fluids and salts (electrolytes) in the body. ACE causes the blood vessels to constrict and blood volume to increase leading to high blood pressure (HBP). Variants in ACE are associated with increased risk of high blood pressure which, in combination with prolonged stress, can be detrimental to heart health.	**AG**	You are likely to have mildly elevated ACE levels and therefore a moderate risk of high blood pressure and lower resilience during and after a stressful situation or intense exercise. Avoid exercise training at maximum heart rate and practice stress management techniques (pg. 10 NLG). Being overweight and/or a diet high in salt will increase likelihood of elevated blood pressure. Have your blood pressure monitored regularly.

Pillar 4: Immunity

Let's get ready to rumble!

Our incredible immune system constantly protects us from infection and harm, however, it can sometimes become overwhelmed - overreacting to perceived threats, or not responding effectively enough to get us quickly back to optimal health. The key is balance.

Inflammation is an integral part of the healing process and protecting a damaged area, however, if inflammation lasts too long it becomes 'chronic' and is linked with a range of health issues such as heart disease, arthritis, asthma, diabetes and even depression.

Histamine is a naturally occurring compound in certain foods and is also generated internally by our bodies since it fulfils some key functions: helps protect against infection and inflammation, is vital for the release of stomach acid and acts as an excitatory neurotransmitter in the brain causing alertness and cognition. However, too much histamine in our bodies can result in unpleasant allergy-type symptoms, anxiety and insomnia due to it's neurotransmitter activity.

*The activity of your **TNF-alpha, HNMT** and **DAO** genes can affect your immune system. Too much **TNF-alpha** can result in chronic inflammation. Conversely, low **DAO** and **HNMT** may result in high histamine levels causing allergy symptoms (itchiness, hives, runny/ blocked nose, asthma or chronic coughing), insomnia and anxiety. Check page 13 to see if any of these variants may be impacting your immunity.*

Your immunity genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
TNF-alpha - Inflammation Helps regulate the immune reaction involved in inflammation, fever and inhibiting tumour growth but is also involved in lipid metabolism, coagulation and insulin resistance as well as being implicated in a number of autoimmune diseases. Variants in TNF-alpha are associated with overactive immune responses and susceptibility to a range of inflammatory health conditions.	**GG**	You are likely to have healthy TNF-a response to inflammatory conditions. Diet and lifestyle factors such as over-indulging in alcohol, caffeine and sugary foods, lack of sleep and being overweight can lead to chronic inflammation regardless of genotype. Chronic inflammation has been linked to a number of conditions from joint pain to insulin resistance and even cancer. Inflammation can be reduced naturally by avoiding the above triggers and following a diet rich in anti-inflammatory foods (pg. 11 NLG).
HNMT - Histamine Controls histamine levels in the brain and airways. The stimulatory activity of histamine in the brain may benefit memory and concentration, however, it can also negatively effect sleep and cause allergy-type symptoms. Genetic variants cause up to five-fold decrease in HNMT activity resulting in symptoms such as headaches, watery, itchy eyes and nose, coughing, wheezing, shortness of breath, insomnia and anxiety.	**TC**	You are likely to have reduced HNMT function and reduced ability to break down histamine in the brain and lungs which can result in allergic symptoms, asthma and insomnia. HNMT activity can also be affected by other genetic variants, particularly MTHFR (check pg. 15 below) which impacts methylation. If you experience symptoms of histamine intolerance, try avoiding histamine-containing foods (pg. 12 NLG), alcohol, and support your methylation pathways (pg. 13 NLG).
DAO - Ingested histamine The DAO gene produces the main enzyme responsible for breaking down ingested histamine and needs vitamin B2 as a cofactor. Variants on this gene may decrease enzyme activity resulting in excess histamine and causing allergy-type symptoms including irritation to the GI tract, food allergies, gluten-sensitivity, Crohn's disease and ulcerative colitis, skin irritation, eczema and hives and even anxiety and insomnia. Those with histamine sensitivities will experience symptoms after ingesting even small amounts of histamine.	**TT**	You are among the 30-50% of the population likely to have genetically reduced DAO activity, and therefore increased risk of histamine sensitivity. If you experience symptoms you should reduce consumption of histamine foods (pg. 12 NLG), alcohol and black tea. Support DAO activity activity with vitamins B2, B6 and C.

Pillar 5: Nutrients

Nutrients are the body's fuel.

Your body requires adequate amounts of vitamins and minerals (micronutrients) as well as protein, fats and carbohydrates (macronutrients) in order to function and regenerate properly. Inadequate or excessive amounts of these vital nutrients can lead to various imbalances and multiple health concerns including low energy, obesity, type 2 diabetes, cardiovascular disease, anaemia, osteoporosis, depression, infertility, poor detoxification and cancer. By eating a diet rich in good quality protein and fats, complex carbohydrates and including a wide variety of vegetables and a smaller amount of fruit, you are helping ensure that your body gets the nutrients it needs to function optimally. Very few foods naturally contain vitamin D so it is important that you also get adequate exposure to sunlight and/ or take a good quality supplement.

Nutrient levels in the body are affected by diet, stress, exercise, age, your environment as well as genetic factors.

The need for and ability to utilise particular nutrients varies from person to person and is greatly influenced by your genes. ***MTHFR****,* ***TCN2*** *and* ***VDR*** *may affect your levels of vitamins B9 (folate), B12 and D respectively.* ***FTO****,* ***TCF7L2*** *and* ***NOS3*** *play a role in determining your ideal macronutrient intake. Check pages 14 & 15 to see whether you have any of these influential variants and what to do about it.*

Your nutrients genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
MTHFR - Vitamin B9 (folate)/ Methylation Responsible for converting folate into the active form needed by the body to support DNA synthesis and repair, cell division, healthy pregnancy as well as the synthesis of the neurotransmitters dopamine and serotonin. Variants have been linked to cardiovascular disease, infertility, neural tube defects, low energy and mood, poor detoxification and impaired gene expression.	**AG**	"Medium methylator" - you are likely to have a reduced ability to convert folate to 'active' folate (vitamin B9). A diet low in B vitamins and other vital co-factors such as zinc, magnesium, betaine and choline; and high alcohol consumption will reduce methylation further. See pg. 13 of your NLG for more information on methylation.
TCN2 - Vitamin B12 Binds vitamin B12 and helps to transport it from the intestine into the blood cells. Variants are linked to low plasma vitamin B12 levels. Low vitamin B12 is associated with high homocysteine (hcy), which can be neurotoxic and a risk factor for cardiovascular disease, anaemia, low energy, pale skin, headaches, feeling faint and heart palpitations.	**GG**	You are likely to have a severely reduced ability to transport vitamin B12 into your blood cells. If you experience any of the symptoms listed or suspect low vitamin B12 levels (e.g. if you follow a vegetarian or vegan diet or consume a large amount of alcohol), have your vitamin B12 levels tested, increase your intake of vitamin B12 foods and/or supplements and minimise alcohol intake. Vitamin B12 is also important for healthy methylation (pg. 13 NLG).
VDR - Vitamin D Regulates the body's vitamin D3 receptor and mediates the production of dopamine, one of the body's 'feel good' chemicals. This is one of the reasons why lack of sunlight is associated with low mood. Vitamin D is also crucial for bone formation, immune regulation and cell growth and differentiation. Over 30% of the population carries the variant which may lead to low vitamin D levels and low dopamine production.	**CC**	You are likely to have healthy receptivity to vitamin D. Make sure to expose your skin to sunlight regularly (without tanning or burning) or, if that's not possible, take a good quality vitamin D supplement (pg. 14 NLG) - especially during winter months.

Your nutrients genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
FTO - Protein & fat consumption Commonly called the "fat gene" due to its connection with weight and body composition. FTO is present in high levels in the brain and other areas affecting metabolism such as the heart, kidneys and fat cells. Variants increase likelihood of obesity and type 2 diabetes. Current research shows that a diet higher in protein can substantially help with weight loss and maintenance in those with the FTO variant.	**AA**	You are less likely to be able to maintain a consistent weight without having to closely watch what you eat. Overweight individuals also have elevated risk of insulin resistance and type 2 diabetes. Your ideal diet to lose or maintain weight would be high in good quality protein (20-30% of your daily energy), a small amount of healthy fats (pg. 15 NLG), complex carbs - aim for no more than 1/4 of your meal (pg. 8 NLG) and a variety of non-starchy vegetables.
TCF7L2 - Carbohydrate & fat consumption Regulates blood sugar by influencing the production of insulin, a hormone responsible for promoting the absorption of glucose (sugar) from the blood into our cells where it is needed for energy. Genetic variants on TCF7L2 may cause decreased insulin secretion leading to risk of glucose intolerance and of developing type 2 and gestational diabetes in females.	**TC**	You are likely to be sensitive to refined, simple carbohydrates and saturated fats in terms of weight gain and decreased insulin secretion increasing risk of type 2 diabetes. You would benefit from eliminating simple carbohydrates (pg. 8 NLG) and unhealthy fats (pg. 15 NLG) from your diet to lose weight, and increasing whole grains to reduce your risk of developing type 2 diabetes.
NOS3 - Omega-3 Produces the enzyme nitric oxide synthase responsible for making nitric oxide, known to be protective in our blood vessels and to be involved in vasodilation (opening of the blood vessels). Variants result in low nitric oxide production which has been associated with cardiovascular disease. Recent research has shown that Omega-3 fat has a positive impact on cardiovascular risk in people with NOS3 variants by lowering another kind of fat called triglycerides which is also linked to lower HDL (good) cholesterol.	**GG**	You are likely to have normal NOS activity and healthy ability to produce nitric oxide which is positively associated with cardiovascular health. As a result you do not have an increased need for omega-3 fats in your diet, however, you should ensure to consume an adequate amount of omega-3 (pg. 16 NLG) in order to keep your risk low and promote overall health.

Pillar 6: Stimulants

Ready for the next hit, the next fix, the next high?

A lot of us wake up to the smell of coffee and wind down with a glass or two of wine in the evening. For some of us, these seemingly harmless habits can wreak havoc on our health.

Alcohol prevents you from getting a refreshing night's sleep, disrupts your metabolism and alters your brain chemistry - slowing you down and potentially leading to low mood, insomnia and anxiety.

Caffeine is a controversial area in nutrition with contradictory research. The ability to metabolise caffeine is highly individual depending on your genetic make up. Even moderate levels of caffeine may have an adverse effect if you are a slow caffeine metaboliser. A big concern about caffeine is how it triggers the release of stress hormones - ***adrenalin*** and ***cortisol***. Cortisol causes spiked blood sugar (remember the blood sugar rollercoaster?) leading to increased fat storage around the midriff. Although caffeine increases brain activity and energy in the short term, over time, it can actually drain your body's ability to produce energy naturally.

Your genes significantly impact your response to caffeine and alcohol. ***CYP1A2*** *determines how effectively you break down (detoxify) caffeine while* ***ADORA2A*** *affects how your nervous system reacts to it - making you feel 'wired' for longer. The* ***ADH*** *genes control the rate at which you convert alcohol to acetaldehyde - a compound more toxic than alcohol which can severely damage the body!* *Check page 18 to see if any of these variants impact you.*

Your stimulant genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
CYP1A2 - Caffeine sensitivity Responsible for detoxifying multiple substances including pharmaceutical drugs (e.g. paracetamol), and most famously, caffeine. Variants are associated with increased activity and thus faster detoxification of substances. This is both good and bad depending on the substance being detoxified. With respect to caffeine, faster metabolism is generally considered positive since it reduces the time caffeine is active in body, reducing its effect.	**CC**	You are a slow caffeine metaboliser. This genotype has been associated with increased anxiety and risk of hypertension when consuming more than 1-2 cups of coffee per day. Consuming caffeine after midday may affect your ability to fall asleep or cause you to wake in the night. If you suffer from anxiety, hypertension and/or insomnia we recommend limiting overall consumption of caffeinated food and drinks including coffee, tea, carbonated drinks (especially 'energy drinks'), and chocolate (pg. 18 NLG).
ADORA2A - Adenosine impact Adenosine receptor activity increases throughout the day as the body generates adenosine, a by-product of energy (ATP) release. ADORA2A also regulates dopamine release - as adenosine levels increase, the stimulatory effect of dopamine declines - facilitating sleep. Caffeine blocks this interaction increasing the stimulatory effect of dopamine, causing alertness. Variants on ADORA2A increase the stimulatory impact of caffeine.	**TT**	You are likely to have normal ADORA2A activity and moderate sensitivity to caffeine. Your response to caffeinated food and drinks including coffee, tea, carbonated drinks (including 'energy drinks'), and chocolate may be impacted by other genetic variances (such as CYP1A2 above) and environmental factors.
ADH1B - Alcohol sensitivity/ detoxification Responsible for breaking down alcohol. Variants on this gene (which are more common in Asian populations than Caucasians), can result in as much as 100x faster metabolism of alcohol to more toxic acetaldehyde causing more severe symptoms of toxicity such as facial flushing, nausea and headaches, and increased oxidative damage to the body when consuming alcohol.	**CT**	You are likely to convert alcohol to acetaldehyde more rapidly. This is considered negative since acetaldehyde is far more toxic than alcohol, causing oxidative (free radical) damage to the body. You are also likely to experience facial flushing, headaches and nausea. If you do consume alcohol, do so in moderation and ensure adequate intake of antioxidants (pg. 17 NLG) to offset the oxidative damage drinking is likely to cause. Support the detoxification of acetaldehyde by increasing magnesium, molybdenum, zinc and vitamins B2 and B3 - all important co-factors. Candida overgrowth (pg. 7 NLG) will increase your levels of acetaldehyde.

Pillar 7: Exercise

On your mark, get set, **GO!**

Whether those words make you feel energised or exhausted, exercise is an important part of maintaining health. Regular exercise helps control weight, combats many health conditions including type 2 diabetes, stroke, metabolic syndrome and arthritis; improves mood, sleep and sex drive and boosts energy. Exercise can also be a fun way to socialise and spend time outdoors breathing in fresh air. Find something that works for you - take a dance class, hit hiking trails, take up tennis, join a team, stretch and unwind in a yoga or pilates class. Whatever gets you out there and gets you moving and breathing!

Aim for at least 2.5 hrs per week of moderate intensity exercise such as walking or body weight exercises, and 2 hours of vigorous exercise such as running or swimming.

Find out which type of training best suits your genotype and how prone you are to injury on the next page.

Your genes can influence the type of exercise your body is naturally more suited to. ***ACE*** *impacts your aerobic efficiency, VO2max and slow twitch muscle fibre volume making you better suited to either endurance or power exercise.* ***COL1A1 & GSTM1*** *influence your tendency for injury and speed of recovery after exercise.* *Check page 20 to see what your specific variants say about you.*

Your exercise genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
ACE - Power vs endurance & VO2max Controls blood pressure and fluid (water/sodium) balance in the blood. This is the most researched gene in relation to sporting performance and its role in vasoconstriction and blood pressure control.	**AG**	You are likely to have good aerobic efficiency and VO2max. A mixture of power and endurance based training would be best suited for you. Monitor your blood pressure and avoid exercise training at maximum heart rate. Being overweight and/or a diet high in salt will increase your blood pressure and should be avoided.
COL1A1 - Injury Associated with Type 1 collagen, the main collagen found in connective tissues and in abundant in bone, cornea, skin, tendons, ligaments and cartilage. Variants are associated with increased risk of osteoporosis, and tendon and ligament injuries in sport.	**CC**	You are not genetically prone to tendon and ligament injuries. Due to higher type 1 collagen production, this genotype is associated with greater joint laxity (flexibility) and risk of low bone mineral density. In this case, you would benefit from strength and weight training to improve joint stability and bone density.
GSTM1 - Recovery GSTM1 is vital for the detoxification of compounds via glutathione including carcinogens, therapeutic drugs, environmental toxins and products of oxidative stress including those generated from exercise. Variations in GSTM1 can increase susceptibility to carcinogens and toxins and increase the toxicity of certain drugs. This gene is known to be highly polymorphic with over 50% of Caucasians having an entirely absent gene. This leads to increased fatigue and decreased recovery from exercise.	**DD**	Your GSTM1 gene is absent leading to very poor ability to neutralise oxidative stress (free radicals) in the body and therefore slower recovery from exercise. Excessive exercise, dietary and environmental toxins, chronic stress, inflammation and low glutathione levels will slow GSTM1 activity further, increasing your risk of oxidative damage which speeds up ageing. We recommend stress management (pg. 10 NLG), reducing inflammation (pg. 11 NLG) and increasing antioxidants (pg.17 NLG), in particular glutathione, to support this important detoxification pathway.

Pillar 8: Sleep

Night owl or a morning lark?

Sleep is a fundamental factor in maintaining health and wellbeing and is often undervalued or even frowned upon in our fast-paced age where working long hours or being out with clients, colleagues or friends until all hours is becoming the norm.

Studies show that less than six hours of sleep per night weakens your body and increases risk of obesity, diabetes, cardiac disease and stroke - not to mention the effect on your mood and mental capacity. Lack of sleep also increases our likelihood of reaching for stimulants such as caffeine, sugary foods and energy drinks to keep us going during the day which negatively impact health, mood and weight and can result in feeling 'wired' in the evening and needing to resort to alcohol or sleeping pills to fall asleep.

Our internal body clocks are regulated by **24 hour cycles (circadian rhythms)** which respond primarily to light or darkness in the environment. Darkness signals the body to drop in temperature and to release the 'sleep hormone' - ***melatonin***. Exposure to light stimulates a raise in body temperature and the release of the stimulating hormone - ***cortisol***, which promotes wakefulness.

*Your body clock is regulated by a group of 'clock genes' including **CLOCK, PER** and **MTNR** which play a major role in orchestrating your body's circadian rhythms. Improper signalling due to environmental or genetic variation can cause disrupted or altered sleep patterns. Check page 22 to see if any of these variants may be disrupting your sleep.*

Your sleep genotype and advice:

GENE DESCRIPTION	YOUR RESULT	IMPACT & ADVICE
CLOCK - Circadian rhythms The CLOCK gene plays a central role in regulating circadian rhythms. Variants in CLOCK are associated with altered sleep length affecting daytime alertness and susceptibility to mood disorders. Less sleep also increases appetite and susceptibility to type 2 diabetes.	**AA**	You are likely to enjoy normal to longer sleep duration. This decreases your susceptibility to mood disorders as a result of insufficient sleep. In addition, your ghrelin levels are likely to be lower (due to normal sleep duration) reducing your risk of increased body mass and type 2 diabetes. Other diet and lifestyle factors can, however, cause disruption to your body clock regardless of your genotype. Always try to maintain a regular sleep routine (pg. 20 NLG) and avoid stimulants and bright light/ electronics too close to bed time.
PER1 - Early bird / night owl The PER family of genes work in opposition to CLOCK to regulate the timing of sleep onset by signalling appropriate circadian functions to begin in response to environmental triggers - such as the release of melatonin and lowering of body temperature in response to dim light / onset of darkness. PER genes determine whether you are an 'early bird' or 'night owl'.	**AA**	You are likely to be an 'early bird', preferring to sleep early and rise early due to healthy melatonin release in response to dim light/ onset of darkness in the evening, and other natural circadian functions. Unfortunately, diet and lifestyle factors such as caffeine, stress, alcohol and bright light, can play a part in disrupting your body clock regardless of your genotype. Always try to maintain a regular sleep routine (pg. 20 NLG) and avoid stimulants and bright light before bed.
MTNR1B - Melatonin receptivity Found mainly in the eyes and brain and involved in the body's receptivity to melatonin, the 'sleep hormone' released in response to the onset of darkness. Melatonin is involved in several processes in the body including circadian rhythms, mood regulation, anxiety, sleep appetite, immune responses and heart function. Variants are associated with disturbed sleep and increased risk of impaired blood glucose metabolism leading to type 2 diabetes.	**GC**	You are more likely to experience disturbed sleep patterns, particularly early waking, increasing your risk of impaired blood sugar metabolism and type 2 diabetes. Your risk increases with low exercise and a diet high in simple carbohydrates (sugar). Aim to get between 7-9 hrs sleep per night (pg. 20 NLG), increase your physical activity, decrease/avoid intake of simple carbohydrates (pg. 8 NLG) and bright light/ electronics (particularly before bed), and increase tryptophan-rich foods (pg. 4 NLG) to encourage healthy melatonin production and activity.

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