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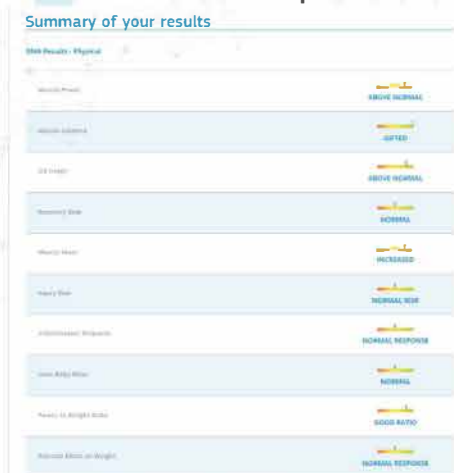
11-May-2024

# DNA Results Report



# How to read your summary

The summary highlights certain aspects that have results that are not standard and therefore maybe a good place to start looking to find out quick fixes that you can put in place to improve health and/or fitness. The summary is not an exhaustive list of all the aspects we look at so make sure you check the whole report to get all the information we provide.





# Summary of your results

## DNA Results - Physical

Muscle Power



Muscle Stamina



O2 Usage



Anaerobic Threshold



Recovery Rate



Muscle Mass



Injury Risk



Soft tissue Inflammation



Lean Body Mass



Power-To-Weight Ratio





# Summary of your results

## DNA Results - Diet

Carbohydrate Response



Saturated Fats Response



Unsaturated Fats Benefit



Protein Response



Sugar Response



Overeating Sweet Foods



Bitter Taste



Snacking Risk



Metabolic Rate



Fat Distribution



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Yo/yo Diet Response



**NEGATIVE TO HEALTH**

Lactase Persistence



**NORMAL LACTASE PERSISTENCE**

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# Summary of your results

## DNA Results - Vitamins

Vitamin D Deficiency



LOW RISK

Vitamin A Deficiency



AVERAGE RISK

Iron Deficiency



NORMAL RISK

Magnesium Deficiency



NORMAL RISK

Potassium Deficiency



NORMAL RISK

Sodium Deficiency



NORMAL RISK

Vitamin B6 Deficiency



NORMAL RISK

Vitamin B12 Deficiency



NORMAL RISK

Folate Deficiency



LOW RISK

Omega-3 Benefit



NORMAL BENEFIT



Calcium Deficiency



BCAAs Benefit



Choline Benefit



Glutamine Benefit



Creatine Benefit



Beta-Alanine Benefit



Arginine Benefit



# Summary of your results

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## DNA Results - Health

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Caffeine Sensitivity



Genetic Bone Mineral Density



Genetic Obesity Risk



Genetic Type 2 Diabetes Risk



Genetic Infection Risk (Colds/Flu)



# Summary of your results

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## Health Insights - Stress

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Stress Response to Pressure



Stress Affecting Memory Risk



Ability to Deal with Stress



Stress Leading to Physical Symptoms



Stress And The Heart



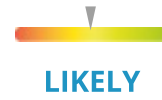
# Summary of your results

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## Health Insights - Sleep

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Night Owl Likelihood



LIKELY

Sleep Duration



LONGER SLEEP

Narcolepsy Risk



LOW RISK

Stress Affecting Sleep Risk



LOW RISK

Caffeine Affecting Sleep Risk



LIKELY

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# Summary of your results

## Health Insights - Anti-ageing

Physical Decline With Age



Keeping Cognition With Age



Testosterone and Ageing



Bone Strength decline with ageing



Back pain and ageing



Stress and ageing





# Summary of your results

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## Health Insights - Injury Risk

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Lower Back Pain Risk



SLIGHT RISK

Bone And Joint Strength



SLIGHT RISK

Achilles Tendinopathy



SLIGHT RISK

Knee Injury



SLIGHT RISK

Type of Injury Rehab



NORMAL REHAB

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# Summary of your results

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## Health Insights - Mental Health

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Attention Span



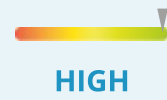
Workaholic Traits



Caffeine Affecting Focus



Dealing With Memory Tasks



Warrior Vs Worrier



# Summary of your results

## Health Insights - Gut Health

Gluten Intolerance Risk



**HIGH RISK**

Gut Irritability Risk



**NORMAL RISK**

Gum Health Risk



**INCREASED RISK**

Stress Affecting Gut Health



**SLIGHT RISK**

# Summary of your results

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## Health Insights - Heart Health

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Genetic High Blood Pressure



Salt Causing High Blood Pressure



Cardiovascular Health Issues



# Summary of your results

## Health Insights - Immunity

Immune Function



Vitamin D Benefit to Your Immune System



B Vitamins Benefit to Your Immune System



Selenium Benefit to Your Immune System



The PTPN22 Gene and Your Immune System



Vitamin C Affecting Immune Function



Inflammatory Infection Response





# Summary of your results

## Health Insights - Eye Health

Sight Degeneration with Age



Cataracts Risk



Open-Angle Glaucoma



Eye Health and B Vitamin Deficiency



# Summary of your results

## Health Insights - Skin Health

Sun Damage Risk



**HIGH RISK**

Rate of Skin Ageing



**NORMAL AGEING**

Skin Beta Carotene Conversion



**SLIGHTLY LOWERED**

Gluten Related Skin Condition Risk



**INCREASED RISK**

Collagen Breakdown



**POOR BREAKDOWN**

Skin Glycation With Age



**NORMAL GLYCATION**

Skin Ancestry



**LIGHTER SKIN ANCESTRY**

Risk of Wrinkles with Age



**INCREASED RISK**

Dermal Sensitivity Risk



**HIGH RISK**

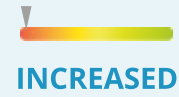
# Summary of your results

## Health Insights - Muscle Health

Natural Testosterone Level



Exercise Induced Muscle Pain



Stress Related Muscle Pain Risk



Coenzyme Q10 Deficiency Risk



# Understanding your action plan

The action plan brings you a few quick fixes to get you started on your health journey with Muhdo. It takes into account both your environment (questionnaire) and DNA. Be aware that the action plan is only a snapshot of your entire report and it is important to read the whole report to get the most from the product.



# Action plan

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## Health Diet Physical Vitamins

We have calculated your current risk levels based upon your genetic results and response to the lifestyle questionnaire to build your Health Action plan below

### Caffeine Affects Sleep

Avoid caffeine 6 hours before you go to bed to help prevent caffeine affecting your sleep quality. It is also important to stay clear of other chemical stimulants such as theobromine which is found in chocolate.

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LOW

**NORMAL**

HIGH

### Caffeine Sensitive

Please be mindful that consuming caffeine in stressful situations as it might increase your anxiety levels. Drink at least 2 litres of water a day.

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**LOW**

NORMAL

HIGH



# Action plan

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Health Diet Physical Vitamins

We have calculated your current risk levels based upon your genetic results and response to the lifestyle questionnaire to build your Diet Action plan below

## Yoyo Diet Response

You may already do so, but try to maintain a steady calorie intake aligned to your exercises.

LOW

NORMAL

HIGH

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# Action plan

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Health Diet Physical Vitamins

We have calculated your current risk levels based upon your genetic results and response to the lifestyle questionnaire to build your Physical Action plan below

It appears that you do not have any major genetic potential physical health risks in the current analysis! This is a rare result.

# Action plan

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Health Diet Physical Vitamins

We have calculated your current risk levels based upon your genetic results and response to the lifestyle questionnaire to build your Vitamin Action plan below

It appears that you do not have any major genetic potential vitamin deficiencies! This is a rare result.

# How to read your Results

The following information relates to how we've arrived at the health conclusions and your specific results. Firstly, we look at a panel, or set of genes, and small reference points on each gene called 'snips' providing a polygenic analysis for a specific predisposition such as "Stress leading to physical symptoms" or "Vitamin D metabolism". With each corresponding gene and snip having been heavily researched with at least 5 peer reviewed studies.

**DNA Results - Omega-3 Benefit**

**Results**

Your genetic variants show an increased risk for omega-3 fatty acids deficiency.

**Genes of Interest**

APOA5, APOB, APOE4, PCSK9

**Recommendations**

This means you probably need more omega-3 fatty acids than the AHA, having 1g per 1000 to help with cholesterol and triglyceride levels. The following of common only eat fish your diet needs, but it is recommended to check your fat acid status in the blood. Your genetic profile suggests you might need to supplement omega-3 fatty acids as well to keep started to physically and mentally.

You may want to supplement omega-3 if the diet anything from 3000-5000mg is sufficient. Optimal symptoms of a diet omega-3 intake include skin problems, behavioral disorder, hyperactivity, abnormal vision, eye dryness, circulation disorders, inflammation, increased susceptibility to infections, coagulation disorders and depression.

Omega-3 fatty acids are extremely important to your health, and offer a variety of benefits to both your body and brain.

One, which is found only in fish, reduces risk of cardiovascular risk in the brain, so it is a surprise that nutrition studies show high fish diets and their implications to brain health and cognition.

Omega-3 can also help combat the pro-inflammatory response seen from diets higher in grains, vegetable oils and processed foods, which are all high in Omega-6 fatty acids.

An extensive information range of the leading causes of cardiovascular and heart disease, helping to minimize its effects may prove beneficial with a good amount of Omega-3 in your diet.

**Take Action Now: Top Tips**

Always take your Omega-3 supplements with food.

Obtain your Omega-3 from a variety of sources. Use the fat levels.

Always use them with moderation, as the will reduce high cholesterol levels in the morning.

Always store Omega-3 in sealed and in the fridge, as this will reduce oxidation and damage caused by the light and air.

**Top 5 sources of Omega-3:**

- Flaxseed (100g has 17g)
- Walnuts (28g has 2.5g)
- Sardines (100g has 14g)
- Salmon (100g has 13g)
- Tilapia (100g has 12g)

MUHOO

We then weight each snip and the most relevant studies according to a variety of factors such as, the university or institution where they were conducted, number of participants in each study and the year the research manuscript was submitted. An extremely important point to remember is that we also look at 1,000 snips. This provides both more detail and crucially more accuracy with our conclusions/results. It also increases the accuracy and allows us to make more informed recommendations for you.

For us to then simplify the vast amount of information contained within this report we have divided your results into various genetic health topics. Each health topic will then have subcategories to explain this area further still, which will then provide you with health insights and recommendations to help improve that particular outcome or result.

# Muscle Power



Muscle Power  
**ABOVE NORMAL**

## Results

The genetic data shows that you have an above normal outcome for muscle power. This result puts you in the top 21.2% of the tested population.

Muscle power and stamina genetics don't impact general health to any large extent, the genes analysed in these areas are more important for sports performance and exercise.

## Genes of Interest

AMPD1, IL-6, ACTN3, NOS3, ACE, VEGFA, AGT, PPARA, TRHR, LEPR, INS-IGF2, COMT

## Recommendations

This means that you can recruit fast-twitch muscle fibres efficiently and will be able to improve when training with resistance quicker than some others. This may lead to you having some excellent power markers. With smart training, you will be able to get to a good level of power, and should be able to mix with the best power/mixed athletes around.

However others may have slightly more gifted genes and therefore will still have a slight advantage. Fast-twitch muscle fibres are acquired through training at a high intensity for short periods of time, and so if you wish to improve your acquisition it is recommended that you output high intense effort for periods of 10-30s before a rest, varying the level of intensity to meet the goal at hand.

## Muscle Power

Muscle Power is an ability to exert a certain level of power over a period of time. This analysis concentrates solely on maximal output for anything under 10 seconds. Those gifted in this area often have an ability to recruit a greater amount of fast-twitch muscle fibres.

It is possible that you can possess both an ability to recruit slow and fast twitch muscle fibres. However, people in this category often have to make a decision on what environmental training adaptations they want to utilise for the best outcome of their goal.

# Muscle Stamina



Muscle Stamina  
**GIFTED**

## Results

The genetic data shows that you have a gifted outcome for muscle stamina. This result puts you in the top 15% of the tested population. The muscle stamina and muscle power genes are utilised in our algorithm to conclude on the recommended training protocols.

The variations in these allow you to train specifically for your genetic makeup with correct time under tensions and varied protocols.

## Genes of Interest

ADRB2, COL5A1, ACTN3, PPARA, ACE, ADRB3, PPARGC1A, AMPD1, ADRB1, VEGFA, GABPB1, IGF2

## Recommendations

This means you may be able to recruit a large amount of slow-twitch muscle fibres, to an extent that may be similar to an elite level ultra endurance athlete. Endurance based training will cause quick and pronounced slow-twitch adaptations and therefore sports that rely on endurance will be applicable. slow-twitch muscle fibre acquisition is often caused by sub-maximal exercise, in other words exercise that utilises effort for over 3 minutes continuously.

Thanks to your highly gifted genetics in this area if you train for prolonged periods you will gain a high level of slow-twitch muscle fibres, due to your genes it is worthwhile considering prolonged sub-maximal exercise that lasts more than 60 minutes if endurance improvement is your goal.

## Muscle Stamina

Muscle Stamina is the ability to perform a physical task over prolonged periods of time with minimal fatigue. Stamina levels are commonly associated with the amount of energy expended during the exercise period.

Those with a higher affinity will therefore be able to exert greater amounts of energy for prolonged periods, resulting in better endurance performance.

# O2 Usage



O2 Usage  
**ABOVE NORMAL**

## Results

You have gifted variants for oxygen usage, meaning you will be able to improve VO2 max to a very good level. An increased VO2 max can lead to greater blood vessel dilation and therefore more nutrients being delivered around the body. As you have gifts in this area it may be wise to up your VO2 max with some specific training in the area, and will also be beneficial to general health.

## Genes of Interest

ADRB1, VEGFA, GABPB1, ACE

## Recommendations

Those with highly gifted variants can often have slightly greater improvements, which can make them superior at ultra-endurance events.

With smart training you should reach a level that is far above standard and is perfectly normal for most mixed sports at an elite level. Besides genetic factors, there are other components that have a large influence on VO2 max:

### Age

Although it varies greatly by individual and training programs, in general, VO2 max is highest at age 20 and decreases nearly 30% by the age of 65.

### Gender

Many elite female athletes have higher VO2 max values than their male counterparts. But because of differences in body size and composition, blood volume and haemoglobin content, a woman's VO2 max is in general about 20% lower than a man's VO2 max.

### Altitude

Because there is less oxygen at higher altitudes, an athlete will generally see a 5% decrease in VO2 max results with every 5,000 feet gained in altitude. There are a few simple methods to improve your VO2 max. For instance, yoga and breathing exercises allow for greater lung expansion. They are also great for relaxation and pose little risk to a person.

### Keep hydrated

This is important for life in general. Dehydration leads to a lower stroke volume, which leads to a decline in VO max. Training your heart seems simple enough; anything that gets the heart pumping will lead to adaptations that will have positive effects upon VO2 max.

### Increasing force capacity

## O2 Usage

Max O2 usage or VO2 max refers to an individual's maximum rate of oxygen consumption, as measured during incremental exercise. It is a fair reflection on aerobic fitness and is an important factor in aerobic activity needed for sub-maximal endurance-based sport, such as marathons and other ultra-endurance activity. There are physical limitations, including gender and age, that can affect how much energy can be utilised through the aerobic systems.

There are devices on the market that make breathing harder while exercising. Some people try breathing through a straw for certain periods of the day. This is to cause adaptations within the respiratory muscles. However, this is a highly specific method of training and is normally done in utilisation with expert coaching.



# Anaerobic Threshold



Anaerobic Threshold  
**GIFTED**

## Results

You have a naturally higher AT when compared to others.

## Genes of Interest

PPARGC1A, ACTN3

## Recommendations

This indicates that exercise and training can be performed at a higher intensity and for a prolonged period before lactate starts to build up. This is highly beneficial for those involved in endurance activity and is a key trait for those involved in ultra-endurance events.

Anaerobic threshold is important for general workout intensity. One of the keys to increasing your anaerobic threshold lies in improving your ability to oxidise lactic acid for energy production.

So, how do we do this?

To start we will need to provide the muscle cells with sufficient oxygen and improve their ability to use it. This will enhance the aerobic system helping to oxidise lactic acid.

The most effective ways to do this is to train and condition your cells so that they learn to become more efficient at their jobs. You can also utilise key nutrients that can support your body's effort to achieve a higher lactic acid threshold.

## Vasodilation and vasoconstriction

You control blood flow by controlling vasoconstriction (narrowing of blood vessels) and vasodilation (widening the blood vessels). Too much vasoconstriction and the inability to vasodilate will cause narrowing of the blood vessels, leading to high blood pressure as well as a whole host of issues, such as asthma. Some people are genetically prone to vasoconstriction and are unable to vasodilate effectively.

## Health Top Tips:

Vitamin C is one of the most potent lactic acid oxidisers.

Beetroots and celery are both great vasodilators improving blood flow.

Creatine has 2 benefits, firstly it buffers acidity, and secondly it helps decrease the formation of lactic acid.

Essential fatty acids, magnesium and manganese are all key factors required by the lungs and respiratory system.

## Top 5 Foods Vitamin C foods.

Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

## Top 5 Magnesium foods.

Pumpkin Seeds, Spinach, Swiss Chard, Soybeans, Sesame Seeds

## Anaerobic Threshold

The anaerobic threshold, or AT, is the point at which lactate begins to accumulate within the blood stream during exercise. This occurs during increasing intensity exercise when it reaches the muscles and the anaerobic processes become dominant. The usage of interval training, which has been popularised in modern times in the form of HIIT or Bootcamp-style classes, uses the principle that the AT can be exceeded for short periods of time, followed by a short recovery period.

Top 5 Manganese foods.

Cloves, Oats, Brown Rice, Spinach, Pineapple

Top 5 Omega 3 foods.

Flaxseeds, Walnuts, Sardines, Salmon, Tofu

# Recovery Rate



Recovery Rate  
**NORMAL**

## Results

The genetic results show that you have a normal recovery rate and therefore have what would be considered the most common outcome.

## Genes of Interest

AMPD1, IGF2, INS-IGF2, NOS3

## Recommendations

You should be able to have multiple intense exercise sessions per week and not need massive amounts of time between maximal exercises to recover energy. However, if your lifestyle and exercise regime are very demanding physically you may need extra rest during the week to fully recover. You will know if you are over-doing something as your body will take longer to recover and you could either need to sleep more or less, and you may have more infections than normal.

## Recovery Rate

Recovery rate works on two levels. The first is the ability to heal from damage caused by physical activity and injury, and the second is the speed in which you recover energy after intense exercise. Those with higher affinity will be able to recover faster from injury and have more energy post-rest period than those with lower affinity.

For example, those with good recovery can often have more training sessions per week and have less rest between bouts of maximal exercise.

# Muscle Mass



Muscle Mass  
**NORMAL**

## Results

The genetic variations have found that you have a normal response to resistance work.

## Genes of Interest

AMPD1, LEPR, INS-IGF2, MSTN

## Recommendations

This means you will put on muscle and gain a hypertrophy effect from resistance training. However, others may be able to gain muscle more effectively and efficiently. This does not mean you cannot build muscle. It just means that you fall into a normal category for muscle hypertrophy which will be similar to much of the population. Muscle mass increases are down to a multitude of genetic and environmental factors such as correct nutrition, training planning and resistance load are key to a successful hypertrophy response.

Your genetics do not define the maximum level of muscle mass you can gain, however you will have to train, eat and plan smartly to reach a high level in sports such as bodybuilding and other similar aesthetic events.

Muscle mass is important for general health as the larger the muscle mass brings, the more superior the metabolism. Muscle mass is also a natural physical armour against injury and allows for greater overall strength. Most people do not have gifts in genetics that give them naturally larger muscles, however any resistance training will lead to an increase in muscle mass and is therefore recommended. Good training also goes hand in hand with the correct nutrition to maximise muscle mass.

## Muscle Mass

Body composition can change due to exercise and training. For example, for muscle growth to occur we'd normally have to utilise resistance exercise. Muscle growth, or 'hypertrophy', is the increase in muscle size that occurs as an adaptation of training. Certain variants are linked highly to larger muscles, and this can either be as a direct genetic influence or as a precursor to the body's response to damage. Being gifted in this area can be considered as rare in the total population, but if you're lucky enough to be, it can be easily and effectively exploited for your benefit.

# Injury Risk



Injury Risk  
**NORMAL RISK**

## Results

Genetically, you have a normal risk for injury and your flexibility may be slightly improved.

## Genes of Interest

COL5A1, GDF5, COL1A1

## Recommendations

This puts you at a normal risk for overuse injuries however direct trauma can still occur and this will cause damage. Your results are linked to a quicker return to play from injury especially with correct nutrition and you may respond better to aggressive rehab. Overtraining is the number one cause of injury in sport, signs to be aware of include:

Trouble sleeping or sleeping for longer than before, anxiety, sweating, increased resting heart rate, restless limbs while sleeping (jerking etc.), depression, decreasing performance, catching more colds/flu (lower immunity) and menstrual dysfunction (female adolescence). All, or a few of these may appear while in training and being aware of them will help. Cease or lower the intensity of exercise before musculoskeletal injuries occur.

If an injury occurs and you believe it to be a ligament/tendon sprain or tear or you believe a muscle has been pulled the PRICE protocol can be implemented. This is vital as a first aid procedure to help with overall recovery. Increased risk of injury will require you to concentrate carefully on any twinges you sustain when exercising, and take rest appropriately, especially if you exercise more frequently.

Nutrition plays such a pivotal role in supporting collagen health, and with you having reduced collagen strength, with a heightened risk of injury. We have provided you with some suggestions to add to both your daily meal and your supplement routine. These will help build collagen in your body, and while we cannot negate injury completely; we can however improve the co-factors needed to optimise your connective tissue and collagen strength.

Injuries during exercise are due to damage from overuse; poor technique; or accident. Genetically, injury risk is associated with tendinitis, and therefore those with a genetically higher risk will be more predisposed to this inflammatory condition, commonly caused by overuse and/or lack of appropriate rest.

## Health Top Tips:

Increase the co-factors needed to support natural levels of collagen. See the list below.

Always make sure to warm up before exercise.

Staying hydrated is also key in avoiding injury.

Reduce pro-inflammatory foods.

As you have reduced Collagen, you should increase the following nutrients:

Vitamin C

## Injury Risk

Collagen is the most abundant protein in the body and is what makes up our skin and connective tissues. Certain genes affect how our collagen is made as well as its overall strength and durability, so any risks in this area will increase your chances of injury and could also affect your flexibility.

Vitamin C is an essential vitamin to allow for correct growth and repair of your body's tissues. This vitamin also aids in the production of collagen, and therefore helps build and maintain your skin, tendons, ligaments, blood vessels and cartilage.

Top 5 Vitamin C Foods.

Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

Copper

Copper aids the formation of red blood cells, melanin and collagen in the body.

Top 5 Copper Foods.

Sesame Seeds, Cashews, Soybeans, Mushroom, Shiitake, Beet Greens

Vitamin B-3

Vitamin B-3 has been found to raise the formation of collagen and decrease dark spots on the skin. To help increase the collagen in your body, you can consume niacin-rich foods such as.

Top 5 B-3 Foods. \* Majority of meats are excellent sources

Tuna, Chicken, Peanuts, Brown Rice, Sweet Potato

Iron

A study in the 2009 edition of the 'Journal of the Korean Society of Food Science and Nutrition', says iron can aid in collagen formation. Iron is a key building block and co-factor needed for the production of collagen. Therefore, consuming iron-rich foods may help boost your collagen levels.

Top 5 Iron Foods

Soybeans, Lentils, Spinach, Sesame Seeds, Garbanzo Beans

Inflammatory Foods

Inflammatory foods will have a detrimental effect on collagen health and production. Mainly as most pro-inflammatory foods deplete the body's micronutrient stores, and thus the co-factors needed for healthy production and maintenance. Pro-inflammatory foods will also lead to tissue degeneration through reduced circulation.

Top 5 Inflammatory foods.

Sugar is by far the worst for inflammation and is void of any nutritional value.

Refined/Processed Grains have no fibre, high GI and void of nutrients.

Cooking Oils, which are packed full of pro-inflammatory omega 6.

Additives and Sweeteners, MSG, food colouring and aspartame being a few.

Trans Fats that are found in fast foods and margarine



# Soft tissue Inflammation



Soft tissue Inflammation  
**LOWER RESPONSE**

## Results

Genetically, you have a lower inflammatory response and therefore the genetic markers linked to inflammation are favourable for you.

## Genes of Interest

AMPD1, GDF5, INS-IGF2

## Recommendations

However, multiple aspects affect inflammation such as nutrition, pollution and general stressors. Inflammation is essential in the body and your genes are not linked to risk factors of increased or chronic levels. On the other hand, it is important to note that it is still highly possible especially with environmental irritants that chronic inflammation can occur.

A lower inflammatory response means physical stressors will not cause a great deal of issues in soft tissues. This is highly important as it means you can probably go through more aggressive rehab if injured, as well as recover quicker with a more proactive approach to illness and injury. Inflammation is our immune system's response to dealing with anything it perceives as an "Attack" from a foreign invader.

Ideally, when you get sick or injured, you want a fast and strong inflammatory response. This will ensure you deal with an infection or injury with a response that will be short and sharp or "acute", resulting in no harm being done and eventually settling down. For example, if you twist your ankle, the body will produce a variety of symptoms including pain, heat and swelling. This response will ensure you don't walk on the ankle, as doing so could cause even more damage.

Increased inflammation can lead to many crucial metabolic pathways being reduced or shut down completely, affecting a variety of areas that are crucial to your weight loss and 'fat burning' goals. Maybe you are overtraining and not allowing your body time to recover effectively, or perhaps you are eating 'Pro' inflammatory foods that are keeping your inflammatory markers raised continuously.

Health Top Tips:

New Zealand Black Currants and Tart Cherries are both great for improving recovery rates and reducing pain.  
Reduce pro-inflammatory foods - see the list below

## Soft tissue Inflammation

Inflammation is one of many factors that the body goes through in response to harmful stimulus or stressors such as pathogens, irritants and tissue damage. Being a protective response from the body, inflammation is essential in health and homeostasis as it clears our necrotic cells and initiates tissue repair. Having no inflammation would be catastrophic for the body as harmful pathogens and diseases could run riot destroying tissues and organs. On the flipside, having a too much inflammation, chronic inflammation or an inappropriate amount of inflammation for the stimulus can also be negative as this also causes harm to the body and can lead to a host of diseases such as most allergies, cancer, rheumatoid arthritis and detrimental bowel conditions. Inflammation is therefore tightly regulated by the body. However, certain genetic traits are linked to inflammatory response and as a result, people will respond differently to physical stressors such as intense exercise, hard physical labour, illness and injury.

Take a cold shower after exercise, as it activates certain genes to help lower inflammation levels, especially the intestines, which will help maximise absorption of nutrients post exercise.

Turmeric is a useful anti-inflammatory

Creatine has been shown to reduce inflammation

Top 5 Inflammatory foods.

Sugar is by far the worst for inflammation and is void of any nutritional value. Refined/Processed grains have no fibre, have a high GI and are void of nutrients.

Cooking oils are packed full of pro-inflammatory Omega 6.

Additives and sweeteners, MSG, food colouring and aspartame being a few.

Trans Fats that are found in fast foods and margarine.



# Lean Body Mass



Lean Body Mass  
**NORMAL**

## Results

Genetically, you have a normal lean body mass outcome and therefore you fall into the most common outcome genetically.

## Genes of Interest

LEPR, TRHR

## Recommendations

A good lean body mass is great for general health, and nutrition is key for a successful muscle to fat ratio.

## Lean Body Mass

Lean body mass (LBM) is simply our total body weight minus fat. It helps us to determine whether or not we're more likely to have lower body fat levels and higher muscle mass. A higher lean body mass through genetics is beneficial to most sports - although being gifted in this area is a rarity.

# Power-To-Weight Ratio



## Results

Genetically, you have a good outcome for power to weight therefore you fall into a slightly rare category for genetic power to weight.

## Genes of Interest

LEPR, TRHR, AMPD1, ACE, INS-IGF2

## Recommendations

This result means you may have a slightly easier time improving power to weight statistics.

## Power-To-Weight Ratio

Power-to-weight is an important measurement for many sports and activities, especially those that are weight categorised. Power-to-weight is closely linked to lean body mass as, in general, the more contractile tissue we have against non-contractile tissue, the greater the power-to-weight will be. However, other aspects come into play such as the general power of muscles and tendons as well as the density of bones.

# Exercise Effect On Weight



Exercise Effect On Weight  
**NORMAL RESPONSE**

## Results

Your genetic variants show that you have a normal outcome.

## Genes of Interest

ADRB2, LPL, FTO, LOC

## Recommendations

This means that a combination of diet and physical activity/exercise is probably the best way for weight control and fat loss. This is the most common outcome, and even those with beneficial exercise variants have to consider diet but just to a lessened extent. We would recommend that you look into your diet aspects to truly understand your weight, exercise has multiple other benefits however and this does not mean you should neglect it.

## Exercise Effect On Weight

Physical activity in conjunction with a balanced diet is important for a good general health status. However, certain gene variants appear to affect how much of an impact physical activity has on our fat mass. By knowing this outcome, you can better plan your weight control and fat loss planning. The common outcome is "normal" for most of the population. Body composition represents the arrangement between bones, fat, visceral tissue and muscle present in the body. It's therefore important to use this information in relation to the information about muscle mass and lean body mass. Just being able to reduce fat mass is not the be all and end all, as increasing muscle mass is also key to a healthy body composition.

# Carbohydrate Response



Carbohydrate Response  
**NORMAL RESPONSE**

## Results

Your genetic profile shows an outcome of having a normalised response to carbohydrates

## Genes of Interest

ADRB2, PPARG

## Recommendations

This means that while overconsumption will cause weight gain you can in fact eat more than some others and utilise this as energy for the gym, sport or any physical activity.

Even though you have a normal response to carbs it is recommended that total sugars do not make up a large proportion of your full energy intake. Carbohydrate intake should come from a balanced mix of complex carbohydrates, simple carbohydrates and also resistant starches. Resistant starches include cruciferous vegetables that don't fully digest in the body but will instead provide fibre. No matter the carbohydrate intake you should still aim to consume 10-20g of fibre per day, all depending on your individual eating habits.

## Carbohydrate Response

Carbohydrates of which there are three types- sugar, starch and fibre - provide the main source of energy for the body. We also need to see whether they are simple or complex carbohydrates, as this will be a measure of how quickly your body can break them down and release the glucose into the blood stream. As an energy provider, carbohydrates contain 4kcal/g and are important for maintaining good health.

Simple carbohydrates:

Simple carbohydrate consists of monosaccharides (1 sugar molecule) and disaccharides (2 sugar molecules). Below are a few examples of each and the food sources that they are contained in. Simple sugar (Monosaccharides) examples Glucose: Dried and fresh fruit, honey and syrups, white bread, rice, pasta Fructose: Fruit, baked goods, fast and processed foods. Galactose: Yogurt, honey, cherries, celery, plums. Simple sugar (Disaccharides) examples Maltose: Cereal grains, corn, potatoes, legumes. Sucrose: Chocolate, table sugar, fruit, peanut butter, almonds. Lactose: Milk, cream, yogurt, cheese, milk chocolate.

Complex carbohydrates:

Complex carbohydrates as the name suggests is comprised of many sugars. Below are a few examples of each and the food sources that they are contained in.

Starch (Rapidly digesting):

Breakfast cereals, rice, pasta, corn, oats.

Starch (Slowly digesting):

Whole grains, legumes, potatoes.

Starch (Resistant):

Beans, brown rice, chickpeas, seeds.

Glycogen:

Is created in the body following carbohydrate digestion.

Fibre (Soluble):

Blends with water in your gut to form a gel. Onions, beets, oats, beans.

Fibre (Insoluble):

Doesn't breakdown in water and passes through your gut intact.

Nuts, whole wheat, brown rice.

Studies have shown that for some people with a particular genetic profile, over-consumption of these macronutrients can increase the risk of gaining weight. All carbohydrates, regardless of where they come from, are broken down into glucose, which is used to fuel activity and is stored in the body as glycogen. You should always opt for complex carbohydrates, which contain fibre and starch take longer to get digested thus providing a more consistent energy source for a longer period of time.

Not all activities utilise glucose in the same way, very intense short bursts of activity don't use much glucose but anything that is prolonged often relies more of the energy properties of glucose. The main point here is that carbs are used for demanding tasks and are important for anyone who is exercising regularly as they provide energy and are best eaten around times of intense activity. Having a diet higher in simple carbohydrates has many negative health connotations associated with it, such as increased inflammation, diabetes and obesity.

# Saturated Fats Response



Saturated Fats Response  
**NORMAL RESPONSE**

## Results

Your genetic profile is associated with a normal response of weight gain from the overconsumption of total fats and especially saturated fats.

## Genes of Interest

FTO, TCF7L2

## Recommendations

This is a positive outcome and therefore minimising fats in the diet is not as important, moderation should still be key and a concentration on unsaturated fats is the wiser option. Your genetic variants mean that you can have a slightly higher total fats intake in comparison to others, which is beneficial to hormone creation, energy levels and cholesterol. Fats are required for the absorption and transportation of the fat-soluble vitamins A, D, E and K, which all have important roles to play in the body. Saturated fat and cholesterol also have a direct correlation and effect on hormone regulation.

## Saturated Fats Response

Fats can be found in almost all foods and are the most energy-rich macronutrient, containing 9kcal/g - which is over twice as much as protein and carbohydrates. Animals use fats as the most economical way to store their energy. However, due to its high calorific value, too much fat can sometimes have a detrimental effect on our health. Fats are often split into unsaturated and saturated fats.

Saturated fats are solid at room temperature and are found in many foods, both sweet and savoury. Most saturated fats come from animal sources, including meat and dairy products, as well as some plant foods, such as palm oil and coconut oil. The main sources are fatty cuts of meat, butter, lard, cakes, palm oil, coconut oil, cream and ice cream.

They often get a bad reputation for being unhealthy, but our genetics could impact the effect they have, especially when controlling our bodyweight. Studies have shown that excess consumption of different fats can increase risk of weight gain, depending on your genotype.



# Unsaturated Fats Benefit



Unsaturated Fats Benefit  
**REDUCED BENEFIT**

## Results

Your genetic profile shows that a diet high in unsaturated fat in terms of weight control will not have as much benefit as it would in others with different variants. But we still need to be aware of the various health benefits that unsaturated fats offer (Please see recommendtaions list)

## Genes of Interest

APOA5, ADIPOQ

## Recommendations

Unsaturated fats in most instances are still more beneficial than saturated fats for health, wellbeing and weight maintenance. Moderation is crucial and therefore you should be more aware of the fats in your food. Studies have indicated that a diet rich in essential fatty acids, and higher Omega 3 fatty acids (i.e Linolenic acid [ALA], eicosapentaenoic acid [EPA], and docosahexaenoic [DHA] have been generally associated with decreased biomarkers of inflammation, and increasing overall health.

ALA forms of omega-3 fatty acids for improvement and prevention of the following health conditions:

Cardiovascular disease, Hypertension, Excessive blood clotting, Pregnancy/lactation, PMS, Fibrocystic breast disease

EPA and DHA forms of omega-3 fatty acids for improvements and prevention of the following health conditions:

Cardiovascular disease, Hypertension, High cholesterol, Diabetes, Excessive blood clotting, Alzheimer's and Parkinson's disease, Nervous system development, Depression, Bipolar disorder

Health Tips:

Macadamia nut oil is a great source and has one of the highest smoke points for cooking.

Avocados are great way to boost glutathione, which is one of the most powerful antioxidants. Eliminating toxins, delay ageing and boost the immune system.

It is best obtaining your Omega 3 from a variety of sources. See list

## Unsaturated Fats Benefit

Unsaturated fats basically fall into 2 main groups: Monounsaturated and Polyunsaturated. Both are generally regarded as more beneficial and healthier for you than saturated fats. Unsaturated Fats like all fats has 9kcal/gram and can result in weight gain if excessive amounts are consumed. They are found in a variety of foods from olive oil, nuts and seeds, and have many positive health benefits associated with them. These include protection from free radical build up due to oxidation damage within the body, to improving insulin sensitivity and blood sugar control.

Polyunsaturated fats are found in both plant and animal sources and are known as Alpha Linolenic Acid known as (Omega 3), Linoleic Acid known as (Omega 6) and Arachidonic acid (Omega 6). Your body can synthesise all the fatty acids you will require from the essential fats Alpha Linolenic and Linoleic. 'Essential' means that your body cannot make them, and you must get them from your diet. It is extremely important to obtain these in the correct 1:1 ratio's, but unfortunately the western diet contains larger amounts of Omega 6, which is found in vegetable oil and processed foods and can throw this balance out. This can result in increased inflammation and a reduction in immune function, thus heightening your chances of ill health. Omega 3 are probably one of the most well-known fats that you are likely to have heard of. There are a variety of Omega 3 from Alpha Linolenic Acid, which is found in chia seeds, flaxseeds, walnuts that are sources of plant-based Omega 3. The main issue is trying to obtain sufficient

below.

Top 5 sources of Omega 3.

Flaxseeds, Walnuts, Sardines, Salmon, Tofu

and effective amounts of both (DHA) and (EPA) from plants, which is extremely difficult as humans don't convert them efficiently, therefore, animal sources will need to be the main supplier. Fats also facilitate in the absorption then transportation of the fat-soluble vitamins A, D, E and K, which all have important roles to play in the body.



# Protein Response



Protein Response  
**GOOD RESPONSE**

## Results

Your genetic profile is linked with a beneficial response to protein.

## Genes of Interest

FTO, TFAP2B

## Recommendations

This means that protein will have a very positive effect on weight management, muscle maintenance, muscle gain and general health. You have the ability to breakdown protein to amino acids more so than others and therefore to exploit this gift it is recommended you intake protein from supplements to either help to build or maintain lean body mass.

Your level of activity should dictate your protein intake, however, your gene profile is linked to an efficient usage of protein. Consequently, you should intake protein before and after hard activity. Protein, is derived from the Greek "Of first importance", meaning it is the first macronutrient you should consume. Proteins are the most abundant and key organic compounds of all living tissue and organisms.

With the majority of protein being located in skeletal muscle, and the remainder in the organs, teeth, blood and other body fluids.

The basic structural unit of protein are amino acids, with digestion of protein resulting in its breakdown and release of individual amino acids. Classically there are nine essential amino acids that are required in the daily diet, as they cannot be made by the body. Amino acids are required for the synthesis of tissue protein and other metabolic functions:

### Proteins Function

Proteins are used to repair worn out tissue.

Proteins are used to build new tissue.

Protein can be used as an energy source.

Proteins make up a large percentage of essential body fluids.

Proteins aid in the blood transport of key nutrients such as vitamins, minerals and fats etc.

## Protein Response

Proteins are the essential nutrients for the human body. As a fuel, proteins contain 4kcal/g, just like carbohydrates. However, unlike carbohydrates and fat, the body does not store protein so it is important that we eat a variety of dietary protein every day. Studies suggest that a high-protein diet may be more beneficial for weight loss and improving body composition. Certain genetic variants are associated with better utilisation of protein for muscle growth and fat distribution. Therefore, by knowing your genetic variants, you can better plan your diet and supplementation! Protein is very important in our diet because, without it, we would not only fail to recover from exercise but we would not be able to build muscle in the first place - and it's our muscles that give us the ability to move our frame, the skeleton. Not only is protein essential for recovery and growth but it is also useful in regards to weight loss and a healthy lifestyle as it takes a longer time to digest and process than carbohydrates/fats. This means it keeps us fuller for longer, helping to manage cravings. Protein also requires more energy to digest and break down as it is more complex in structure than carbohydrates/fats (up to about 30% of the calories in protein is believed to be used when being broken down in digestion), meaning it is also the nutrient least likely to be stored as body fat.

## Amino Acids

Amino acids are most commonly described as the building blocks of protein. There are thousands of individual proteins in our body, with each one constructed and combined together from amino acids.

There are 9 Amino acids that the body requires as it is unable to create them, they are officially known as the "Essential Amino Acids." A tenth amino acid, arginine, can also be added to the list. But only in childhood during times of rapid growth, because although the body can synthesise it, we can't always produce sufficient levels of it.

If for any reason one or more are missing from your day-to-day food groups, then possible injury or illness awaits. A complete protein is a source of protein that contains sufficient amounts of all nine of the essential amino acids necessary for the dietary needs of humans or other animals. (This is where vegans and some vegetarians will need to be mindful, to make sure that they have complementary food groups to obtain complete proteins)

## Essential Amino Acids

Histidine, Isoleucine, Leucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan Valine

## Essential Amino Acid Food Sources

Dairy, Cheese and eggs, Meats such as lamb, beef, chicken and turkey, Seeds and nuts, Fish, Beans and lentils

# Sugar Response



Sugar Response  
**INCREASED RESPONSE**

## Results

Your genetics link you to a higher level of fat gain from consuming too much sugar.

## Genes of Interest

ADRB2, PPARG

## Recommendations

Therefore, if you are concerned about gaining bodyfat you should consider reducing sugar from all sources, and especially from processed foods which contain simple sugars and offer no nutritional value or benefit.

Please also be mindful of the sugar contained within fruits, as much as fruit contains "natural sugars" excessive fruit intake will negatively impact your ability to lose bodyfat or weight.

## Sugar Response

Sugar is a generic name for the soluble carbohydrates that are sweet to taste and found in the majority of foods. Sugar is derived from multiple sources. Simple sugars - known as monosaccharides - include glucose and fructose.

Then there's disaccharides and polysaccharides/oligosaccharides sugars, which are basically longer chains of sugars such as galactose and lactose (found in milk). Sugar offers us a quick fix of energy and can be utilised to some success by sports people who need energy fast. However, sugar often has a negative effect on our weight and health - the extent of which is controlled by our genetic variations.

Simple carbohydrates:

Simple carbohydrate consists of monosaccharides (1 sugar molecule) and disaccharides (2 sugar molecules). Below are a few examples of each and the food sources that they are contained in.

Simple sugar (Monosaccharides) examples

Glucose: Dried and fresh fruit, honey and syrups, white bread, rice, pasta

Fructose: Fruit, baked goods, fast and processed foods.

Galactose: Yogurt, honey, cherries, celery, plums.

Simple sugar (Disaccharides) examples

Maltose: Cereal grains, corn, potatoes, legumes.

Sucrose: Chocolate, table sugar, fruit, peanut butter, almonds.

Lactose: Milk, cream, yogurt, cheese, milk chocolate.

# Overeating Sweet Foods



Overeating Sweet Foods  
**NORMAL RISK**

## Results

Your genetics do not link you to a particularly strong fondness to sweet-tasting foods.

## Genes of Interest

TAS1R3, TAS1R2

## Recommendations

However, that does not mean that savoury foods are your preferred taste. Instead, it suggests you might not over-consume sweet or sugary foods all the time.

## Overeating Sweet Foods

Some genetics affect our taste preference, which may answer the question of whether you are a sweet or savoury person. While this might not seem like an important aspect to concentrate on, it can help you understand why you might crave certain types of food.

# Bitter Taste



Bitter Taste  
**NORMAL**

## Results

You have normal genetic variants linked to bitter taste acceptance.

## Genes of Interest

TAS1R3, TAS2R38

## Recommendations

This means that bitter foods, such as cabbage and broccoli should not taste too strong for you and therefore you will be more likely to enjoy these type of foods.

## Bitter Taste

Some genetics affect our taste preference, which may answer the question of whether you are a sweet or savoury person. While this might not seem like an important aspect to concentrate on, it can help you understand why you might crave certain types of food.

This section looks at how your taste buds respond to bitter foods, such as very dark chocolate.

# Snacking Risk



Snacking Risk  
**LESS RISK**

## Results

Your genetics link you to having a less likelihood to snack.

## Genes of Interest

MC4R, FTO

## Recommendations

But please be mindful that under times of stress or high demand that your tendency to snack might increase.

## Snacking Risk

Snacking can be a major problem and is often referred to as one of the major causes of obesity. Some people have a higher tendency to snack due to a lack of feeling satisfied after eating. Being aware that your genetics might be responsible could help you understand why you may have a tendency to snack.

# Metabolic Rate



Metabolic Rate  
**NORMAL METABOLISM**

## Results

Your genetic variants show that you have a normal energy expenditure.

## Genes of Interest

IL-6, UCP1

## Recommendations

This means that your body uses the same amount of energy as the majority of the population with a similar body weight, height, age and gender. In general, this is considered as a positive outcome, as those with a slower BMR often have a harder time losing fat. However, a higher calorie intake will be required for those wanting to gain weight.

## Metabolic Rate

The basal metabolic rate (BMR) is the rate of energy used by the body at rest. The release and use of energy in this state is sufficient to maintain vital organ function, respiration and repair. Basal metabolism is typically the largest component of our total energy expenditure (at approximately 60%). BMR is individual and is affected by height, weight, age, gender and activity levels. It can also be affected by our genes.



# Fat Distribution



Fat Distribution  
**GOOD DISTRIBUTION**

## Results

You have a good genetic predisposition for fat distribution.

## Genes of Interest

ADRB2, UCP2

## Recommendations

This is a positive outcome as it means you are less likely to store fat around the mid section, which is beneficial for your general health.

## Fat Distribution

Where we store fat is highly important as it is vital to our general health. Fat distributed across the torso is often looked upon as less favourable as it might have more impact on our health and wellness. Certain genetic variants are linked to the location of fat stored in the body and so it is important to know if genetics are impacting its distribution.



# Yo/Yo Diet Response



Yo/yo Diet Response  
**NEGATIVE TO HEALTH**

## Results

Your genetic profile is associated with an increased risk for weight regain, which means that you WILL gain excess weight and fat quicker after reintroducing calories from a deficit.

## Genes of Interest

ADRB2, IL6

## Recommendations

This is a negative outcome and means you will have to slowly decrease calories when wanting to lose weight and slowly increase calories when wanting to gain weight healthily.

## Yo/yo Diet Response

When it comes to obesity risk, successful weight management consists of two main components:

- 1) Initial weight loss, and
- 2) Weight maintenance

Some individuals find weight loss easy, but it's the maintenance phase that is commonly the long-term challenge. Some genetic profiles are associated with a greater propensity for regaining weight after the reintroduction of increased calories. Many people will find themselves going through periods of weight loss and weight gain – more commonly referred to as the “yo-yo” diet. The yo-yo diet can cause some people to gain more weight on their next cycle due to their genes telling them to store fat. In times of famine, our bodies will hold onto any nutrients we take in, and will store them in fat cells. The energy in these fat cells is less obtainable by the body, so they stay there as a reserve in case of other famines.

# Lactase Persistence



## Results

You are not genetically prone to losing the ability to digest lactose over time, however you may still be sensitive to lactose and you can still have congenital lactose intolerance which is something you will already know from birth.

## Genes of Interest

LCT (MCM6)

## Recommendations

Normal lactase persistence

## Lactase Persistence

While lactose intolerance can occur both environmentally and genetically, the results from this indicate only a genetic predisposition to lactase persistence over time, this is NOT congenital lactose intolerance just the ability to become lactose intolerance as you age. As we age, we often become worse at digesting lactose, and so those who have large breaks from dairy based foods can often cause a decrease in lactase (the enzyme needed to break down lactose) in the gut.

This could also bring on any lactose intolerance symptoms when a diet including dairy items is reintroduced.

# Vitamin D Deficiency



Vitamin D Deficiency  
**LOW RISK**

## Results

Vitamin D or the sunshine vitamin, which is actually a hormone has many positive health benefits, such as maintaining strong bones, modulation of cell growth, hormone, neuromuscular and immune function, as well as the reduction of inflammation. Vitamin D deficiency is a widespread problem in developed countries.

Some of the elements contributing towards this include lifestyle factors, such as reduced outdoor activities, old age, obesity, environmental factors, such as living in northern hemisphere and air pollution, poor dietary choices and genetic factors are all known to influence serum vitamin D concentrations.

Testosterone is also highly linked with vitamin D levels and, therefore, any risk should be met with swift supplementation to help prevent low testosterone levels.

## Genes of Interest

CYP2R1, NADSYN1, GC

## Recommendations

However, in times of little sunlight such as winter, it may be worth considering vitamin D3 supplementation. It is also worthwhile considering getting your vitamin D levels checked as deficiency affects around 1 in 5 of the world's population, and this dramatically increases to 3 in 5 in the elderly.

Low vitamin D levels can cause: an increased vulnerability to infections (especially upper respiratory tract), depressed mood, fatigue, weakness, insomnia and fertility disorders.

## Vitamin D Deficiency

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# Vitamin A Deficiency



Vitamin A Deficiency  
**AVERAGE RISK**

## Results

Your genetic profile shows some hampered conversion of beta-carotene to vitamin A.

## Genes of Interest

BCO1

## Recommendations

Therefore, to maintain the correct level of vitamin A, you need to eat a balanced diet. If you are vegetarian or vegan you will need a bit more coloured fruits and vegetables, especially those that are very dark green. If you eat a balanced diet you should have no need to supplement.

Low levels of vitamin A can lead to problems with eyes like reduced night vision or dry eyes, rough and dry skin, vulnerability to respiratory and urinary infections.

## Vitamin A Deficiency

Vitamin A is a fat-soluble compound and more than just a single nutrient as it is found in a variety of forms of which retinoids come from animal sources and carotenoids from plants.

Both of these will provide us with differing health benefits, such as being essential for the function of retinal pigments of vision, as well as for the growth and renewal of cells and tissues like mucosa and immune cells.

Vitamin A is known as the anti-infective vitamin and is required for normal functioning of the immune system. It is also needed for hormone metabolism and iron transportation and both an excess and deficiency of the vitamin are known to cause birth defects.

Pre-formed vitamin A (retinoids) exists only in animal products such as organ meats, fish oil and dairy products. However, there are about 50 carotenes that the body can convert into vitamin A. The most common is beta-carotene, which you can find in orange, yellow, green vegetables and fruits.

# Iron Deficiency



Iron Deficiency  
**NORMAL RISK**

## Results

Your genetic profile shows no increased risk for iron deficiency.

## Genes of Interest

TF, Tmprss6

## Recommendations

Therefore, a diet that is balanced, rich in dark green vegetables and a variety of food will be enough to maintain iron levels.

A lack of iron in the diet can cause fatigue, decreased performance (energy/ATP production), concentration and learning weakness, sensitivity to cold, pale skin, hair loss, brittle nails, palpitations, dizziness, increased susceptibility to infections. For athletes - increased pulse and lactate levels and decreased aerobic capacity.

## Iron Deficiency

Iron is an essential nutrient required by every human cell. The main function of iron is to transport oxygen to our cells and tissues for energy production. An iron deficiency is the most common nutritional disorder in the world and the leading cause of anaemia. Without anaemia, iron deficiency is usually associated with inefficient energy metabolism and a reduced muscle strength and endurance.

# Magnesium Deficiency



Magnesium Deficiency  
**NORMAL RISK**

## Results

Your results show that you have a normal magnesium risk.

## Genes of Interest

MUC1, ATP2B1

## Recommendations

Therefore, if you eat a balanced diet high in nuts, seeds, certain meats and vegetables you should not become deficient. If you find that you have trouble sleeping you could try supplementing 250mg before bed to see if this helps, and if so, it would indicate if you are deficient.

Green leafy vegetables such as spinach provide magnesium as chlorophyll contains magnesium. In addition, nuts, seeds, beans and some whole grains are also good sources of magnesium. Although magnesium is present in many foods, it usually occurs in small amounts.

As with most nutrients, daily needs for magnesium cannot be met from a single food. Eating a wide variety of foods, including five servings of fruits and vegetables daily and plenty of whole grains can help to ensure an adequate intake of magnesium. Making some simple changes to your diet can also help. Whole-wheat bread, for example, has twice as much magnesium as white bread because the magnesium-rich germ and bran are removed when white flour is processed.

As magnesium and calcium have a Ying/Yang type of relationship and are competing minerals, it is important to know, that the more calcium we eat, the more magnesium we will require.

## Magnesium Deficiency

As half the world's population is deficient in magnesium, so it's no wonder that many of the negative health connotations associated with deficiency are so prevalent.

Magnesium is an essential mineral and cofactor for over 300 metabolic reactions in the body. The body consists of about 25g of magnesium, 50-60% of which is in the bones and the rest in soft tissue. Our fast-paced modern lifestyles and reliance on many refined foods (which tend to have low magnesium content) mean that many of us are not getting enough magnesium in our diets.

Magnesium deficiency may lead to cardiovascular disease, hypertension, metabolic syndrome, and type 2 diabetes. Magnesium is also needed in energy production and is vital in tissue functions (such as the blood and muscles).

Low magnesium consumption, particularly against a background of high calcium intakes, increases the risk of cancer and cardiovascular disease, too. The optimal calcium-magnesium ratio is 2:1. Many calcium-rich foods like milk or cheese have a calcium-magnesium ratio of 10:1 or 30:1, which does not favour calcium or magnesium uptake.



# Potassium Deficiency



Potassium Deficiency  
**NORMAL RISK**

## Results

You have a normal genetic risk to potassium deficiency.

## Genes of Interest

MUC1, ATP2B1

## Recommendations

Therefore, if you eat a balanced diet your potassium levels should be within the healthy range.

## Potassium Deficiency

Potassium is an essential nutrient that constitutes 5% of the mineral content of the body. It's found in varying amounts in a plethora of foods and carries a whole host of important roles, from maintaining healthy blood pressure, improving kidney function and stabilising fluid and electrolytes.

Having a potassium deficiency (hypokalemia) can have an array of symptoms, from high blood pressure, headaches and dehydration. If potassium levels are too high (or low) then our heart and nervous system will be affected.

Potassium - along with sodium, chloride, calcium, and magnesium - is an electrolyte, meaning that it helps to conduct electrical charges in our bodies. Diets high in potassium are associated with improved blood pressure.

There are several factors that contribute towards this beneficial effect, including improved kidney function, reduction in blood clotting, and crucially inhibiting certain genes such as ACE, AGT and AGTR1, which convert angiotensinogen increasing vasoconstriction.

Potassium will allow more efficient vasodilation and improved blood flow. It is important to understand the synergy of potassium and sodium as well. They exist in a partnership; every time the body requires potassium you will also need sodium to maintain balance.

Importantly, with blood pressure issues increasing it could be related to the average diet becoming depleted in

potassium with higher concentrations of sodium, throwing the balance out of this crucially important relationship.



# Sodium Deficiency



Sodium Deficiency  
**NORMAL RISK**

## Results

You have a normal genetic risk to sodium deficiency

## Genes of Interest

MUC1, ATP2B1

## Recommendations

Therefore, you should not worry about any further supplementation of the nutrient. It's highly likely that you will be getting enough from your diet.

## Sodium Deficiency

Sodium is an essential nutrient for blood pressure, volume and pH. The minimal level of sodium a human needs per day is 500mg. We normally acquire our sodium from sodium chloride, which is also known as simple table salt.

Due to the first world diet, it is estimated that the majority of people over consume sodium and therefore any genetic risk of deficiency is unlikely to have much impact. However, those involved in heavy activity or highly-intense sports might find that their sodium levels drop more dramatically, which could have a negative effect on muscle efficiency and could lead to cramps.

# Vitamin B6 Deficiency



Vitamin B6 Deficiency  
**NORMAL RISK**

## Results

Your genetic variants show an normal risk for vitamin B6 deficiency.

## Genes of Interest

NBPF3

## Recommendations

This means you probably get the average recommendation of 1-3 mg from your food. Many foods are reinforced with B6 and it can come from multiple sources. Meats are a great source with tuna, chicken and beef being great sources of B6.

If you are vegetarian or vegan you can get B6 from bananas, spinach, hazelnuts and sweet potatoes. Low levels of vitamin B6 in the body can cause sleepiness, fatigue, sores in the sides of the mouth, a swollen tongue, inflammation of the skin, depression, cognitive problems, anaemia, carpal tunnel syndrome, high homocysteine, epilepsy, ADHD and asthma.

## Vitamin B6 Deficiency

B6 is part of a family of 8 vitamins that are all essential to life and all provide us with a variety of health benefits.

It is crucially involved at several points during the metabolism of carbohydrates, and most importantly with the enzyme that draws carbohydrates (glycogen) out of storage from inside the cell requires B6 for its activity. Hence why it is such an important nutrient for improving your energy systems and performance.

B6 is also hugely important in the removal of chemicals from our body, with the first step making the chemicals water-soluble which allows the second step of binding of these chemicals and removal. And a low circulating level of vitamin B6 is a risk factor for both cardiovascular disease and rheumatoid arthritis.

During high intensity/endurance exercise or events, vitamin B6 is also more prone to being lost during sweating and urination due to it being a water-soluble vitamin.

# Vitamin B12 Deficiency



Vitamin B12 Deficiency  
**NORMAL RISK**

## Results

You have a normal outcome for B12 deficiency, meaning you already absorb the required amount of B12 from your food.

## Genes of Interest

MTHFR

## Recommendations

If you are eating a varied diet that includes meat and dairy you should easily be getting the required levels of B12 to stay healthy. As supplementing vitamin B12 has minimal risks associated, it is worthwhile taking at least 25mcg if you are vegan or even vegetarian.

General symptoms of a poor intake of Vitamin B12 are loss of appetite, weakness, easily fatigued, dizziness, pale skin, shortness of breath, sleep disorders, nausea and a loss of menstruation.

## Vitamin B12 Deficiency

Vitamin B12 as the name suggests is part of the B complex of vitamins, which are involved in energy metabolism and other biological processes. B12 is one of the most common deficiencies and affects the whole body, from brain to bone.

Deficiency in vitamin B12 is often related to poor B12 absorption, which can be due to a lack of stomach acid, rather than direct dietary deficiency. Some people also need a lot more B vitamins than others.

Deficiency becomes more likely as we age and more prevalent in vegetarians and vegans, as B12 cannot be obtained through plant, fruit or vegetable sources. In adults, typical deficiency symptoms include loss of energy, tingling, numbness, reduced sensitivity to pain or pressure, blurred vision, abnormal gait, sore tongue, poor memory, confusion, hallucinations and personality changes.

These symptoms often develop gradually - over several months to a year - before being recognised as due to a vitamin B12 deficiency and are usually reversible on administration of B12. A lack of vitamin B12 can also cause anaemia, dementia and nervous system damage.

# Folate Deficiency



Folate Deficiency  
**LOW RISK**

## Results

Your genetic profile shows minimal increased risk of folate deficiency.

## Genes of Interest

MTHFR, SLC19A1, MTRR

## Recommendations

However, deficiency may still occur at certain periods during your life. It is also recommended that you get your levels checked with a blood analysis, which should look at erythrocytes.

Make sure you keep a balanced diet high in folate rich food like spinach. Many cereals and other foods are reinforced with folate these days.

## Folate Deficiency

Folate (vitamin B9) is a natural nutrient found in food (hence why its name sounds like foliage and the Latin form of folium, meaning "Leaf").

It is also referred to as folic acid or folacin and is best known for its prevention of pregnancy defects. It's a crucial nutrient that supports important physiological functions such as DNA synthesis, cell division and methylation, which is a mechanism our cells employ to regulate gene expression and function.

Adequate folate intake is also helpful in lowering the risk of some forms of cancer, especially in genetically susceptible individuals, and could also lower the risk of cardiovascular diseases by keeping homocysteine levels low.

Folate is also responsible for the synthesis of brain neurotransmitters, dopamine, norepinephrine and serotonin.

# Omega-3 Benefit



Omega-3 Benefit  
**NORMAL BENEFIT**

## Results

Your genetic variants are not linked to a deficiency in omega-3

## Genes of Interest

APOA5, ADIPOQ, PPARG, FTO

## Recommendations

Therefore, supplementation may not be required. If you eat a diet rich in fish, nuts and seeds you will easily reach healthy levels! If you are on a restricted diet, then it may be wise to at least supplement 5g per day of omega-3.

General symptoms of a poor omega-3 intake include skin problems, behavioural disorders (hyperactivity), abnormal vision, eye dryness, circulation disorders, inflammation, increased susceptibility to infections, concentration disorders and depression.

## Omega-3 Benefit

Omega-3 fatty acids are essential for our health. Omega-3 fatty acids include 3 different fat acids shortened to ALA, EPA and DHA, which are all essential, meaning we cannot produce them in our bodies, so we have to consume them in the form of food.

Omega-3 fatty acids are primarily essential for a healthy heart and blood vessels, as well as the eyes and the brain.

There is evidence that omega-3 fatty acids are useful in the prevention and treatment of heart disease, cognitive function and depression, EPA and DHA are essential for prevention of these ailments.

Not only that, but the deficiencies or imbalances in brain fats are now known to be associated with everything from dyslexia, hyperactivity, depression, schizophrenia and manic depression.

# Calcium Deficiency



Calcium Deficiency  
**NORMAL RISK**

## Results

Your genetic variants are not linked to a calcium deficiency.

## Genes of Interest

VDR

## Recommendations

Therefore, if you eat a balanced diet your calcium levels should be within the healthy range. Make sure your calcium intake is at least 1000 mg per day. A cup of yoghurt and a slice of cheese can give you around 50% of your RDA.

General symptoms of a poor calcium intake are: weakness, memory loss, muscle spasms, numbness and tingling in the hands and face, depression and psychological issues.

## Calcium Deficiency

Calcium is the best-known mineral needed for strong bones. As one of the most abundant minerals in the body, Calcium is mostly located in the bones and teeth. Other necessary nutrients for strong bones are vitamin D and magnesium, along with many other minerals and vitamins.

Low calcium intake has been associated with a multitude of disorders, such as a risk of hypertension, preclampsia, premenstrual syndrome, obesity, polycystic ovary syndrome and hyperparathyroidism. Weight bearing physical activity is also necessary to build strong bones, optimise bone mass and reduce the risk of osteoporosis.



# BCAAs Benefit



## Results

BCAAs supplementation will most likely not be of benefit to you.

## Genes of Interest

FTO, TFAP2B

## Recommendations

However, if your diet is restricted, especially if you follow a vegan diet, BCAAs supplementation may be worthwhile.

## BCAAs Benefit

BCAAs consist of three amino acids bound together on a branched chain nature.

These are: LEUCINE, ISOLEUCINE, VALINE

Out of these three amino acids, it appears that leucine has the greatest effect in preventing muscle tissue breakdown and increasing protein synthesis. It also seems that isoleucine plays a larger role in glucose uptake within the cells, while valine on the other hand appears to have neural effects and maintains nitrogen balance within the body.

When a person's diet is low in BCAAs due to food preference or a vegan/vegetarian diet, for instance, then supplemental BCAAs will be beneficial in promoting protein synthesis and muscle tissue growth. However, studies are still uncertain as to whether the supplements can help those with an adequate dietary intake (1-1.5g/kg of protein).

Genetic variants may help us understand how we utilise these three amino acids and if it is therefore worth using them.

# Choline Benefit



Choline Benefit  
**VERY BENEFICIAL**

## Results

Increasing your choline consumption would prove very beneficial to you.

## Genes of Interest

FADS1

## Recommendations

Please be aware that just with all micronutrients, choline levels can be depleted through exercise due to sweating, or during times of stress or illness.

High alcohol consumption can also increase your risk of choline deficiency. This can be magnified if choline intake is low.

Choline plays an important role in fat transportations and metabolism, with particular attention to cholesterol regulation from the liver. While optimal choline levels may not offer any fitness or performance related properties, deficiency can offer a variety of negative health effects or illnesses, such as: Fatty Liver, Liver Cirrhosis, Kidney haemorrhage

## Health Top Tips:

Obtain your choline from a variety of food sources. See the list below

Try and mix your Choline foods with foods high in Folate, B6 and B12

Adult males should aim for 500mg per day, with females aiming for 400mg

## Top 5 Choline Foods:

Eggs, Chicken, Cod, Brussels Sprouts, Broccoli

For methylation to function correctly choline needs other key nutrients to aid in that process, for instance folate and vitamins B6 and B12 are all crucial.

## Choline Benefit

Choline is a water-soluble nutrient that is neither classified as a vitamin nor a mineral but is often grouped with the B-complex family. Until recently, it was incorrectly thought that we could produce enough internally to meet our daily needs.

Luckily, Choline is contained in a wide variety of food groups with eggs, chicken, salmon and brussels sprouts all containing good levels. Deficiency can cause a host of health issues such as a reduction in metabolism, the transporting of lipids from the liver, muscle damage, methylation and down regulation of neurotransmitters.

Methylation is an extremely important function in our body, from correct and efficient signalling between cells and genes to improved detoxification and cardiovascular health.



# Glutamine Benefit



Glutamine Benefit  
**LOWER BENEFIT**

## Results

Increasing glutamine intake will not cause major improvements in your health or training in most circumstances

## Genes of Interest

COL5A1, GDF5, COL1A1

## Recommendations

However, it may become important if you have had severe trauma physically or injured.

## Glutamine Benefit

Glutamine is not an essential amino acid but is considered conditionally essential and the most common found in the body. It has a variety of important roles, from metabolising protein, reducing muscle breakdown, boosting immune, digestive and brain function, to helping the body to produce the Human Growth Hormone.

One of its most important roles is maintaining a nitrogen balance throughout the body. Glutamine is used by a variety of organs such as the kidneys, liver, small intestines, with the skeletal muscle also accounting for 70% of glutamine production. It is extremely useful for intestinal and digestive health as the tissue lining that protects the intestines prefers glutamine as its fuel source.

# Creatine Benefit



Creatine Benefit  
**SOME BENEFIT**

## Results

Your genetic variants show that extra creatine intake beyond a normal balanced diet will have little impact.

## Genes of Interest

AMPD1, IL-6, ACTN3, NOS3, ACE, VEGFA, AGT, PPARA, TRHR, LEPR, INS-IGF2, COMT

## Recommendations

However, creatine has been shown to reduce inflammation, and stop neurons from being destroyed by toxins, and thus having neuroprotective properties.

Creatine may prove effective as an anti-ageing supplement, as initial studies have suggested that collagen and intracellular stores of energy get affected and diminish with age. Creatine can help replenish energy stores and improve skin cell health, as well having enhanced antioxidant properties.

### Health Top Tips:

Remember to maintain good fluid levels throughout the day, as creatine super hydrates the muscles and may cause slight tears with insufficient hydration.

Creatine levels can be diminished with extended cooking times.

### Top 5 Creatine Foods

Herring, Pork, Beef, Salmon, Tuna

## Creatine Benefit

Creatine is an organic acid that helps supply our cells with energy. This is especially important for sportsmen and women as the cells primarily involved are found in muscle tissue. This energy is attained by increasing the construction of adenosine triphosphate, or ATP.

Creatine is produced naturally in our bodies from the breakdown of amino acids, which occurs mainly in the liver. The creatine is then transported via the vessels to our muscles, with 90-95% of all total creatine located in the skeletal muscles. As creatine is manufactured by the body from the three amino acids L-methionine, L-arginine and glycin, it is not an "essential" nutrient.

However, as 50% of all our stored creatine comes from food, and meat in particular, studies show that vegetarians have a much lower creatine store within the skeletal muscles over meat eaters. While this doesn't mean that vegetarians should supplement actual creatine (although that is an option) a more natural method of increasing these levels would be to supplement with foods that contain the aforementioned amino acids, thus allowing the body to synthesise the required creatine.

# Beta-Alanine Benefit



Beta-Alanine Benefit  
**SOME BENEFIT**

## Results

Your genetic variants show that extra beta-alanine intake beyond a normal balanced diet will have some impact on muscle stamina and general health.

## Genes of Interest

ADRB2, COL5A1, ACTN3, PPARA, ACE, ADRB3, PPARGC1A, AMPD1, ADRB1, VEGFA, GABPB1, IGF2

## Recommendations

It is therefore recommended attempting to get some more beta-alanine through your diet. Adding certain foods or nutrients into your diet may have several health benefits.

Beta-alanine is one such nutrient for improving your health, with anti-ageing and immune enhancing properties, as well the antioxidant capabilities of carnosine.

Beta-alanine is not required for the synthesis of protein, but more so in preventing changes in the structure and function of protein in your body. Once converted to carnosine it has enhanced antioxidant and protective capabilities and reduces the rate of cellular ageing.

Having a whole host of health benefits, beta-alanine helps the removal of toxic metals and protects cells from ROS (reactive oxygen species) or toxic proteins.

## Top 5 Alanine Foods

Cod, Pork, Cured Beef, Turkey, Eggs

Please be aware that high doses may induce paresthesia, an itchy, tingly feeling that may be uncomfortable.

## Beta-Alanine Benefit

Beta-Alanine, commonly known as alanine, is a non-essential amino acid, and unlike the majority of amino acids, it's not used to synthesise proteins. Once consumed, beta-alanine is quickly converted to carnosine, which is then stored in your skeletal muscle.

Beta-alanine is extremely effective at reducing lactic acid build up in your muscles during intense exercise, which can lead to an increase in performance. It can also be used post exercise to buffer and remove the lactic acid that has built up - allowing the body to recovery more effectively.

Getting sufficient levels of beta-alanine in your diet can be achieved through consuming foods high in dipeptides, which are found in animal protein-rich foods such as cod, pork, beef etc.

It's for this reason that vegetarians and vegans will have much lower concentration levels of carnosine in their muscles.

# Arginine Benefit



Arginine Benefit  
**BENEFICIAL**

## Results

Your genetic variants show that arginine supplementation will benefit to you, but it's important that you consider both diet and supplementation.

## Genes of Interest

ADRB1, VEGFA, GABPB1, ACE

## Recommendations

Supplementation should be pure powder and be within a dosage of 4-8g. Higher dosages are linked with larger vasodilation which is favourable for general heart health and those involved in exercise.

Arginine is used to synthesise nitric oxide, improving vasodilation and making blood vessels relax and expand, which increases blood flow and oxygen uptake. It's also extremely important in nitrogen detoxification and helping to reduce ammonia levels within the body, which is formed when protein is broken down by bacteria in the intestines.

Increasing arginine levels may improve mental health and cognition, as ageing brains seem to have lower levels of nitric oxide.

## Top 5 Arginine Foods

Sesame Seeds, Soybeans, Spinach, Pork Loin, Turkey

## Arginine Benefit

Arginine is an essential amino acid, conditional to all stages of human development. It is highly important in aiding blood flow and nitric oxide creation and, because of these aspects, it is often vital in times of human illness.

Hypertension and diabetes are two diseases in which arginine is particularly important and is therefore a worthwhile supplement for anyone suffering from these ailments. Although it can make low blood pressure worse, genetic variants may help explain the impact arginine will have on us with some having a large benefit from supplementation.

# Caffeine Sensitivity



Caffeine Sensitivity  
**HIGHER SENSITIVITY**

## Results

Your genetic profile indicates that you have a higher sensitivity to caffeine.

## Genes of Interest

CPLX3, CYP1A2

## Recommendations

This outcome means that even small amounts of caffeine can cause undesirable effects. People who are hypersensitive to caffeine can experience unwanted symptoms such as insomnia, jitteriness and increased heart rate after consuming as little as 100mg.

We recommend that you minimise or reduce your caffeine intake or you avoid caffeine entirely.

If you rely on caffeine for an energy boost, perhaps consider other ways to naturally increase energy and alertness, such as increasing your physical activity, getting enough sleep and taking vitamin supplements such as B vitamins and tyrosine.

## Caffeine Sensitivity

Caffeine is a commonly consumed psychostimulant and is found in coffee, tea and other caffeinated foods and medications. Caffeine promotes wakefulness, enhances mood and increases mental alertness. However, it can also produce anxiety, nausea, increased blood pressure, trembling and jitteriness. These effects vary for different people and are due to certain genetic variants. Caffeine sensitivity does not necessarily correlate with the efficiency of the body to metabolise caffeine, as even fast metabolisers can still be sensitive to caffeine and get the jitters from drinking coffee. The variations in caffeine sensitivity are due to differences in the amount of caffeine receptors in the brain and the efficiency of these receptors to bind caffeine. These factors are dependent on your genetic make-up.

# Genetic Bone Mineral Density



Genetic Bone Mineral Density  
**NORMAL DENSITY**

## Results

Genetically, you have Normal Bone Mineral Density and subsequently a normal risk of bone mineral density disorders in later life.

## Genes of Interest

VDR, CYP2R1, NADSYN1, GC

## Recommendations

This result means that a healthy and balanced diet should cover your vitamin and mineral needs for strong bones. The RDA of calcium is 1000mg. Foods rich in calcium include dairy products like milk, yoghurt and cheese, fish, such as sardines and salmon, and vegetables including collard greens, kale and broccoli.

Vitamin D is an important mineral necessary for calcium absorption. It can be found in sunlight, supplements and some fortified foods including various dairy products, soy milk, cereals and some types of fruit juice.

## Genetic Bone Mineral Density

Minerals such as calcium give the bone strength, whereas other necessary nutrients for strong bones include vitamin D, magnesium, potassium and many other vitamins and minerals.

Bone tissue is constantly broken down and rebuilt throughout our lifetimes, but our bones naturally become thinner as we age because existing tissue is broken down faster than new bone is made. This can lead to conditions such as osteoporosis and increased risk of fracture.

Weight bearing exercises are also necessary to maintain strong bone density and prevent osteoporosis and other bone mineral disorders. Certain genetic variants can lead to a slight risk of having problems in this area, also.



# Genetic Obesity Risk



Genetic Obesity Risk  
**NORMAL RISK**

## Results

Your genetic profile suggests you have a normal risk of obesity.

## Genes of Interest

FTO, MC4R, TNF, APOA2, ADIPOQ

## Recommendations

Although this indicates your genetic predisposition is like the majority of other people, there are a number of things you can do to control the situation, including making educated diet choices and getting regular exercise.

## Genetic Obesity Risk

Obesity is a medical condition in which excess body fat has accumulated to such a level that it is having a negative effect on health. A person is considered obese when their body mass index (BMI) is over 30 kg/m<sup>2</sup>. Obesity increases the likelihood of developing various diseases including cardiovascular diseases, type 2 diabetes, dyslipidaemia, obstructive sleep apnoea, cancer, osteoarthritis, depression and ultimately 8-13 years shorter life expectancy. Obesity is most commonly caused by a combination of excessive food intake, lack of physical exercise and genetic susceptibility.

# Genetic Type 2 Diabetes Risk



Genetic Type 2 Diabetes Risk  
**NORMAL RISK**

## Results

Your genetic profile shows that you have a normal risk of developing Type 2 Diabetes.

## Genes of Interest

ADRB2, PPARG, PLIN1, IL6, FTO, UCP1, CDKN2A, MTNR1B, HHEX, SLC30A8, SLC11A2, GCKR

## Recommendations

Genetics only accounts for a small increase in risk as lifestyle factors will have more importance in any development of Type 2 Diabetes. The more risk factors that apply to you, the higher the chances are of getting it. Lifestyle factors that can contribute to the development of the disease include getting little or no exercise, smoking, stress and sleeping too little or too much.

There are a number of lifestyle changes you can make to reduce the risk, these include: Losing weight: losing just 5 to 10% of your weight can cut your risk of type 2 diabetes in half. Getting regular exercise. Eating a balanced diet. Quit smoking. Getting the right levels sleep.

## Genetic Type 2 Diabetes Risk

Type 2 Diabetes is a long-term metabolic disorder that is characterised by high blood sugar, and relative lack of and resistance to a hormone called insulin. Insulin is made in the pancreas, which turns glucose into energy. Without the required amount, long-term complications can include things like heart disease, strokes and diabetic retinopathy, which can result in blindness, kidney failure and poor blood flow in the limbs - something that could eventually result in amputation. In type 1 diabetes the body is unable to make insulin. However, people with type 2 diabetes can make insulin but the cells in their body are unable to use it the way they should. This is known as insulin resistance. Type 2 diabetes primarily results from obesity and lack of exercise, however some people are more genetically at risk than others.



# Genetic Infection Risk (Colds/Flu)



## Results

Your genetic profile shows you have a normal risk of infections. This means you are as likely to catch the cold or flu as the majority of people.

## Genes of Interest

FUT2, GPX1

## Recommendations

There are a number of common-sense precautions you can take to slow the spread and reduce the likelihood of getting sick:

**Flu Vaccine:** Can help protect vulnerable groups such as the elderly and those with underlying health conditions against infection from influenza viruses.

**Wash your hands after contact with people:** Washing your hands is a quick and easy way to keep you fit and healthy by removing dirt, viruses and bacteria to stop them spreading to other people and objects, which can spread illnesses.

**Eat plenty of fruit and vegetables:** Incorporating lots of fresh fruits and vegetables into your diet each day will allow for a diverse range of vitamins and minerals, which will be fundamentally important to maintaining a strong immune system and health.

**Quit smoking:** smoking increases the risk of infections by destroying the cilia (small hair-like structures that catch bacteria and viruses and help flush infections out) in your nose and lungs and thereby decreases your immune response.

**Take probiotics:** probiotics improve your gut microbiota population by increasing the number of healthy bacteria in your gut, which improves the body's resistance to bacterial and viral infections.

## Genetic Infection Risk (Colds/Flu)

The common cold and influenza (also known as the flu) are both contagious viral infections of the respiratory tract. Although the symptoms can be similar, the flu is much worse and can lead to more serious problems such as pneumonia. Symptoms of a cold include congestion, sore throat and sneezing. Coughing, headache and chest discomfort are experienced with both the flu and a cold. However, the flu is also associated with fever, body-aches, fatigue and weakness. These viruses can enter your body through your mouth, eyes or nose. It can spread through droplets in the air when someone who is sick coughs or sneezes, and can also spread by hand-to-hand contact. While anyone can catch one of these infections, some people are more genetically susceptible.

# Stress Response to Pressure



Stress Response to Pressure  
**SLIGHT RESPONSE**

## Results

Studies indicate that you share similar genetic variants with users that have shown a slight stress response whilst under pressure.

## Genes of Interest

COMT, DTNBP1, CHRNA4, BDNF

## Recommendations

Your results indicate that pressure may cause a small rise in stress levels that is higher than in some others.

This may in certain circumstances be helpful, especially when attempting to hit a deadline or when under pressure to get a new job, etc. However, if stress increases too much you could see some symptoms of chronic stress levels.

## Vitamin C

Studies have shown that Vitamin C can curb levels of stress hormones while strengthening the immune system. Please see the list of foods below.

Top 5 Foods Rich in Vitamin C. Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

It may be worth adding some of these foods into your diet, especially considering that your stress levels have increased due to pressured scenarios.

## Stress Response to Pressure

Pressure is the perception that one may have of external factors affecting life. Many people often conclude that they are stressed due to the pressures placed upon them from finances, friends or family, perceived duty, work and a multitude of other factors. How one responds to the situation may differ due to their gene variations and so translating this result will lead to a superior understanding of oneself.

# Stress Affecting Memory Risk



Stress Affecting Memory Risk  
**NORMAL**

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal memory deficit while under stress.

## Genes of Interest

COMT, DTNBP1

## Recommendations

Your result indicates a response that is similar to those who don't get a memory deficit in relation to genetic variants.

## Stress Affecting Memory Risk

Acute stress may cause a sudden loss of recall, which unfortunately could come at a time when you need it the most (think exams, tests, etc.). Chronic stress might also lead to an inability to actually form new memories, which - again - if you are revising, practicing for an event, or meeting new people, could be highly detrimental. Our genes play a role in this response and understanding this may help you put into place certain pre-test rituals, methods of revising, etc. that may reduce stress levels and therefore benefit your memory.

# Ability to Deal with Stress



Ability to Deal with Stress  
**NORMAL**

## Results

Studies indicate that you share similar genetic variants with users that deal with stress to a normal extent

## Genes of Interest

COMT, DRD4, DTNBP1, BDNF

## Recommendations

This result links you to genetic variants that are similar to those who may seek out external help to a normal extent when stressed.

When you are stressed, friends, family, colleagues are all important support structures.

## Ability to Deal with Stress

The way we deal with stress is highly important. Methods to reduce stress may include breathing exercises, meditation, eating certain foods, going to the gym or for a run, yoga, etc. However, some people are more likely to keep themselves isolated when chronically stressed and research has shown that it is better to talk with others instead of going into isolation. There has also been some correlation between those who are more likely to isolate themselves and certain genetic variants.

# Stress Leading to Physical Symptoms



Stress Leading to Physical Symptoms  
**SLIGHT RISK**

## Stress Leading to Physical Symptoms

Stress can cause a magnitude of physical symptoms. Acute stress can cause tremors, muscle twitches, sweating, flushing, increased heart rate, skin itching, headaches, and more. Chronic stress can cause increased blood pressure, muscle aches and can lead to a limitless number of diseases such as diabetes, obesity and migraines. Genetic variants are linked to how we may respond to stress from a physical perspective.

### Results

Studies indicate that you share similar genetic variants with users that have shown a slight genetic risk of stress-causing physical symptoms

### Genes of Interest

COMT, G1246A, CHRNA4, BDNF

### Recommendations

Your results link you to a result similar to those that have a slight increased risk of stress-causing physical symptoms. Warning signs of chronic stress may be fatigue, sleeping too little or too much, sweating and muscle aches. These, however, differ for every person.

It may be worth considering:

**Exercise** - Exercise increases the expression of gene BDNF, which will improve your cognitive performance, memory and help alleviate anxiety and help alleviate the physical symptoms of stress. 15 minutes a day may be all you need to help.

**Food** - Reducing high-inflammatory foods such as breads and sugar can improve your memory and general health significantly. Increasing foods, which are high in antioxidants such as Vitamin E, selenium and glutathione, will have a beneficial effect for reducing free radicals and oxidative stress which may lead to physical symptoms. We can increase glutathione through 2 different pathways. The first is by consuming foods high in glutathione such as avocado and asparagus. The second - and more effective - pathway would be to give the body the relevant cofactors that stimulate glutathione production and/or up regulate the activity of glutathione enzymes, such as cinnamon or turmeric.

**Vitamin D** - Having low Vitamin D levels has been shown to affect cognitive function and affect how you may approach stressful scenarios, so it's extremely important to maintain healthy levels throughout the year. Supplementation is essential during the autumn and winter months.

# Stress And The Heart



Stress And The Heart  
**NORMAL**

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal risk of mental health affecting the heart

## Genes of Interest

COMT, DTNBP1, CHRNA4, BDNF, ADD1, MTHFR

## Recommendations

One physical symptom of stress is its effect on the heart. You share genetic variants that are similar to others that do not have a link with stress-causing heart problems to an extent that is amplified by genes. This does not mean that stress will not affect the heart. The most common warning signs that stress may be affecting the heart are a fast heart rate and an increased blood pressure. These can be acute or prolonged especially in relation to chronic stress.

## Stress And The Heart

Stress can cause a host of physical issues as highlighted in the “stress leading to physical symptoms” aspect. One major part of stress that does lead to physical symptoms is the effect it has on the heart. Stress can affect the heart in both a chronic and acute sense and these could have the same or different symptoms, with certain genetic variants being linked to how the heart may be affected by stress.



# Night Owl Likelihood



Night Owl Likelihood  
**LIKELY**

## Night Owl Likelihood

A night owl is often known as an evening person and is a person who tends to stay up until late at night. Night owls will often attempt to find jobs which may require night working, or working into the late hours. The three main reasons for being a night owl are age, genetics and environmental light.

### Results

Studies indicate that you share similar genetic variants with users that are likely to be night owls

### Genes of Interest

AANAT, CRY1, PER3

### Recommendations

The stresses and fast pace of modern day life has a whole variety of negative health connotations associated with it. You share some genetic variants linking you to possibly being a night owl. This means that you might struggle to get to sleep at night and may find you often sleep into the morning. The quality of sleep you get is vital to correct functioning and therefore the following tips may be of benefit:

Foods rich in melatonin with your evening meal, such as: tomatoes, asparagus, broccoli, olives, barley, rice, walnuts or milk in combination with foods high in tryptophan. Tryptophan is an essential amino acid which is found in a variety of foods and acts as a mood regulator. It also increases melatonin and serotonin levels, helping you to feel more relaxed, calm and possibly sleepy.

Top 5 Tryptophan foods 100grams

Pumpkin seeds 575mg

Soy Beans 572mg

Cheese 570mg

Beef 410mg

Chicken 405mg

There are also other key nutrients such as Folate, B12, B6 and Zinc that are precursors in the process of creating tryptophan, with deficiency linked to lower melatonin levels.

Top 5 Folate Foods

Lentils 1 cup 355.00mcg

Asparagus 1 cup 265.00mcg

Spinach 1 cup 260.00mcg

Broccoli 1 cup 165.00mcg

Beets 1 cup 135.00mcg

Top 5 B12 Foods

Sardines 3oz 8.00mcg

Salmon 4oz 5.00mcg

Tuna 4oz 2.50mcg

Cod 4oz 2.45mcg  
Scallops 4oz 2.40mcg

#### Top 5 B6 Foods

Tuna 4oz 1.20mg  
Turkey 4oz 0.90mg  
Spinach 1 cup 0.45mg  
Cabbage 1 cup 0.35mg  
Bok Choy 1 cup 0.30mg

#### Top 5 Zinc Foods

Beef 4oz 4.0mg  
Lamb 4oz 3.8mg  
Sesame Seeds 0.25cup 2.8mg  
Pumpkin Seeds 0.25cup 2.5mg  
Lentils 1cup 2.5mg

As you are only a possible night owl it may be wise to increase the above foods and see if these can help you get to sleep at what would be considered a "normal" time. They might also help with the quality of your sleep.



# Sleep Duration



## Results

Studies indicate that you share similar genetic variants with users that have shown longer sleep duration

## Genes of Interest

ABCC9, FABP7, ARNTL, CLOCK

## Recommendations

You have variants linked to sleeping more than normal. This might mean that you require more sleep in order to recover and repair. If you fall into this category and find that you wake up groggy, unfocused or generally tired it may be worth trying to get to bed a bit earlier, meditation, or yoga and decreasing stress and anxiety - especially before bed.

## Sleep Duration

Getting both the correct quality and quantity of sleep is hugely important to your health and wellbeing. An interesting study from the University of Chicago looked at individuals who wanted to lose weight following a calorie-restricted diet while at the same time monitoring their sleep. There were two groups, both on the same diet. While group A was sleep deprived, having just 5.5 hours sleep, group B achieved a substantial 8.5 hours sleep. They found that at the end of the study, group B had lost 55% more body fat simply from sleeping more. Genetics have an impact on how much sleep you are most likely to need, with some rare variants giving rise to "short sleepers". However those who have very physically demanding lives may need more sleep to recover for proper repair and cognitive health.

# Narcolepsy Risk



Narcolepsy Risk  
**LOW RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown no genetic cause of narcolepsy.

## Genes of Interest

CPT1B, TCRA, P2RY11, HCRT

## Recommendations

This is the most common outcome. If you have problems with sleep it may be wise to look at external factors or look into other aspects in this mode.

## Narcolepsy Risk

Narcolepsy is a chronic disorder that destroys orexin neurons, which is one of the neurotransmitters that helps regulate your sleep/wake cycle, wakefulness and appetite along with melatonin. It can also cause long periods of daytime sleepiness and muscle weakness. Certain gene variants may put you at higher risk of developing the disorder. This aspect looks at those

# Stress Affecting Sleep Risk



Stress Affecting Sleep Risk  
**LOW RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown no genetic link between stress and sleep

## Genes of Interest

COMT, DTNBP1, CHRNA4, BDNF

## Recommendations

Stress will always have some impact on how well you can get to sleep, as anxious thoughts and pressures may be on your mind while you are tucked up in bed. However, the gene variants do not link you to having a poorer quality of sleep due to stress, although reducing stress will always be advantageous to general health.

## Stress Affecting Sleep Risk

In many ways, stress and sleep can be the perfect chicken and the egg scenario. Having continuous stress will have a negative effect on your sleep quality and having poor quality sleep will increase your stress levels. Your health can be affected by a variety of factors, One that is currently being studied is the effect of sleep and our circadian rhythm. Our circadian rhythm is thought to regulate around 15-20% of our genome, and is tremendously important to keeping us fit and healthy as it affects our hormones, eating habits and reduces the chances of us become ill.

# Caffeine Affecting Sleep Risk



Caffeine Affecting Sleep Risk  
**LIKELY**

## Caffeine Affecting Sleep Risk

Caffeine is a stimulant and therefore may affect sleep regardless of your genetics. However, certain gene variants mean that the stimulating effects of caffeine may last longer and the effect is more pronounced. Certain gene variants can mean that caffeine can affect sleep quality even if there is no stimulating effect present. Understanding this aspect might therefore lead to superior sleep and recovery.

### Results

Studies indicate that you share similar genetic variants with users that have shown caffeine affects their sleep patterns

### Genes of Interest

ADORA2A, CYP1A2

### Recommendations

The stresses and fast pace of modern-day life has a whole variety of negative health connotations associated with it. You share some genetic variants linking you to possibly being a night owl.

This means that you might struggle to get to sleep at night and may find you often sleep into the morning. The quality of sleep you get is vital to correct functioning and therefore the following tips may be of benefit:

Foods rich in melatonin with your evening meal, such as: tomatoes, asparagus, broccoli, olives, barley, rice, walnuts or milk in combination with foods high in tryptophan.

#### Tryptophan

Is an essential amino acid which is found in a variety of foods and acts as a mood regulator. It also increases melatonin and serotonin levels, helping you to feel more relaxed, calm and possibly sleepy.

#### Top 5 Tryptophan foods

Pumpkin seeds, Soy Beans, Cheese, Beef, Chicken

There are also other key nutrients such as Folate, B12, B6 and Zinc that are precursors in the process of creating tryptophan, with deficiency linked to lower melatonin levels.

#### Top 5 Folate Foods

Lentils, Asparagus, Spinach, Broccoli, Beets

#### Top 5 B12 Foods

Sardines, Salmon, Tuna, Cod, Scallops

#### Top 5 B6 Foods

Tuna, Turkey, Spinach, Cabbage, Bok Choy

Top 5 Zinc Foods

Beef, Lamb, Sesame Seeds, Pumpkin Seeds, Lentils

As you are only a possible night owl it may be wise to increase the above foods and see if these can help you get to sleep at what would be considered a “normal” time. They might also help with the quality of your sleep.

# Physical Decline With Age



Physical Decline With Age  
**SLIGHTLY FASTER DECLINE**

## Results

Studies indicate that you share similar genetic variants with users that have shown an increased risk of physical decline with age.

## Genes of Interest

SIRT1, CETP, MSTN, ACTN3, UCP3

## Recommendations

Whatever stage in life that you find yourself, we all need to be aware that staying active is fundamentally important for physical, mental and emotional health and wellbeing. Various studies have looked at to see how exercise can affect ageing, with one study finding that aerobic exercise of around 120 minutes per week over 24 weeks helped to lengthen telomeres.

One aspect that is gaining notoriety in the "Anti-Ageing" community is that of "Mammalian Target of Rapamycin Complex 1" or mTOR to give its simplistic abbreviation. mTOR acts very much as the "On" switch for energy production, protein synthesis and for gaining muscle, but continuously activated is also associated with cancer growth, auto immune disease, depression, diabetes and ageing. Exercise can provide us with active mTOR levels within the brain and muscles where it is more beneficial from a health and longevity standpoint, and not within the fat and liver cells, which is more detrimental to the ageing process.

Calorie restriction has been shown to increase lifespan in numerous species by increasing a process named autophagy, which is a detox mechanism that removes and reduces dysfunctional components from building up internally and autophagy can be increased when the mTOR signalling and pathway is reduced and inhibited.

## Physical Decline With Age

Physical fitness is an aspect heavily associated with age, with many becoming less physically active as they get older. Some genetic variants are linked to this process are faster or more pronounced and this aspect looks at these variants, highlighting potential interventions you can put in place. Physical fitness is vital in the maintenance of good quality of life, mobility, muscle strength and bone strength. Each are related to physical activity and play a huge role in ageing well vs. ageing poorly.



# Keeping Cognition With Age



Keeping Cognition With Age  
**NORMAL DECLINE**

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal risk of cognitive decline with age.

## Genes of Interest

COMT, OXTR, IL-1 $\beta$ , BDNF, DTNBP1, KL $\rightarrow$ -VS

## Recommendations

Aerobic exercise has been found to maintain brain volume in the left hippocampus in a variety of controlled trials suggesting exercise may prevent brain ageing.

The KL-VS gene is seen as an anti-ageing/suppressor protein (Klotho) and plays a key role in cellular metabolism and homeostasis - the state of steady internal conditions maintained by living things - as well as neuroprotective effects, which will help slow neurodegeneration. Neuronal cell death will be affected by increased levels of free radicals/ROS (reactive oxygen species), which your body will produce every minute of each day.

Oxidative stress leads to ageing and underlies all disease processes, including cardiovascular disease, dementia and diabetes. It also plays a role in the development of cancer, but luckily your body produces antioxidant enzymes, which will remove these ROS.

Genetically, some people do not produce sufficient levels of these antioxidant enzymes and are at risk of increased oxidative damage, which then asks the question of how you can improve your antioxidant status.

Below are a few recommendations to help improve your antioxidant levels, which will help to neutralise free radical build up throughout the day.

### Lycopene

Lycopene is a phytochemical found in red fruits and vegetables such as tomatoes, red carrots and watermelons, significantly increases a variety of antioxidant genes.

### Selenium

Primary antioxidant gene GPX1 incorporates the mineral selenium and is dependent on there being sufficient levels to work effectively. Selenium is an extremely important antioxidant, which prevents cellular and subcellular lipids and fats from being peroxidised, meaning it prevents body fats from going rancid, and which are seen externally as "Age and Liver spots".

Apart from Brazil nuts, which are probably the most well-known and highest containing food source of selenium, which other foods can you incorporate into your diet?

## Keeping Cognition With Age

Cognition is the process at which we acquire knowledge and understand experiences, senses and thought. Cognition can be an umbrella term for long- and short-term memory, knowledge formation, attention span, problem solving, language, and comprehension skills. We know that as we age cognition begins to falter and certain genetic variants are linked to this occurring at a faster rate. Understanding these can therefore help us implement changes that can help improve the process.



### Top 5 Selenium Foods (Animal)

Tuna, Shrimp, Sardines, Salmon, Cod

### Top 5 Selenium Foods (Plants)

Brazil Nuts, Tofu, Brown Rice, Sunflower seeds, Shiitake Mushroom

### Exercise

Resistance training at least twice per week as well as endurance training (cycling) increases the “primary antioxidant” gene MnSOD, with weights being slightly more effective. However, please avoid prolonged high intensity exercise, which will dramatically increase free radical build up.

### Ashwagandha

Daily supplementation with ashwagandha, which is a potent herb that is classified as an “Adaptogen”, helps your body to adapt and cope to a variety of physiological stressors. It has been shown to regenerate nerve cells and promote dendrite (from the Greek word for tree, and which is a branched projection of a nerve cell that conducts electrical stimulation to the cell body) growth throughout the brain.

### Choline

Choline is essential in the diet. It's a nutrient that is naturally present in some foods and available as a dietary supplement. Choline is essential in metabolism as it is a source of the methyl groups required for proper metabolic functions.

Choline allows the body to synthesize phosphatidylcholine and sphingomyelin, two major phospholipids vital for cell membranes. Importantly for cognition, choline is needed to produce acetylcholine, a crucial neurotransmitter for memory, mood, muscle control, and other brain and nervous system functions.

Choline also plays vital roles in modulating gene expression, cell membrane signalling, lipid transport and metabolism, and early brain development.

As we age our requirements for choline increase as it is an important nutrient for maintaining cognition. It is therefore highly important to have a diet rich in choline-based foods the older we get.

### Choline rich foods:

Beef Liver, Salmon, Chickpeas, Split Peas, Navy Beans, Eggs, Grass-Fed Beef, Turkey, Chicken Breast, Cauliflower, Goat Milk, Brussel Sprouts

Supplements are also available such as alpha-gpc. These may be handy for vegans and vegetarians or those who struggle to eat the above foods.

# Testosterone and Ageing



Testosterone and Ageing  
**NORMAL DECLINE**

## Testosterone and Ageing

Testosterone is the main male sex hormone. It is an anabolic agent and plays a vital role in male characteristics such as the development of male reproductive tissues, increasing muscle and bone mass, hair growth and the deepening of the voice. Testosterone is also essential for bone health, and those with lower levels have frailty and potential bone density loss. On average males have 7-8 times the testosterone levels of females, however, females are more sensitive to the hormone. Testosterone in males peaks in the 20's and then begins to decline with age. It is therefore important to know if your genes are affecting your testosterone levels as some may have higher and some may have lower.

### Results

Studies indicate that you share similar genetic variants with users that have shown a normal outcome for testosterone levels

### Genes of Interest

FAM9B, PDE7B, SHBG, HSD17B3

### Recommendations

This is the most common outcome, however as a male, maintaining testosterone levels during ageing is paramount, so some aspects that might help are:

#### Vitamin D

Vitamin D is extremely important for healthy testosterone levels, with one study on overweight men showing an increase by 25% with healthy Vitamin D levels. Also consider increasing other nutrients that are cofactors of Vitamin D metabolism.

Cofactors are nutrients that work together to help the body absorb as much of the nutrients as possible.

- Boron, which can be found in almonds, apples, hazelnuts, dates and avocados.
- Vitamin K, which can be found in basil, kale, spinach, scallions, brussels sprouts and asparagus.
- Zinc, which can be found in oysters, crab, beef, lobster and baked beans.
- Vitamin A, which can be found in sweet potatoes, carrots, kale, butternut, apricots and romaine lettuce.

#### Saturated Fats

Saturated fats are paramount for maintaining a healthy testosterone level, as the cholesterol, which is contained within saturated fat is an essential building for free testosterone levels.

Remember that certain gene variants may make saturated fat negative for your heart and weight, however, it is still vital to have some within the diet.

#### Sleep

Getting sufficient sleep will affect your testosterone levels significantly, with one study finding that testosterone levels in young healthy men decreased by 10% to 15% following one week of sleep restriction to five hours per night, and which is a condition that will be experienced by at least 15% of the working population.

The quality of sleep you get is obviously vital for healthy testosterone levels and therefore the following tips may be of benefit: Foods rich in melatonin with your evening meal, such as: tomatoes, asparagus, broccoli, olives, barley, rice, walnuts or milk in combination with foods high in tryptophan.

Tryptophan is an essential amino acid which is found in a variety of foods and acts as a mood regulator and increases melatonin and serotonin levels, helping you to feel more relaxed, calm and possibly sleepy.

#### Top 5 Tryptophan foods

Pumpkin seeds, Soy Beans, Cheese, Beef, Chicken

#### Exercise

Perhaps look to reduce high endurance training and start lifting weights, as recent research has shown that both total and free testosterone levels can be dramatically reduced by prolonged endurance exercise.

# Bone Strength decline with ageing



## Results

Studies indicate that you share similar genetic variants with users that have shown a slightly decreased risk of bone density issues with ageing

## Genes of Interest

OSTM1, VDR, CYP2R1, DHCR7, CYP2R1, RANK, SNX10

## Recommendations

Your results are linked to perhaps not having a dramatic decline in bone strength as you age, however, it is still important to maintain bone strength with weight bearing exercise. Proper nutrition that contains calcium and Vitamin D as well as good amounts of sleep and rest will also allow for healing and hormone maintenance.

## Bone Strength decline with ageing

Bone strength is essential for maintaining mobility. As we age, we know our bones become weaker, but genetic variants affect the rate at which this occurs. There are a multitude of ways to help keep our bones strong such as dietary changes and activity changes, this aspect looks at these.

# Back pain and ageing



Back pain and ageing  
**NORMAL RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal genetic risk of spinal degeneration with age

## Genes of Interest

CILP, COL11A1, COL9A3, OPG

## Recommendations

Back pain can be caused from a multitude of reasons, from a breakdown in cartilage to a loss in muscle elasticity. Both these can be magnified through older age, but once we have an understanding of the integral role that our genes will play we can inhibit or slow this process dramatically. While your genes play a huge role in maintaining a good posture and a healthy back, we also need to examine our lifestyle and the other contributing factors that can lead to its deterioration, such as sedentary lifestyle.

Spending the majority of the day sat at our desks makes us fall into the habit of continual underuse of our back and postural muscles, which can quickly become deconditioned and deactivated. Keep up an active lifestyle and eat right to maintain good overall health and also lower back health. If you start to have problems always take your physician's advice.

## Back pain and ageing

Back pain is one of the most common complaints people have. There are a whole host of reasons why someone experiences back pain: obesity, spinal disease, trauma, smoking, general disease such as cancer. However, the most common cause is age related degeneration. This aspect concentrates on the genes that affect degeneration of the spine, which include disc degeneration and general bone strength. Understanding this aspect allows superior interventional activities and dietary changes to be made.

# Stress and ageing



Stress and ageing  
**SLIGHT RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown a slight risk of stress affecting ageing

## Genes of Interest

COMT, DTNBP1, CHRNA4, BDNF

## Recommendations

Being in a continually elevated or chronic stress response can have a multitude of negative health effects, with ageing being one such area that will be increased significantly. Trying to control/manage your cortisol levels throughout the day would be hugely advantageous at reducing tissue breakdown with the knock-on effects of ageing. Check out the stress mode for more info on your stress related gene variants.

## Stress and ageing

Stress is well known to cause premature ageing. This is down to the affect stress has on our hormones, sleep and general cognition. Keeping stress levels low allows the body to recover from the day, helps prevent high blood pressure and keep cortisol in check. Some people may find that their genes impact how they respond to stress and therefore how stress may age them, this aspect looks into that.



# Lower Back Pain Risk



Lower Back Pain Risk  
**SLIGHT RISK**

## Results

Studies indicate that you share results that are similar to those with a slight genetic risk of lower back pain from degeneration and/or collagen weakness

## Genes of Interest

CILP, COL11A1, COL9A3.

## Recommendations

These variants link you to a slight increased risk of lower back pain. Overtraining and lifting inappropriately with poor technique will put your back at risk. One aspect that is vitally important is diet and Vitamin D.

A recent study has shown that individuals who experience persistent, non-specific musculoskeletal pain are deficient in Vitamin D, and that increasing levels helped to decrease pain.

If you do struggle with lower back ache, try these tips to help alleviate the pain:

Lay on your back with your feet up on a pillow. Put a thickly-rolled towel in the small curve in your lower back. Do this every day for at least 10 minutes. Doing so allows your back to regain its natural curvature and can release sciatic related pain as well as muscle strains.

Use heat NOT cold for the lower back, especially if the injury is chronic. Heat brings blood to the area and can help speed healing. Cold compresses could cause spasms and in chronic conditions is not much use.

If you sleep on your side, put a pillow in between your legs. This allows your vertebrae to go into a more natural state. Doing this can release nerve impingement and may help prevent it in the future.

Always get down on one knee when picking anything up from the floor. Arching the back to lift off the ground is one the biggest causes of back injury especially if you already have predisposing risk factors.

It is also wise to watch the temperature when training. If you train in the cold it may put you at greater risk of back injury and injury in general. It is therefore wise to utilise some of the below tips:

Wear appropriate clothing.

Work up to large movements. A good progressive warm-up will be beneficial.

Keep hydrated even if you feel like you are not losing as much fluid as you would normally.

Make sure you plan training sessions so that you're not left stranded in the cold for long periods.

Try and get a training buddy as they can help if you become injured, for example, and far from help.

If you are getting increased back pain that does not go away within two weeks, it may be worth visiting your Dr/GP.

## Lower Back Pain Risk

Lower back pain, which is also known as lumbago, is one of the most common healthcare complaints. The majority of lower back pain causes are not serious and often relieve themselves after a few weeks. However, there are some serious causes, and these can have associated symptoms or not. The most common causes of lower back pain are:

Muscular spasm/pull

Lumbar disc degeneration

Disc herniation

Nerve impingement (often causes referred pains)

Inflammatory conditions

Kidney stones

Obesity

This list is not exhaustive, and many conditions are both directly and indirectly linked to lower back pain. This aspect looks at the genes that can contribute to disc degeneration and collagen genes that can specifically affect lumbar structure and strength.



# Bone And Joint Strength



Bone And Joint Strength  
**SLIGHT RISK**

## Results

Studies indicate that you share results that are similar to those with a slight increased genetic risk of weaker bones and joint issues.

## Genes of Interest

COL6A4P1, IL1R1, MCF2L, VDR, CYP2R1, NADSYN1, GC

## Recommendations

Your profile is linked with a slightly increased risk of bone strength and joint problems. The biggest issues that can arise normally occur from a lack of physical activity and/or a poor diet. Vitamin D is often overlooked but its importance has grown significantly in the past few years, especially its effect on bone strength. Vitamin D is required for the absorption, metabolism, and proper deposition of calcium and phosphorus, and thus extremely important for maintaining healthy bones.

However, in some instances, it isn't just as simple as incorporating more Vitamin D into your diet from either a food or supplement. We also need to be aware of both the conversion and absorption rate of Vitamin D3. The journey and various stages that Vitamin D takes before we utilise it fully is made up by a complex panel of genes. Simplistically, each gene will encode for a particular enzymatic reaction to help either convert, process, or absorb Vitamin D throughout the body.

The gene CYP2R1 encodes for an enzyme that is located within your liver, which converts Vitamin D3 into the main circulatory form known as 1-25-dihydroxyVitamin D. It then gets transported through the body where it gets absorbed by Vitamin D receptor genes, or VDR.

Providing the body with sufficient levels of Vitamin D to get converted is the start of the process, but if you have poor genetic receptors/absorption rate then you will have a whole variety of poor health outcomes associated - bone health being just one. We must remember that Vitamin D does not exert its effects from being present in the blood, it is only utilised after being absorbed and converted at a cellular level via Vitamin D receptor VDR.

Sulforaphane is extremely useful as it helps up regulate the Vitamin D receptors, and thus improves the absorption rate. It is found in cruciferous vegetables such as broccoli, Brussel sprouts and bok choy, and is produced when you chew or cut the vegetable, which allows the two enzymes Myrosinase and Glucoraphanin to mix and react. Vitamin D often goes hand-in-hand with calcium, which has a variety of roles in the human body from bone structure, to helping control muscle and nerve function, as well as balance the pH in our blood stream.

Physical activity and resistance training are very important in maintaining bone strength. Ignoring this aspect can

## Bone And Joint Strength

Our skeleton gives us structure and allows us to move. However, if bones are weak, they can fracture easily from trauma, spontaneously and through pathological disease. It is estimated that 500,000 fractures occur each year in the UK alone due to fragile bones.

It is, therefore, vitally important to know any potential risk factors that may lead to weakening of the bones. Certain gene variants are linked to potentially lower bone density naturally while others can cause lower nutrient levels of important vitamins and minerals. These can determine bone and joint health, while some variants are linked to degeneration. This aspect concentrates on these variants with a unique algorithm utilised to determine the risk factors and what interventions can be put in place to help.

lead to a slow loss of bone density. However, it's more likely that if bone density loss occurs it will happen from already weakened bones. Physical activity, especially resistance training, allows the skeletal system to take small shocks and adapt by increasing bone density. This is progressive and takes time and so regimented exercise is vital. However, the range of exercises can sway dramatically. Those who are very inactive that start walking consistently will gain benefit as do athletes who increase hypertrophy and strength-based training.

# Achilles Tendinopathy



Achilles Tendinopathy  
**SLIGHT RISK**

## Results

Studies indicate that you share results that are similar to those with a slight genetic risk of Achilles Tendinopathy

## Genes of Interest

COL5A1

## Recommendations

You have the gene variants associated with a slight increased risk of Achilles tendinopathy. Therefore, it's wise to be aware of this along with the other causes of the condition, such as overtraining. Nutrition plays a pivotal role in supporting collagen health. Leafy greens, citrus foods, and oysters are great sources of collagen-boosting vitamins and minerals. These will help build collagen within your body, and while we cannot negate injury completely, we can improve the co-factors needed to optimise your connective tissue and collagen strength.

If you are a keen walker or you're on your feet a lot, get yourself booked in for a soft/deep tissue massage once or twice per month. A good massage will help your muscles relax from training but also help take away built up tension from general life. Tense muscles are weaker muscles; get them firing again by seeing a qualified therapist.

If you do start to feel twinging, pulling, or a dull ache in the calf muscles or Achilles, it may be wise to take some extra rest especially after training or play. Sharp shooting pains are often a sign of an injury, especially if a particular movement brings it on. Get it checked out and rest it as training through sharp pain can lead to serious injury further down the line.

Achilles tendinopathy occurs in repetitive strain, usually from running. Here are a few tips to help:

### Flexibility

Flexibility is important to have in all soft tissues. These include muscles, tendons and ligaments. When these have limited flexibility, your joints will have limited range of movement (ROM), which can lead to bad running and walking biomechanics. Ensure that stretching is in your regime for any sport, even if you are not one for exercise. We also recommend spending time stretching muscles out to help prevent injury and loss of ROM in daily life.

### Posture

Posture is the way in which you hold yourself. When it comes to running, this is vital as poor posture will place strain on the knee and ankle. Many consider good posture to be those with spines that are neutral and do not require the muscles to strain to maintain this. Poor posture can lead to severe muscle imbalances which in turn can cause poor

## Achilles Tendinopathy

Achilles tendinopathy causes pain in the Achilles tendon - the thick tendon joining the calcaneus (heel bone) to the soleus and gastrocnemius (calf). It is a common injury that affects all age groups, sports people, and non-sports people alike. Pain, stiffness, and swelling are all potential signs of the condition and it is thought that around 150,000 people suffer Achilles tendinopathy ever year. There are multiple risk factors for the condition:

- Obesity
  - Diabetes
  - Genetics (family history can be an indicator)
  - Inappropriate footwear
  - Overtraining
  - Increased cholesterol levels
  - Poor coaching/training
- With genetics playing a role in the development of the condition it is key to understand what role it plays, and which interventions can be done to help negate its potential development.

circulation in the muscles, leading to less oxygen uptake, which is vital in endurance sports.

#### Leg motion

It is important to make sure stride length is not too wide. This may make sense as it allows further distance with fewer strides, however, it can lead to injuries to the knee and hamstring and overstretch the Achilles tendon. A long stride will also cause the natural bend in the knee to be lessened, which will lead to more force travelling through the knee joint.

#### Cadence

Try to maintain a steady pace and a good stride length, you want to be able to produce enough force to propel your body forward without having to use excess energy. To produce this, you must be landing with the heel and coming off from the toe, this motion allows a perfect method of thrust without as much force.

# Knee Injury



Knee Injury  
**SLIGHT RISK**

## Results

Studies indicate that you share results that are similar to those with a slight genetic risk of knee injury

## Genes of Interest

COL1A1, GDF5

## Recommendations

Your results show that you have an increased risk of knee damage due to your genetics. If you are involved with high impact sports or have a very manual job, your risk will be increased further. A few important aspects should be concentrated on to help prevent injury occurring:

**Footwear** - Choosing the correct footwear for the sports that you are taking part in is crucial. Football is a prime example of where studs are better than blades. Blades have a tendency to become stuck within the ground in moments of high rotational agility which leads to over twisting of the knee joint. Those involved with Olympic lifting may want to consider flat soled high-grip shoes. Trainers which are designed for running are not going to offer the stability required in snatches, clean and jerk movements, and this is also applicable in all weight lifting from squats to leg press.

**Stretching & Strengthening** - Major leg muscles such as the hamstring, quad, and calf muscle groups require stretching and strengthening to help prevent injuries occurring. Stretching before dynamic activities is paramount in preventing meniscal tears from occurring. When strengthening muscles, it is essential that correct technique is used. Squats cause a great deal of stress to be placed throughout the knee joint and it is essential this is done correctly.

A great way to prevent ACL injuries occurring (non-contact) is to work on proprioception and muscular strength activities. It is essential that those performing in sports at high risk of ACL injury perform proprioception exercises to help prevent injuries occurring during training and play.

Examples:

Wobble board work

Biodex Stability System

## Knee Injury

The knee is not only made up of muscles, bones and ligaments, but it is also the biggest synovial joint in the body. It comprises the distal femur and proximal tibia, which is called the tibiofemoral joint. The knee is also a hinge joint, allowing flexion and extension with slight medial and lateral rotation.

### Knee Cap (patella)

The patella is also known as the knee cap. It is a circular/triangular bone that articulates with the femur and covers and protects the anterior articular surface of the knee joint. It is also the most common and largest sesamoid bone in the body. Its main purpose is to aid in leg extension.

### Menisci

The menisci are the articular disks in the knee joint. It comprises two disks in total with the medial meniscus and lateral meniscus. It also involves widespread collagen fibres consisting of pseudo cartilage cells and connective tissue. Fibres run along the menisci to allow for attachments, flat over the centre of the knee joint itself, fused with the synovial membrane laterally, which moves over the tibial surface. The menisci exist to protect the bone ends from rubbing, acting as shock absorbers and therefore coming in very handy, especially for those involved with exercise and sports.

### ACL injury/tears

The ACL, or anterior cruciate ligament, is one of the four main knee ligaments and prevents excessive movement of the knee joint.

Injuries to the ACL are the most common ligamentous injury to the knee joint and can be very debilitating.

Bosu

Piston Squats

Agility Exercises (rapid changing turns) – only used in functional stage of rehab.

Meniscal Cartilage Tear

Commonly injured in sports such as football and skiing, the meniscus can become torn by a sudden and/or forceful movement of the knee during weight bearing. Mechanisms of injury are very similar to that of an ACL injury, such as a footballer changing direction while the foot is planted in the ground or when a tennis player goes for a strong forearm but fails to move the foot with the rotation of the body. The amount of meniscus tearing, and the site of tearing represents how bad the injury will be.

While the most common reason for meniscus tearing is a forceful movement it can come about due to repetitive damage occurring at the meniscal site and can be caused by muscular imbalances or other soft tissue/bone/joint injuries. The major problem with the meniscus is that it has a bad supply of blood and therefore does not heal well when injured, the central area of the meniscus has no direct blood supply, which indicates that a tear through the centre in general will not heal.

Symptoms

The usual symptoms would be suspected such as pain and swelling, these are made worse by weight bearing and especially during weight bearing movement (e.g. running). It is not uncommon for the knee to lock or seize up during movement especially at full extension, and like an ACL injury there is usually a sense of giving way and/or instability with the knee.

If you are suffering from knee problems, it would be wise to seek out your physician/Dr for diagnostics and further treatment.

Tearing or rupture due to excessive movement is the most common cause of ACL tears with contact ACL injuries only accounting for 20% of all ACL injuries. Sports show the highest incidence of ACL injuries within society, with football, martial arts, gymnastics and skiing all being sports with particular high-risk factors. Female athletes and those over 40 also show higher incidence of ACL injuries, with certain genetic variants leading to increased incidence.

Symptoms

A pop or bang when the injury occurs (this is the ACL tearing or rupturing)

Swelling around the knee joint

Pain (can be severe)

Instability on the affected leg

Diagnosis

Clinical tests are highly accurate if performed by a trained professional, but a ruptured ACL is commonly confirmed by an MRI examination.



# Type of Injury Rehab



Type of Injury Rehab  
**NORMAL REHAB**

## Results

Studies indicate that you share genetic results that are similar to those who may benefit from normal (mixed) rehab if this matches your environmental needs.

## Genes of Interest

AMPD1, COMT

## Recommendations

Your results link you to the most common outcome and you should follow your medical professional's advice on injury recovery.

On return to activity it is wise to help prevent further injury by following well set out protocols in training and daily life:

**Stretching** - Lack of stretching comes under a lot of stigma. Many believe it to be a waste of time and merely dissipates energy before a workout. However, science tells us that stretching does in fact help prevent muscle tears and joint damage, so why would we want to skip it? When we stretch, we are actually allowing our muscles to prepare for the workout ahead:

Help prevent injury

Increase range of movement (ROM)

Improve posture

Maintain joint integrity

**Form** - Form can quickly disappear in weightlifting. Sometimes this is caused by muscle imbalances, or too much weight/resistance or poor teachings. However, often people do not realise that their form is underdeveloped.

**The Biceps Curl:** This a biceps exercise but on many occasions can become a lower back exercise if not performed correctly. If you are struggling to achieve proper form then stand with your back against a wall, use a bench with the back fully up, or get a coach to help guide you.

**Bench Press:** There are two examples of bad form on bench press and both are on either ends of the scale. The first is lifting far too heavy and only doing a half rep, which places strain on the shoulders, and the other is bouncing a weight from your chest, which can damage the cartridge.

**Deadlift:** We recommend going to see a coach or video your form so that changes can be made to make sure this excellent exercise is done correctly

**Dehydration** - Dehydration is a serious and potentially fatal condition which leads to cramping of muscles, decreased cognition and can cause electrolyte imbalances. Dehydration places monumental pressure upon the kidneys and the brain, athletes have died attempting to meet weights for events, especially boxers. The majority of individuals who do these protocols understand the risks associated, however we just wanted to highlight how important proper hydration is.

## Type of Injury Rehab

After an injury has occurred it is difficult to assess what is the best course of treatment and rehab to do. Even experts will disagree on the correct way to treat the same patient with the same injury. Different methods of rehab are often put across, such as rest, soft exercise, aggressive exercise, etc. However, the response of treatment can come down to a number of factors, for instance environment, age, starting fitness level, type of injury, gender, diet, underline illness and genetics. To help build a superior rehab plan, knowing certain gene variants takes one aspect out of the equation, however, you should always follow your medical professional's advice when it comes injury treatment and use the advice here for supplementary guidance.



Maintaining muscle mass when you are injured is also crucial to successful recovery.

There are four factors that determine what happens to your fitness and muscle mass when you cease training.

These are:

Nutrition

Normal Activity

Genetics

Rest

The following are interventions to try to help maintain muscle mass especially if the injury has made you inactive.

Maintain a good supply of amino acids, especially leucine, glutamine and arginine. You are what you eat, and amino acids are the building blocks of those muscles! Failure to have a good supply of them will cause muscle tissue to waste (atrophy) faster. Try the following:

45-55kg (weight) – 8g BCAAs (4:1:1), 5g Glutamine, 60g general protein\* intake.

55kg-80kg (weight) – 10g BCAAs (4:1:1), 10g Glutamine, 75-100g general protein\* intake.

80kg+ (weight) – 15g BCAAs (6/8:1:1), 15g Glutamine, 100-150g general protein\* intake.

\* General protein should have a full essential amino acid profile.

Those who are not injured can follow the same as above, although you could drop the glutamine intake.

General activity should include some exercise. It doesn't have to be regimented, or planned in a gym, etc., BUT make sure you are moving. Even if that means cooking, walking to the shops, taking the stairs instead of the lift, and so on.

Muscle atrophy occurs quicker when we are inactive, so keep moving. More often than not, those in manual jobs will maintain muscle better than those in office jobs.

Get some quality sleep. It is highly important that you help maintain correct hormone levels. Getting quality sleep at night will help maintain growth hormone levels, which is highly important to maintaining muscle mass and tissue repair when injured.

# Attention Span



Attention Span  
**LONGER DURATION**

## Results

Studies indicate that you share results that are similar to those with a higher attention span.

## Genes of Interest

DTNBP1, COMT, DRD4, BDNF, OXTR

## Recommendations

These results indicate a higher likelihood of having an improved attention span. To further improve upon this a few protocols can be followed:

**Exercise** – Exercise increases the expression of gene BDNF, which will improve your cognitive performance, memory and help alleviate anxiety and the physical symptoms of stress. As little as 15 minutes each is all you need to help.

**Attention Tasks** – Completing memory tasks and games can help boost your attention abilities, especially when gene variants are linked to increased attention. Focusing on a crossword, for example, but adding in additional distractions like an interesting TV show, or general noise/music that you dislike can be methods to help with focus.

**Multitask activities** – multitasking can be a great way to improve attention, small mental exercises that swap between numerical and alphabetical processing can be very beneficial, even 15 minutes per day can improve multitasking ability. You could get a word jumble on one side and a math problem on the other, then try and find a word in the jumble while solving the math problem!

**Colour words** – A great test is to have a word that is the colour of an alternative colour. For instance, the word “BLUE” coloured as RED. Have many of these on cards and go through them saying the colour of the word and not the alphabetical word, then mix them up and go again.

## Attention Span

Attention is the process of concentrating on information that has been selected by the individual or given to the individual as a task. This can be subjective or objective, so the key to attention is the ability to concentrate on the information while ignoring other non-important information. The complexity of the information, the time required to process the information, and the distractions will all determine the amount of cognitive resources needed to maintain attention.

Attention seems to be affected by a multitude of factors such as environmental upbringing, educational level, brain injury, drugs/alcohol, sleep, and food. Attention even seems to be affected by cultural differences, as well as inherently attention is affected by our genetics.

# Workaholic Traits



Workaholic Traits  
**POSSIBLE WORKAHOLIC**

## Results

Studies indicate that you share results that are similar to those with a higher chance of being a workaholic.

## Genes of Interest

SLC6A4, COMT, TPH2

## Recommendations

These genetic variants are linked to an increased likelihood of workaholic like attributes, meaning you may be more focused on work or other personal pursuits. As mentioned, this may not be seen as negative as it could increase productivity.

However, if you find that you are relentlessly trying to tackle a task, it may be worth considering taking a break to re-evaluate the situation or asking for advice. Sometimes new eyes can make a complex task seem much easier.

## Workaholic Traits

A "workaholic" is a person who often works compulsively to meet a career or personal end, however, it can equally be that a person enjoys their work. Some may feel that they are compelled to do work or become obsessive over a certain subject. "Workaholic" may not be a medical condition, but it is one which is used to describe an individual who may appear to be driven at their work, obsessed with jobs or tasks or compelled to do work from external forces. It may be looked as positive or negative and this is usually subjective. Nevertheless, certain genes are associated with behaviours that may make an individual more inclined to be a workaholic.

# Caffeine Affecting Focus



## Results

Studies indicate that you share similar genetic variants with users, which have shown that caffeine may cause a negative effect on cognitive function, especially in high dosages.

## Genes of Interest

ADORA2A, CYP1A2

## Recommendations

The results show that caffeine's potential negatives may outweigh any possible cognitive benefits. However, this may well be dose dependent. If you want to use caffeine it would be wise to start with a small dosage and assess how you feel. There may be a slimmer line between stimulated and agitated with your response to caffeine.

## Caffeine Affecting Focus

Caffeine is a stimulant that fires up our central nervous system (CNS). It's the world's most widely used psychoactive drug, being legal in nearly all parts of the world. It's also a natural constituent of many of the most popular foods and drinks such as chocolate, tea and coffee. Caffeine blocks adenosine, which can help prevent drowsiness by stimulating portions of the nervous system.

80% of people in the UK consume caffeine daily. That figure is up to 90% across the pond in the USA, making it the most widely used psychoactive drug in the world.

Caffeine can physiologically stimulate the body and can prevent mental and physical fatigue. It can increase thinking processes and improve focus. However, the amount of caffeine needed to produce this depends on the person's tolerance and size. There have been a wealth of studies backing up caffeine usage in improving performance in sportsmen and women, however, this has been dosage dependent. Higher dosages can lead to rapid heartbeat and anxiety, which can lead to a loss in athletic performance.

### Caffeine positives

Improves cognitive function, increasing alertness and improving focus  
Improves athletic performance boosting both mental and physical attributes  
Given the correct dosage, it can lower the risk of both diabetes and cardiovascular disease  
Speeds up metabolic rate  
Suppresses appetite

### Caffeine negatives

Can become addictive  
May cause anxiety and dependence  
Withdrawal symptoms  
Increase heart rate  
Increases blood pressure  
High dosages reduce

fine motor control  
Insomnia

High dosages are normally considered anything that is over 1000mg (1g) of synthetic caffeine, to put that in perspective most energy drinks are anything from 80mg-200mg per drink.

Overdose is highly unlikely. It depends on an individual's tolerance but to be lethal a dosage of 150mg-200mg/kg is required. That would mean about 67 cans of Red Bull for an 80kg person (around 12,000mg).

Our genes dictate our ability to utilise caffeine:

**CYP1A2** – Variations in the genes affect the way in which we metabolise caffeine in the body, with certain variants causing a greater stimulating effect as the drug stays in the blood stream for longer. This would mean that some people may require more caffeine than others to really feel its stimulating ability, and those with a slow metabolism would find it easier to overdose and perhaps show signs of anxiety.

**ADORA2A** – This gene affects the way in which we respond to caffeine. The majority of the population are normal in their response. However, variants in this gene may mean that some people would have side effects like anxiety, twitching, stomach upset and sweating with even small dosages of caffeine. The gene also seems to determine the amplification of insomnia, with some experiencing severe sleep problems sleep post-caffeine consumption due to their ADORA2A gene variants

# Dealing With Memory Tasks



Dealing With Memory Tasks  
**HIGH**

## Results

Studies indicate that you share results that are similar to those with a far higher ability when dealing with memory tasks.

## Genes of Interest

DTNBP1, CHRNA4, DRD2, BDNF

## Recommendations

This is a rare outcome and may mean that your genes may help enhance your memory and cognition, why not get the most out this by doing all or some of the following exercises:

Memorising a pack of cards is a simple exercise that can be performed to help with memory training. Most allow 10 minutes of looking over the cards before attempting to go through them.

Learning to play an instrument or a new language can really help improve brain power and help with memory. Don't rely on a calculator, try and do arithmetic in your head.

Try and draw a map of where you live, the road, the shops, buildings. etc. See how far you can get. This can be made harder by attempting to draw maps of holiday destinations or past residences.

Try out a new sport. Learning a new fitness activity not only helps with activity but improves the nervous system and challenges the brain to learn new techniques.

Doing puzzles in the local newspaper and using online brain training tools can also be beneficial.

To enhance memory even further the following tips can really be of benefit:

## Choline

Choline is a water-soluble nutrient that is neither classified as a vitamin nor a mineral. However, it is often grouped with the B-complex family and is used to create acetylcholine, which is one of the most complex neurotransmitters helping to regulate mood and memory. It's also critical for everyday functioning of the brain.

Top 5 Choline Foods.

Eggs, 1 medium, 145.00mg

Chicken, 4oz, 95.00mg

Cod, 4oz, 90.00mg

Brussel Sprouts, 1 cup, 62.00mg

Broccoli, 1 cup, 60.00mg

## Dealing With Memory Tasks

Memory is how we encode information that has been stored in the brain. It's a processing system that is imperative to everyday life. It is often split into working (short-term) memory and long-term memory. Memory is essential as it allows the retention of information over time and thus allowing us to learn, develop language, personality and relationships with others.

Working memory takes information by encoding stimuli and can also retrieve memories needed for tasks at hand with long-term memory storing recollections which can be retrieved. Working memory appears to rely on an acoustic code for information storing and less so visual stimuli.

Genetics influence how well our memory stands the test of time and can have some affect on the speed at which we pick up information and store it. Sleep is also highly important to memory as it allows processes that cement memories in long-term memory.



Supplementing choline is also possible, alpha-GPC is often one of the best sources of choline.

#### Green Tea

Green tea has many health benefits from improving antioxidant levels to having a positive effect on cognitive health and memory. Various studies have indicated that green tea has many psychopathological-enhancing effects, however, as green tea contains caffeine it is wise to check your caffeine sensitivity before increasing intake.

#### Omega 3 fatty acids

There are various health benefits that are associated with both types of omega-3 fatty acids, that is EPA, DHA, which are found in fish, and ALA, which is located in flaxseeds, walnuts and Brussels Sprouts.

From building the nerve endings within your brain to reducing chronic fatigue and inflammation (which has been shown to help reduce cognitive decline and ageing), the effects of Omega 3 fatty acids have many positive memory-boosting properties.

Avocados, while not having high levels of ALA Omega 3, are packed full of other beneficial nutrients such as potassium, folate, magnesium, and vitamin k. They also offer a carotenoid called lutein, which has been shown to boost your working memory and cognitive health.



# Warrior Vs Worrier



Warrior Vs Worrier  
**MIXED**

## Results

You have a genetic variant of COMT that is "Mixed" and the most common amongst the population.

## Genes of Interest

COMT

## Recommendations

You have a genetic variant that is common amongst the population. This outcome means you have a normal response to pain and can react appropriately to stress and pressure.

1. You deal with stress normally; even so you may want to prevent prolonged stress.
2. You have a normal pain threshold and therefore you should respond appropriately if you feel something is wrong.
3. Understand that others in at risk categories may seem illogical or respond strangely to situations that you may respond to a "norm" extent.

## Warrior Vs Worrier

The variants in this topic are related to stress response and the ability to deal with stressors, ranging from executive decision-making to pain threshold. The variants are split between those who are 'warriors', those who are 'worriers' and those who fall in between. In general life, this determines how you may respond to success and failure, loss and gain and how you might interact with others.

Those in the Warrior category may be more aggressive and have a higher pain threshold but could be very hard on themselves when it comes to failure. Decision-making may also be impaired due to a lack of dopamine response, which could lead to making rash decisions or coming to a "quick" decision.

Those in the worrier category might make better decisions and seem to be superior in executive or management positions, however might have a low pain threshold and a habit of over-thinking. There appears to be a link with this variant and mental illnesses, too.

Those (like most) in the Mixed cat will share aspects of the two above, which is a norm outcome.

# Gluten Intolerance Risk



Gluten Intolerance Risk  
**HIGH RISK**

## Results

Studies indicate that you share results that are similar to those with a high genetic risk of gluten intolerance

## Genes of Interest

HLA-DRB1, CCR3, IL18RAP, MYO9B, IL21, IL2

## Recommendations

From a genetic perspective you do share variants associated with gluten intolerance, therefore it is possible that you could suffer from gluten intolerance and/or gluten sensitivity. If you feel gluten may cause symptoms of bloating, loose stools, general gastric distress, rashes and/or your suffering from malaise or general illness without a known cause, it would be wise to limit gluten intake to see if these symptoms improve. If symptoms do resolve it may be wise to avoid gluten in the diet completely. You could also try the following:

### Glutamine

Glutamine is an extremely important amino acid, the most abundant within your body. It has a variety of important roles, from metabolising protein, reducing muscle breakdown to boosting immune, digestive and brain function and plays a role in the production of human growth hormone. Glutamine is paramount for intestinal and digestive health as the tissue lining that protects the intestines prefer glutamine as their fuel source. It is also crucial to help absorb and transport nutrients around the body, as well as helping to maintain intestinal mucosal growth/function preserving the villi within the small intestines.

Glutamine helps to promote and support the immune system, as it's the main amino acid used by our immune cells. It also plays an extremely important role in neurotransmission, and promotes memory, focus and improves your concentration. It's important to add that the antioxidant glutathione is created from glutamine, which can become depleted during exercise or times of stress/illness, as glutamine is required by the kidneys and the immune cells.

Glutamine can be found in both animal sources such as meats and dairy, as well as plant sources such as spirulina, beans, raw spinach, and asparagus.

Getting a varied source of both will be of obvious benefit, however animal sources are not as easy to digest and

## Gluten Intolerance Risk

Gluten is a protein contained in wheat, barley and rye and is found in a variety of everyday food items. It allows doughs to be more elastic and pliable and this is why gluten-containing grains have been used in breads and other baked goods for many years. It can be difficult to actually know if you have an intolerance to gluten as there may be little to no symptoms. Typical symptoms of intolerance include stomach pain with possible diarrhoea when gluten begins to damage the intestinal lining. The small intestines are covered with millions of little octopus-like arms called villi, which pull nutrients in from our foods and absorb them into the blood stream.

Our bodies create enzymes that break gluten (a protein) down, but it cannot fully break it down. Damage to the villi can occur due to gluten intolerance to such an extent that they cannot function correctly, and this can lead to a tremendous amount of inflammation and pain as well as eventually leading to malnutrition.

absorb as plant sources of glutamine.

#### Top 5 Glutamine Foods

Bone Broth, Grass Fed Beef, Spirulina, Cottage Cheese, Asparagus

Once the intestinal lining has had a chance and time to heal, we can then introduce fermentable foods and probiotics.

If these are consumed too soon then even the foods providing “healthy bacteria” will be seen as a threat by the immune system and trigger an inflammatory response.

#### Removing Histamine Foods

You must also be aware that if you are having issues with gluten affecting your gut then high histamine foods can also be cause for concern, as again they will cause an immune response, which will have adverse effects on your health.

#### High histamine foods

Alcohol, Soy products, Tomatoes, Spinach

In general, the best course of action would be to remove gluten foods from the diet if you are suffering from symptoms of gluten intolerance. Fortunately, gluten-free foods have become more readily available in recent times.

# Gut Irritability Risk



Gut Irritability Risk  
**NORMAL RISK**

## Results

Studies show that you share results that are similar to those with an average genetic risk of gut irritability.

## Genes of Interest

BSN, ATG16L1, PTGER4, ZNF300, ZNF365, NKX2-3, NOD2, PTPN2, IBD5, CDKAL1, HLA-DQB1, RSPH6A

## Recommendations

You have an average genetic risk of gut irritability. It's therefore possible for inflammation to occur and for the gut to become compromised. The bacteria and immune cells within your gut are separated by a substance called mucin, which looks like mucus. This mucin is vitally important as it separates the gut bacteria to stop immune cells from attacking them and causing a huge amount of inflammation and releasing toxins.

Those with gut issues such as IBS/IBD may be able to see it covering the faeces and this is a sure sign of inflammation and poor gut health.

In order for the gut cells to make mucin they require energy. The gut bacteria actually prefer this energy to come from short chain fatty acids which are made up from fermentable fibres such as vegetables, fruits, sauerkraut and mushrooms. These get fermented by friendly commensal bacteria within the gut also known as your good bacteria. Fermentable fibres make short chain fatty acids, such as lactate, butyrate, propionate, acetate, with 70-90% going to fuel the cells and make mucin.

This highlights why these foods and nutrients are so important for improving your gut health and reducing inflammation.

The opposite is true if you are eating a lot of refined carbohydrates and sugars, as you have other bacteria within your gut that like to absorb and feed off the sugar. These bacteria will increase in numbers dramatically and take up the space that your friendly commensal bacteria require, so simplistically the more sugar you eat the less your gut cells respond, increasing your chances of insulin resistance, which can eventually lead to type 2 diabetes.

## Gut Irritability Risk

Having an unhealthy gut can lead to a whole array of health issues, from IBS, leaky gut, and autoimmune issues to raised inflammation and cholesterol. Each of us has over 100 trillion bacteria within our gut, which are required to metabolise the foods that we eat each day.

This bacterium turns food into fatty acids, proteins, amino acids and metabolises vitamins and minerals. We also have the highest concentration of immune cells within the gut due to the fact it is in contact with the external environment.

Every time we have something to eat or drink the gut has to deal with it, so if there is something harmful or pathogenic inside, the immune cells within the gut will hopefully fight it off. The immune cells are separated by the gut barrier, so if this becomes run down and compromised then the immune cells start to kill the bacteria within the gut and attack the bacterial membrane. Unfortunately, the immune cells cannot differentiate between good and bad bacteria, so if you have any issues with your gut lining you will find that many of the foods which contain good bacteria can actually be doing more harm than good. Our genetics can link us to inflammation occurring within the gut and therefore it is important to have the knowledge to help our gut thrive and remain stable.

Besides from reducing sugar and increasing fermentable fibre the following tips may be of benefit:

## Glutamine

Glutamine is an extremely important amino acid, the most abundant within your body. It has a variety of important roles, from metabolising protein, reducing muscle breakdown to boosting immune, digestive and brain function and plays a role in the production of human growth hormone. Glutamine is paramount for intestinal and digestive health as the tissue lining that protects the intestines prefer glutamine as their fuel source. It is also crucial to help absorb and transport nutrients around the body, as well as helping to maintain intestinal mucosal growth/function preserving the villi within the small intestines.

Glutamine helps to promote and support the immune system, as it's the main amino acid used by our immune cells. It also plays an extremely important role in neurotransmission, and promotes memory, focus and improves your concentration. It's important to add that the antioxidant glutathione is created from glutamine, which can become depleted during exercise or times of stress/illness, as glutamine is required by the kidneys and the immune cells.

Glutamine can be found in both animal sources such as meats and dairy, as well as plant sources such as spirulina, beans, raw spinach, and asparagus.

Getting a varied source of both will be of obvious benefit, however animal sources are not as easy to digest and absorb as plant sources of glutamine.

### Top 5 Glutamine Foods

Bone Broth, Grass Fed Beef, Spirulina, Cottage Cheese, Asparagus

Once the intestinal lining has had a chance and time to heal, we can then introduce fermentable foods and probiotics.

If these are consumed too soon then even the foods providing "healthy bacteria" will be seen as a threat by the immune system and trigger an inflammatory response.

### Reduce alcohol

Gut irritability can also be caused by alcohol, especially if it contains wheat, barley or rye; grains which are found in various beers and ales.

### Avoid sugar

Easier said than done, but sugar and processed foods not only feed the bad bacteria within the intestines but will also increase inflammation throughout the gut.

### Reduce Histamine Foods

Gut irritability can also be caused by high histamine foods, as they can cause an immune response, which will have an adverse effect on your health. (Please see list below, but also be aware that there will be a variety of other foods which might induce a histamine response.)

### High histamine foods

Alcohol, Soy products, Tomatoes, Spinach



# Gum Health Risk



Gum Health Risk  
**INCREASED RISK**

## Results

Studies show that you share results that are similar to those with an increased genetic risk of gum problems.

## Genes of Interest

GLT6D1, DEFB1, CDKN2B, IL1B

## Recommendations

You have an increased genetic risk of gum health issues, therefore maintaining correct oral care and following the below tips may be very beneficial for you:

### Oral Hygiene

Implementing the correct oral health routine and care each day (brushing teeth twice per day and using mouthwash) would obviously be highly beneficial to reduce bacteria and plaque build-up. Inflammation

Controlling inflammation levels is one area that could help to improve your gum health, through reducing inflammatory foods (see list below) and including more anti-inflammatory foods, which can help to reduce inflammation levels and help to negate tissue breakdown and degeneration.

### Top 5 Inflammatory foods.

- Sugar is by far the worst for inflammation and is void of any nutritional value.
- Refined/processed grains have no fibre, are high GI and void of nutrients.
- Cooking oils, which are packed full of pro-inflammatory Omega 6.
- Additives and sweeteners, MSG, food colouring and aspartame being a few.
- Trans Fats that are found in fast foods and margarine.

### Manganese

Manganese is a required co-factor for an enzyme called Prolidase, which is necessary to make collagen as a structural component of skin, connective tissues and joint cartilage.

### Top 5 Foods Rich in Manganese.

Cloves, Brown Rice, Garbanzo Beans, Spinach, Pineapple

### Copper

## Gum Health Risk

Gum health can be affected by both your lifestyle and certain genetic factors, from continually eating a diet high in sugar and processed foods, to smoking or being exposed to various medications or ever-increasing levels of pollution each day. There will also be a genetic component that we need to be aware of that will predispose us to having an increased risk of gum disease.

For instance, the gene CDKN2B has a strong association with periodontitis, which is a disease caused by bacteria inflaming the gums. This can lead to the teeth possibly falling out and eventual jaw damage.

Copper aids the formation of red blood cells, melanin and collagen in the body. It also plays a pivotal role in oxygen process and transportation as copper and iron cooperate for oxygen activation and reduction.

Top 5 Foods Rich in Copper.

Sesame Seeds, Cashews, Soybeans, Shiitake Mushroom, Beet Greens

Vitamin A

Vitamin A plays an important role for keeping your teeth and soft tissues such as your gums healthy. Vitamin A is more than just a single nutrient but a broad group of related nutrients, each providing us with differing health benefits.

Retinoids

There are some specific immune, inflammatory, genetic, and reproductive-related benefits of vitamin A that can only be obtained from the retinoid (animal source) forms of the vitamin.

Top 5 Retinoid Foods.

Shrimp, Eggs, Cheese, Yogurt, Salmon

Carotenoids

Carotenoids act much in the same way as retinoids in providing us with unique health benefits. Carotenoids function as antioxidant and anti-inflammatory nutrients, with some having a special role to play in the protection of our health.

Top 5 Carotenoids Foods.

Sweet Potato, Carrots, Spinach, Kale, Mustard Greens

Vitamin B-12

B12 is extremely important for the production of red blood cells and preventing anaemia, which can cause bleeding gums.

Top 5 B12 Foods:

Sardines, Salmon, Tuna, Cod Scallops

Vitamin B-3

Vitamin B-3 has been found to raise the formation of collagen and support healthy tissue repair and production.

Top 5 Foods Rich in B-3. \* Majority of meats are excellent sources

Tuna, Chicken, Peanuts, Brown Rice, Sweet Potato

Vitamin C

Vitamin C is an essential vitamin for correct growth and repair of your body's tissues. It has also been shown to protect against gingivitis or the early signs of gum disease



This vitamin also aids in the production of collagen and therefore helps build and maintain your skin, tendons, ligaments, blood vessels, cartilage and gums.

Top 5 Foods Rich in Vitamin C.

Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

# Stress Affecting Gut Health



## Results

Studies show that you share results that are similar to those with a slight genetic risk of stress affecting gut health.

## Genes of Interest

COMT, DTNBP1, CHRNA4, BDNF

## Recommendations

You have a slight genetic link between stress and gut health; therefore, it is possible that the mind/gut balance can negatively affect you. When you get stressed your brain will send a cocktail of signals around your body to release a variety of hormones. Hormones have a tremendous role to play with regards to your gut health and if they are functioning correctly.

Adrenaline is known as our “fight or flight” hormone, which can have a profound effect on both your stomach as well as your intestines. An increase in adrenaline will also mean an increase in heart rate and blood flow, which in some instances can be extremely useful and in others can cause unwanted stress and anxiety.

Adrenaline will move blood away from your gut, which can result in slower digestion and possible bloating. It will also result in your metabolic rate slowing down. An increase in adrenaline can be triggered by various lifestyle factors or choices, from being late for a meeting to consuming too many cups of coffee each day.

## Cortisol

The primary stress hormone - is our friend for most of the time and only becomes an issue if it's produced at the wrong time and in the wrong amount. Sleep deprivation has an immediate effect with an increase in cortisol levels and a decrease in growth hormone production, which will also suppress the digestive system. So, getting a good night's sleep will help keep cortisol levels in check and at a healthy level, which will also be good news for your gut health.

## Sleep and Hormones

Getting the correct amount of sleep will have a tremendous effect on your gut and overall health. There will be various hormones that will be affected with a lack of sleep; however, leptin and ghrelin are two such hormones that will also affect the digestive system.

Leptin is your body's satiety hormone (feeling full), which your body reduces if you aren't getting enough sleep. This

## Stress Affecting Gut Health

The connection between your brain and gut has now been well established, with the realisation that stress and anxiety will have a profound effect on our gut and overall health. This gives us some serious food for thought in regard to combating our daily stress levels. Stress can be brought on by a variety of factors, from work or family life to consuming certain types of food such as caffeine or sugar. There is also a strong genetic component, which will predispose us to having higher adrenaline levels or reduced ability to manufacture serotonin or dopamine. Obviously, we cannot legislate for what life throws at us, but understanding specific triggers and then providing useful tools to hopefully negate their effect would prove extremely useful.

is one of the reasons that you will tend to eat more following a late night, as your “feeling full” hormone isn’t working correctly. The second hormone, ghrelin, is the body’s “hunger hormone”. An interesting study showed that just one night of poor quality of sleep can lead to a 20% increase in ghrelin levels.

So again, this may be one reason as to why your appetite increases following a late night, or continually going to bed late. These are just two examples of the hormones which will have a direct correlation with gut and digestive health and getting sufficient rest.

## **Ashwagandha**

If you are looking to reduce your stress levels, then adding the super herb ashwagandha to your supplement list may prove to be extremely useful. Ashwagandha is classified as an “adaptogen”, meaning it helps your body cope and manage stress. Having been heavily researched, it has shown a whole variety of health benefits from helping to lower blood sugar, improve testosterone levels and interestingly helps to reduce cortisol levels.

## **Exercise**

Exercise increases the expression of gene BDNF, which will improve your cognitive performance, memory and help alleviate anxiety and physical symptoms of stress. As little as 15 minutes a day at a moderate intensity may be all that you actually need to help.

# Genetic High Blood Pressure



## Results

Studies indicate that you share results that are similar to those with a normal genetic risk for high blood pressure.

## Genes of Interest

CPLX3, PPARGC1A, APOA5, ADRB2, ADD1, MTHFR

## Recommendations

This is the most common outcome; there are a few things that you can do to help maintain a healthy blood pressure.

### Bodyweight

A reduction in body fat if you are currently overweight is one area that you can look to improve. Body fat can in many instances act as an endocrine gland such as the thyroid or adrenal, which can increase a variety of vasoconstriction genes.

### Exercise

Aerobic exercise has various benefits to improve high blood pressure, such as reducing a peptide hormone called angiotensinogen II, which causes vasoconstriction and increases blood pressure. Exercise also improves endothelial function, which helps to regulate your inflammatory response and blood flow.

### Nutrition

“Let food be thy medicine and medicine be thy food” Hippocrates

There are many foods/nutrients that we can look to include in order to improve blood pressure.

Ginger, pea and whey protein have all been shown to have ACE (Angiotensin converting enzyme) inhibitory affect. This reduces vasoconstriction and high blood pressure.

Reducing sodium (table salt) from your diet will affect a complex hormonal system that helps to regulate your blood pressure through the (RAS) renin angiotensin system, which balances salt and water.

### Nitrate Rich Foods

Studies have indicated the correlation between certain vegetables increasing a substance called Nitric Oxide. This is a vasodilator that helps to expand the blood vessels and reduce blood pressure. Below are a few suggestions of

## Genetic High Blood Pressure

There are a variety of lifestyle and environmental factors that will contribute towards having high blood pressure. These include diet, lack of exercise, lack of sleep, stress and anxiety.

There is also a genetic component that we need to be aware of with genes that encode something called vasoconstriction (narrowing of the blood vessels) as well as vasodilation (widening of the blood vessels). Too much vasoconstriction will narrow the blood vessels leading to an increase in blood pressure, which can lead to a whole array of health complications.

nitrate-rich foods that you could include in your diet.

- Beet root
- Leafy Greens
- Garlic
- Dark Chocolate

# Salt Causing High Blood Pressure



Salt Causing High Blood Pressure  
**LOW RISK**

## Results

Genetic studies indicate no genetic benefit of radically decreasing salt in the diet unless salt intake is abnormally high.

## Genes of Interest

ADD1

## Recommendations

This is a common outcome and indicates that unless your salt intake is radically high (6g+) you should not have to decrease salt intake unless directed to do so by your physician/Dr.

## Salt Causing High Blood Pressure

Consuming salt increases the sodium in the bloodstream and eating too much can cause issues with nutrient balance, reducing the ability of the kidneys to remove water. Blood pressure will then increase due to the extra strain from fluid build-up on blood vessels, which - if left untreated - can lead to kidney damage.

# Cardiovascular Health Issues



Cardiovascular Health Issues  
**NORMAL RISK**

## Results

Studies indicate that you share results that are similar to those with a normal risk of CV issues.

## Genes of Interest

CDKN2A, CDKN2B, CDKN2BAS, R451Q, MTHFD1L, APOE, SEZ6L, MIA3, CXCL12, SMAD3

## Recommendations

This outcome is associated with a weak association of CV risk due to the genes analysed in this test. It is wise to consider some of the below interventions to keep CV issues at bay and help alleviate current ones:

### Cocoa

Dark chocolate has many positive health benefits, but when it comes to cardiovascular health, they have one specific antioxidant epicatechin, which crosses the blood brain barrier upregulating brain neurotrophic factor (BNDF) as well as nitric oxide production to improve vasodilation.

### Aerobic exercise

Exercise is extremely useful at reducing the NADPH enzyme, which is a major source of reactive oxygen species (ROS) causing oxidative damage within the blood vessels. It also helps to decrease the levels of the PAI-1 enzyme, which affect the cells lining the blood vessels. This controls cell adhesion and clotting which can lead to thrombosis, atherosclerosis, metabolic syndrome and abnormal blood lipids.

### Omega 3 fish oils

Omega-3 fish oils play a significant role in helping to prevent various cardiovascular health issues such as thrombosis and atherosclerosis. This can be achieved by reducing the activity of the PAI-1 enzyme, which are mainly produced within the cells lining of the blood vessels as well as your body fat.

## Cardiovascular Health Issues

Heart disease is the number one cause of death worldwide and so maintaining a healthy cardiovascular system is paramount to your overall health and wellbeing.

The cardiovascular (CV) system has a variety of different roles to play within the body from transporting air and nutrients to the cells, to the removal of carbon dioxide and waste products. However, the entirety of your cardiovascular system, which includes your heart, lungs and blood vessels, need to be healthy and free from inflammation and disease for this to happen.

The body controls blood flow by incorporating vasoconstriction and vasodilating, which is the narrowing and widening of the blood vessels. If you have too much vasoconstriction then this narrowing of the blood vessels which will cause blood pressure to go up.

Certain lifestyle choices such as diet, stress, lack of exercise and sleep can all cause inflammation and oxidative stress, which contribute to the damaging of the blood vessel lining causing it to become stiff and inelastic.



# Immune Function



Immune Function  
**NORMAL RESPONSE**

## Results

Studies indicate that you share gene variants that link you to having a normal immune response at a genetic level.

## Genes of Interest

IL-6, TNF, TLR4, HLA-DQA1, PON1, MTHFR, SH2B3, FOXO3

## Recommendations

This would be a common result and may mean you have a normal risk of the immune system having an inappropriate response, however, there are some potential risks on a genetic level. It is therefore vital that you maintain health with a balanced diet, regular exercise and getting enough sleep as well as staying clear of pathogens found in pollution and smoking.

- Exercise is extremely effective, but please be aware that excessive/over training and or high-intensity exercise increases the expression of TNF $\alpha$ . If you are a beginner or new to training, then please start off with light exercise such as walking. Trying to exercise too much is one of the fastest ways to weaken your immune system, so take it easy.
- Decreasing stress is easier said than done, but chronic stressors can shut down the immune system and directly provoke long-term changes in pro-inflammatory production and increase IL-6.
- Vitamin D increases TNF $\alpha$  production in immune cells, so get out in the fresh air and sun if possible.
- Zinc deficiency has been shown to increase IL-6 production.
- Vitamin C in adequate amounts from food and/or supplements is also important for general health and fighting infections.
- Incorporating lots of fresh fruits and vegetables into your diet each day will allow for a diverse range of vitamins and minerals, which will be fundamentally important to maintaining a strong immune system and health.

## Immune Function

The word “immunity” actually originates from the Latin word *immunis*, meaning “exempt”. Our immune system is a defence system within the body and has many different processes to protect against disease and infection. A fully functioning immune system should detect pathogens such as viruses like influenza, rhinovirus, coronavirus, adenovirus, etc.

The immune system must also differentiate a pathogen from healthy tissue. When the immune system attacks the body like it does in rheumatoid arthritis for example, it is known as an autoimmune condition. This is an inappropriate immune response, in the same way that it can act very aggressively to pathogens and cause the immune system to kill healthy tissue as well as the pathogen.

As humans we all have the same DNA and share roughly 25,000 genes. What differentiates us are variations along the genome which affect gene function. Some of these are extremely easy to see, such as our obvious physical traits like eye and hair colour or how tall we are. However, some variations in our genome remain unseen until we respond to an allergy, feel sick from food or medication, etc. These variations also affect our immune response to certain pathogens and our risk of autoimmune conditions.

This aspect looks at multiple variations in the genome which may affect certain genes that impact the immune system in one way or another. Below is a summary of the genes that are utilised in the

## Sleep

Getting a good night's sleep has many positive health benefits, from repairing your DNA to increasing your antioxidants levels, which will enhance your immune system. Certain genes dictate whether you are a morning person or a night owl, how much sleep you get, if your sleep is fragmented, and if stress will affect you sleeping well.

For instance, stress and sleep can be the perfect chicken and the egg scenario. Having continuous stress will have a negative effect on your sleep quality and having poor quality sleep will increase your stress levels. There are a variety of factors which affect our health.

One of which is currently being studied is the effect of sleep and our circadian rhythm. Our circadian rhythm is thought to regulate around 15-20% of our genome and is tremendously important to keeping us fit and healthy as it affects our hormones, eating habits and reduces the chances of us becoming ill.

Our diet also has huge connotations for how well we sleep. For instance, the "sleep hormone" melatonin is responsible for signalling darkness for the body and regulating daily physiological rhythms, which are dramatically affected by retinol (Vitamin A). Studies have shown high levels of retinol in the mammalian pineal gland and Vitamin A deficiency causes a reduction in the AANAT gene, which reduces melatonin levels.

During our sleep, we repair damage to our DNA. One of the ways that this is done is by releasing melatonin. This hormone is inhibited by blue light during the day and hindered when we use our phones, laptops and tablets at night. It's important because it activates and regulates over 500 genes that are involved in repair and antioxidant function.

Securing a good night's sleep has many positive health benefits, from repairing your DNA, increasing your antioxidants to improving the length of your telomeres, which are known as "mother nature's stopwatch".

The vast majority of people have trouble falling or staying asleep from the blue light resonating off of their phone, laptop and or TV. The advent of artificial light has also led to multiple sleep disorders as artificial light will prevent the release of melatonin. If you're consistently getting poor quality as well as quantity of sleep, you will be fundamentally damaging your immune system and health.

The quickest and most effective way to improve your sleep is to stop using your phone, laptop and or TV in the evenings as the blue light resonating from these devices mimics the effects of morning light, telling your brain to stop producing melatonin which prevents

algorithm and the reason why:

### IL-6 (Interleukin 6)

The IL-6 gene encodes interleukin 6 (IL-6) which is a pro-inflammatory cytokine. It's involved in the immune system, helping with bone metabolism, protection from bacterial infection as well as a host of other physiological functions. Various pharmaceutical companies are now looking at IL-6 inhibitors as possible therapy for multiple pathogens. While IL-6 under normal circumstances has many positive health benefits, data suggests that patients with worse outcomes have increased IL-6 compared with those with better outcomes.

### TNF-alpha gene (Tumour necrosis factor)

TNF-alpha encodes a pro-inflammatory cytokine produced to kill bacteria, viruses and parasites. When produced in small amounts it will play an important role for the protection of your cells. Unfortunately, if it is produced in larger amounts and more frequently, it can cause your cells to become weakened and lose their function.

### TLR4 (Toll-like receptor 4)

Toll-like receptor 4 is a protein and is encoded by the TLR4 gene. It helps activate pro-inflammatory cytokine production as well as having a key role in the innate immune system, which represents the body's first line of defence against infections.

### HLA-DQA1 (Major histocompatibility complex, class II, DQ alpha 1)

HLA-DQA1 belongs to the HLA class II alpha chain paralogues, the protein encoded by this gene is one of two proteins that form the DQ heterodimer, which is essential for a functioning immune system. Variations in this gene

you from peacefully drifting off to sleep.

You could also look to add foods rich in melatonin with your evening meal, such as: tomatoes, asparagus, broccoli, olives, barley, rice, walnuts or milk in combination with foods high in tryptophan. This is an essential amino acid which is found in a variety of foods and acts as a mood regulator. It also increases melatonin and serotonin levels, helping you to feel more relaxed, calm and possibly sleepy.

#### Top 5 Tryptophan foods

Pumpkin seeds, Soy Beans, Cheese, Beef, Chicken

(Please see your Sleep mode for your results and further information)

Also, try reducing alcohol intake as we must remember that while it will help make you feel drowsy and fall asleep faster due to its ability to sedate you, this sedation is not actually real sleep. Alcohol will therefore have a negative effect on you entering a deeper sleep and achieving the correct sleep cycle.

#### Stress

Another area which is largely overlooked is the effects of stress on the immune system. We need to remember that high levels of stress will release a whole variety of catecholamines (stress hormones) which help to regulate the sympathetic nervous system (SNS) and adrenal response to stress. In many instances, this can have a negative effect and will shut down your immune system if activated for too long.

Stress can be brought on for a whole variety of reasons, from physical stressors such as: falling sick or getting injured or hurt; chemical stressors from high levels of pollution; or the myriad of household products people use each day. Then we have emotional stress which most people will encounter, such as a friend or family member passing away, pressure at work, or financial difficulty.

When we are scared or feel threatened, we will all respond in different ways, but the vast majority of us will get ourselves into the sympathetic response otherwise known as "fight or flight", which we will have developed thousands of years ago to protect us from not being eaten by predators.

If this is an acute response, not lasting that long, then it's perfectly fine and will do no real harm. It's only when this response moves from acute to systemic that it can cause some real issues. One of these is your immune system being heavily affected and shut down.

All of your body's energy will be focused on running away or

cause inappropriate immune responses and are associated with conditions such as celiac disease, among others.

#### PON1 (Paraoxonase 1)

The PON1 gene encodes an enzyme known as serum paraoxonase/arylesterase 1. PON1 has a contributing role to our innate immunity as it protects against bacterial infection. It is therefore an important gene when considering secondary infections from common respiratory tract infections.

#### MTHFR (Methylenetetrahydrofolate reductase)

Methylenetetrahydrofolate reductase is an enzyme encoded by the MTHFR gene. It is related to multiple conditions and is used in our other modes such as folate deficiency and B12 algorithms. DNA methylation can be impaired with certain variants within the MTHFR gene, which may lead to ill health and a poor operating immune system.

#### SH2B3 (Src homology 2-B)

SH2B adapter protein 3 is a protein encoded by the SH2B3 gene. It regulates signalling pathways for inflammation, cell migration and haematopoiesis. It's also associated with autoimmune conditions due to its role in inflammation but is heavily studied for its association with vascular/blood ailments.

#### FOXO3 (Forkhead box O3)

Forkhead box O3 is a protein encoded by the FOXO3 gene. It's associated with protection from oxidative stressors and, interestingly, has a variant associated with longevity; being overly apparent in those who live to 100.

This aspect only considers genetic factors. The immune system is impacted

fighting this perceived threat and not on all of our other regular biological functions, such as your immune system functioning correctly and fighting off any colds or viruses.

A good example of this would be the sensation of butterflies in our stomach when we get nervous or anxious about something. This is due to your body releasing adrenaline, which will cause your blood vessels inside your intestines and stomach to constrict, pushing all of the blood to your extremities where it's required when you're in that "fight" or "flight" response.

(Please see your Stress mode for your results and further information)

## Vitamin A

Vitamin A is more than just a single nutrient, it's a broad group of related nutrients each providing us with differing health benefits. Below is a brief explanation to Vitamin A, and some of the health benefits that it offers.

Retinoids have specific immune, inflammatory, genetic and reproductive-related benefits and can only be obtained from the retinoid (animal source) forms of the vitamin.

Carotenoids act much in the same way as retinoids in providing us with unique health benefits, they function as antioxidant and anti-inflammatory nutrients, with some having a special role to play in the protection of our health.

The two forms aren't just chemically different - they also provide us with different types of health benefits. Each offer specific immune, inflammatory and genetic benefits of Vitamin A, with some that can only be obtained from the retinoid forms of the vitamin.

Retinoids are especially important with respect to pregnancy and childbirth, childhood growth, night vision, red blood cell production and resistance to infectious disease. However, retinoids in high dosages can cause birth defects and, therefore, it is unwise to supplement retinoid-based supplements when pregnant unless otherwise specified by your physician.

In most instances we will be required to consume both retinoids and carotenoids, with carotenoids converting to retinol in the body. However, conversion of the most important carotenoid - beta-carotene - differs between individuals based on their genetic variances.

### Top Five Vitamin A Retinoids Foods

Shrimp, Eggs, Cheese, Yoghurt, Salmon

### Top Five Vitamin A Carotenoids Foods

Sweet Potato, Carrots, Spinach, Kale, Mustard Greens

Vitamin A is also called "anti-infective" vitamin and many of the body's defences against infection depend on an adequate supply.

## Omega 3

There are basically 3 main types of omega 3:

A-linolenic acid (ALA), which cannot be made within the body and is found in plants such as flaxseed, pumpkin seeds,

by multiple other factors such as pollution, fitness levels, nutrition, body fat and age. Our genome is also affected by epigenetic changes which may mitigate or amplify certain issues, and our epigenetics are impacted by the aforementioned factors.

tofu and walnuts.

Then we have Docosahexaenoic acid (DHA) and Eicosapentaenoic acid (EPA), which are found from animal sources such as salmon, tuna and eggs.

Both will offer a variety of health benefits which include protection from free radical build up due to oxidation damage within the body, to improving your immune system and insulin sensitivity. Omega 3 fatty acids are fundamentally important for your inflammatory and immune responses.



# Vitamin D Benefit to Your Immune System



Vitamin D Benefit to Your Immune System  
**NORMAL BENEFIT**

## Results

Studies indicate that you share variants that link you to a normal benefit from Vitamin D.

## Genes of Interest

CYP2R1, NADSYN1, GC, VDR

## Recommendations


You do not have any risk for Vitamin D deficiency and, therefore, supplementing may only be important if you spend very little time outside and/or in the autumn or winter months. Vitamin D is also found in foods like cheese, fish, egg yolk and beef liver and so if you eat adequate amounts of these foods you should be covering your needs if you are also spending adequate time outside.

## Vitamin D Benefit to Your Immune System

Vitamin D helps with the enhancement and regulation of the innate immune response, which our first line of defence against bacteria, viruses and infection.

It has also been shown in various studies to have protective effect against respiratory tract infections, with daily or weekly supplementation reducing the risk of acute respiratory infections by more than 50%.

# B Vitamins Benefit to Your Immune System



B Vitamins Benefit to Your Immune System  
**NORMAL BENEFIT**

## Results

Studies indicate that you share variants which link B vitamins to having a normal benefit to immunity.

## Genes of Interest

NBPF3, MTHFR, SLC19A1

## Recommendations

You will require B vitamins to function and can probably gather the majority from your diet. B vitamins are found in a whole host of different foods as mentioned in the intro. As long as you are eating a varied diet you probably do not require extra B vitamins through supplementation. However, as B vitamins are water soluble and they will be of benefit to your immunity it may be wise to supplement B12 and B6 in particular.

Vitamin B6 plays an important role in immune function. It's also crucially involved at several points during the metabolism of protein, carbohydrates and fats. Most importantly, though, it helps aid the enzyme that draws carbohydrates (glycogen) out of storage from inside the cell, which requires B6 for its activity.

Top 5 B6 Foods:

- Tuna
- Turkey
- Spinach
- Cabbage
- Bok Choy

Vitamin B12 is involved in energy metabolism, formation of red blood cells and the development and normal functioning of the brain and nervous system. B12 is fairly unique and includes the following:

1. Unlike other B vitamins, no plant or animal can make vitamin B12, except for microorganisms like fungi and bacteria. This is why animal sources are the best source of B12.
2. Mushrooms can often contain B12, but in extremely small amounts.
3. B vitamins are not stored well in the body normally, but vitamin B12 can be stored from

## B Vitamins Benefit to Your Immune System

B vitamins are made up of eight key vitamins that form the B- vitamin family. They will both individually and collectively offer a whole variety of health properties.

- B1 (Thiamine), asparagus, pork, navy beans, sunflower/flax seeds.
- B2 (Riboflavin), spinach, almonds, eggs, steak, soya beans.
- B3 (Niacin), tuna, brown rice, chicken, peanuts, green peas.
- B5 (Pantothenic acid), shiitake mushrooms, sweet potato, salmon, lentils.
- B6 (Pyridoxine), tuna, turkey, pistachios, sweet potato, banana.
- B7 (Biotin), almonds, egg yolk, sweet potato, onions, tomatoes.
- B9 (folate), lentils, soy beans, asparagus, broccoli, beet root.
- B12 (Cobalamin), sardines, salmon, eggs, yogurt, mushrooms.

Each of the above B vitamins has its own special function. However, together they are highly important for the correct functioning of the immune system either directly or indirectly.



anywhere between 3-5 years. 4. Most B vitamins are more easily absorbed than Vitamin B12, which has more complicated requirements for absorption. 5. Vitamin B12 is also the only vitamin that contains a metal element (cobalt), hence why the chemical name cobalamin.

Top 5 B12 Foods:

• Sardines • Salmon • Tuna • Cod • Scallops

Vitamin B12 - alongside a whole array of other nutrients such as folate, choline as well as the other B-vitamins - are crucial in keeping our DNA and genes healthy through a process called methylation.

DNA methylation (DNAm) is a process where tiny chemical markers called methyl groups will attach to one of the Four nucleotide bases on your DNA (adenine [A], cytosine [C], guanine [G], or thymine [T]). As we naturally age these methyl groups will either hypo (low) or hyper (high) methylate regions across your genome, which will then affect how specific genes and biological processes function.

# Selenium Benefit to Your Immune System



## Results

Studies indicate that you share variants that link you to a normal benefit from selenium.

## Genes of Interest

GPX1, GPX4

## Recommendations

You will require selenium for the correct functioning of the body and can probably get most of your needs from your diet. However, it would be wise to make sure you are eating a balanced and varied diet, with Brazil nuts having the highest levels of selenium. Besides Brazil nuts there are other foods to make sure your selenium levels are topped up:

### Top 5 Selenium Foods (Animal)

Tuna, Shrimp, Sardines, Salmon, Cod

### Top 5 Selenium Foods (Plants)

Brazil Nuts, Tofu, Brown Rice, Sunflower seeds, Shiitake Mushroom

It will also be important to have adequate levels of glutathione which is found in:

### Foods higher in glutathione:

Asparagus, Avocado, Spinach, Broccoli, Tomato

### Foods/nutrients that stimulate glutathione production:

Turmeric, Vitamin C, Cinnamon, Sulphur containing foods such as beef, fish, Brussels sprouts and watercress

The amount of dietary glutathione that is available is relatively small compared to the amount of glutathione that is created internally and found within our bodies. It is important to remember that cooking will reduce the glutathione content in food, as will the

## Selenium Benefit to Your Immune System

Selenium is an essential trace mineral and an extremely important antioxidant. It prevents cellular and subcellular lipids and fats from being peroxidised, meaning it prevents body fats from going rancid, something which is seen externally as "age and liver spots". If you have a high intake of polyunsaturated oils such as those found in olive, coconut, fish oil, salad dressing and margarine at the same time as having a selenium deficiency, you could increase the chances of illness and disease.

Getting rid of toxins is crucial to your health. Selenium has been well publicised for the activity of a group of enzymes called glutathione peroxidases, which form the front line of the body's antioxidant defence system. These enzymes play a critical role in the body's detoxification pathways. They are also involved in recycling of vitamin C from its used form back to active.

### GPX1 (Glutathione peroxidase)

GPX1 is an anti-oxidant gene that neutralises hydrogen peroxide by converting it to water and oxygen. This protects cell surfaces, extracellular fluid and red blood cells as well as other cells against oxidative damage. GPX1 is also known as a selenoprotein, meaning that selenium is required for it to function correctly. Therefore, how much GPX1 you produce will depend on your selenium levels.

GPX1 will also require glutathione, which is one of the body's most important antioxidants. Unfortunately, this also

length of time that it is stored. If we want to achieve higher levels of glutathione, then our vegetables need to be raw and uncooked. We can also obtain glutathione from fruit, raw eggs and dairy as well as rare meats.

You can improve the expression of GPX1 through the following:

- Exercise. This has been shown to increase GPX1, with weight training being more effective. But please be aware that prolonged intense exercise will increase free radical damage.
- Avoiding smoke exposure as well as over-consumption of alcohol.
- Lycopene. Epidemiological studies have reported that regular consumption of lycopene - a phytochemical found in red fruits and vegetables such as tomatoes, red carrots and watermelons - significantly increases GPX1.
- Sulforaphane. This is a phytochemical produced in cruciferous vegetables such as broccoli sprouts, broccoli, bok choy etc.

decreases as we age. Trying to improve glutathione levels can be fairly tricky and can only be achieved by increasing all the necessary nutrients/cofactors and precursors needed to manufacture it internally.

Glutathione foods can be divided into two categories: foods that contain the glutathione molecule and foods that stimulate glutathione production and/or up regulate the activity of glutathione enzymes.

# The PTPN22 Gene and Your Immune System



The PTPN22 Gene and Your Immune System  
**NORMAL IMPACT**

## Results

Studies indicate that you share variants that link you a normal PTPN22 variant conferring no risk.

## Genes of Interest

PTPN22

## Recommendations

As you do not have variants linked to an increased risk from PTPN22 it would be wise to follow the guidance in the other aspects of immune mode.

## The PTPN22 Gene and Your Immune System

PTPN22 is a protein that regulates the development and function of T cells and B cells and helps immune function through suppressing inflammation, fighting bacterial infection.

Experts are not fully concluded on the exact mechanisms of PTPN22 and its effect on the immune system, however, those with risk variants are linked to having higher infection rates, a tougher time clearing infections and more inflammation post-infection.

Our immune system consists of two types of cells, namely: "innate", which is our body's first line of defence against infection, bacteria or a virus and "adaptive", which are T and B cells that are called into action if our first line of defence is broken.

B cells create antibodies to help fight and kill any bacteria and or viruses and T cells have a few different roles to play. There are two types of T cells: "helpers" and "killers". The helper T-cells will stimulate B-cells into making antibodies, which will help to fight off any bacteria or viruses and help killer cells to develop.

While both these types of cells are extremely important for your immune system to function correctly, they also have very different roles to play.

# Vitamin C Affecting Immune Function



Vitamin C Affecting Immune Function  
**BENEFICIAL**

## Results

Increasing your vitamin C intake would be beneficial for improving your health, either from your diet alone or combined with a supplement according to your gene variants.

## Genes of Interest

IL- 6, TNF, TLR4, HLA-DQA1, PON1, MTHFR, SH2B3, FOXO3, PTPN22, SLC23A1

## Recommendations

Vitamin C is essential to immunity. Having supplemental vitamin C may be useful for you especially if you are training with high intensity, eating a very restricted diet, currently suffering with illness, have chronic stress, poor sleep patterns or are generally feel run down. The best sources of vitamin C in the diet are:

- Citrus fruit (lemons, limes, oranges etc.)
- Peppers
- Blackberries
- Potatoes
- Broccoli
- Strawberries
- Sprouts
- Blackcurrants
- Kale
- Kiwi
- Fortified foods
- Fruit juices (oranges juice etc.)

It is unlikely any overdose in vitamin C will occur if you are just getting vitamin C from your diet. The main symptoms of vitamin C overdose are stomach upset and diarrhoea. Supplemental vitamin C over 500mg can cause symptoms, although this is unlikely. It is best to take supplemental vitamin C a few times a day but in smaller amounts. Vitamin C supplements often come in 250-1500mg tablets, chewables or effervescent powders.

Vitamin C supplements are often combined with other nutrients which may aid immunity, such as zinc and quercetin. Taking these may be worthwhile, especially if it is a viral infection such as a cold that you are suffering from. Theoretically, high dosed vitamin C intake may increase iron absorption, but this will only be an issue for those suffering with a diagnosis haemochromatosis.

## Vitamin C Affecting Immune Function

Vitamin C is a water-soluble nutrient that the body does not store. Humans need vitamin C from dietary sources in order to maintain adequate levels within the body for the majority of people in “developed countries”, however, this is easily done.

Vitamin C plays a vital role in a number of functions. For example, it is essential for correct immune response, the production of collagen, L-carnitine and certain neurotransmitters. A deficiency in vitamin C is called scurvy, which is exceedingly rare at present. Nevertheless, if it does develop, it can cause joint swelling, bleeding gums, tiredness and anaemia.

Scurvy can be cured with vitamin C intake, however, taking high dosages and then suddenly ceasing intake can also cause scurvy, known as “rebound scurvy”. The genes analysed here look into the typical variants that may cause worsened responses to infection from all sources as well as the need for increased antioxidants. The gene SLC23A1 has a direct effect on the absorption of vitamin C into the body and its distribution to organs.

# Inflammatory Infection Response



## Results

You share some gene variants associated with an increased risk of an abnormal inflammation response from the genes analysed in this aspect.

### Genes of Interest

IL- 6, TNF, TLR4, HLA-DQA1, PON1, SH2B3, PTPN22, SLC23A1, HLA-DQB1, HLA-DRB1, GPX1, FOXO3, IL1B, IRF5, SOD2

### Recommendations

This result would be considered reasonably common. Even though you do have a few variants linked to an abnormal inflammatory response, if we look at your gene variants overall it would be a normal outcome, some good and some bad.

It would be wise to keep tabs on your general wellness to help prevent severe flare-ups. A well-balanced diet, maintenance of stress and daily exercise are probably all you need to help keep your inflammation response in check and help prevent any chronic or unwanted inflammatory response from infection. However, it may be wise to put extra measures in place to help maintain health and wellness. Some good places to start would be:

- Meditation
- Improving sleep routine
- Getting away from pollution
- Taking a break from alcohol
- Swapping sugary drinks for water
- Extra fat loss

Some dietary additions may also aid you:

- Tomatoes (lightly cooked)
- Kale
- Spinach
- Almonds
- Walnuts
- Cherries

## Inflammatory Infection Response

How we respond to infection can vary dramatically. Inflammation can occur due to infection or injury and certain genes affect this response. Inflammation occurs when the body is fighting against harm in an attempt to heal itself. In this instance, chemicals are released to commence inflammation, antibodies and proteins are released as well as an increase in blood flow to damaged areas, such as injuries.

Inflammation is not a bad thing, although it is often portrayed as a negative. Inflammation is required for correct healing and the destruction of pathogens. When inflammation gets out of control through an excessive response from the body, or when it lasts when there is no longer need for it to (chronic inflammation), problems can begin.

This aspect looks at the genes associated with the inflammation response from infection, analysing the likelihood of an over response leading to a release of excess inflammatory chemicals into the body. This may cause a risk of inflammation lingering even after the infection has passed. This aspect looks at multiple variants across genes that have been identified to be important to the inflammatory response from infection.



- Blueberries
- Blackberries
- Strawberries
- Tuna
- Salmon
- Sardines
- Mackerel
- Beans

Adding in some herbs and spices is also a great way to go:

- Turmeric
- Garlic
- Ginger
- Black pepper
- Cayenne
- Clove

While creating an anti-inflammatory diet can be really helpful, the key is not just in the addition of the above foods but also in the removal of potentially inflammation-causing foods. Reducing the following will also aid you:

- Processed meats, especially red meat
- Sugary drinks
- Fried and burnt foods
- Trans fats

This result would be considered reasonably common. Even though you do have a few variants linked to an abnormal inflammatory response, if we look at your gene variants overall it would be a normal outcome, some good and some bad.



# Sight Degeneration with Age



Sight Degeneration with Age  
**SLIGHTLY FASTER DECLINE**

## Results

Studies indicate that you have a weak genetic link to age-related sight degeneration.

## Genes of Interest

HTRA1, CFH, C3, TLR3

## Recommendations

Your genetic variants have a weak link when it comes to age-related sight degeneration, so please read through the recommendations below. They will provide some useful insights to hopefully mitigate their effect.

### Vitamin A

Vitamin A is more than just a single nutrient. It's a broad group of related nutrients, each providing us with differing health benefits. When we think about which foods are good for our eyes we instantaneously think of carrots, as apparently, they help us to see in the dark. Below is a brief explanation to vitamin A and some of the health benefits that it offers.

### Retinoids

There are some specific immune, inflammatory, genetic and reproductive-related benefits of vitamin A that can only be obtained from the retinoid (animal source) forms of the vitamin.

### Carotenoids

Carotenoids act much in the same way as retinoids in that they provide us with unique health benefits. Carotenoids function as antioxidant and anti-inflammatory nutrients, with some having a special role to play in the protection of our health. The two forms aren't just chemically different - they also provide us with different types of health benefits.

Each provide us with specific immune, inflammatory and genetic benefits of vitamin A, while some can only be obtained from the retinoid (animal source) forms of the vitamin. Retinoids are especially important with respect to pregnancy and childbirth, childhood growth, night vision, red blood cell production and resistance to infectious disease.

However, retinoids in high dosages can cause birth defects and so it's unwise to supplement retinoid-based

## Sight Degeneration with Age

As with all biological processes, our eyes will be affected as we age. But there will also be a variety of other areas - such as diet, general health, pollution as well as a strong genetic component - that can affect our eyesight. Fundamentally, inflammation and oxidation are two main areas that you need to improve to try and negate eye degeneration, with both playing a crucial part in sustaining eye health.

Your sight can diminish for various reasons, with one condition called presbyopia affecting our eyes as we age. Presbyopia is a normal part of ageing and hardens the lens and affects our ability to see close objects. However, macular degeneration is the leading cause of vision loss for the elderly and the genes analysed in this mode are possible risk factors.

supplements when pregnant, unless otherwise specified by your physician. In most instances we will be required to consume both retinoids and carotenoids, with carotenoids converting to retinol in the body.

However, conversion of the most important carotenoid, beta-carotene, differs between individuals based on their genetic variances.

Top Five Vitamin A Retinoids Foods Shrimp, Eggs, Cheese, Yogurt, Salmon

Top Five Vitamin A Carotenoids Foods Sweet Potato, Carrots, Spinach, Kale, Mustard Greens

Lutein and zeaxanthin

Both are extremely important macular carotenoids, which are not only high in antioxidants but give plants and fruits their bright red and yellow pigmentation. They are also extremely important for their protective quality for your eyes, as they provide natural filters for the blue light emitted from digital devices.

Astaxanthin – is a potent antioxidant that occurs naturally and provides a reddish pigment to a group of chemicals called Carotenoids. Studies indicate that they offer a whole array of benefits, such as improvements to cancer, brain ageing and cardiovascular health.

Astaxanthin appears to protect the retina and is a highly important nutrient for general eye health. The highest natural sources of astaxanthin will predominantly be found in fish, shellfish and algae. The highest concentrations are found in green algae, which has 1000's of times more astaxanthin than salmonoids.

Lycopene

This is another carotenoid found in tomatoes and other red and orange fruits and vegetables and it's a fantastic antioxidant that has been shown to suppress tumours and colon cancer. And with regards to keeping your eyes healthy, experts suggest that lycopene can also reduce angiogenesis, a formation of new blood cells which can eventually cause major issues with your sight.

Blue Light

With our lives seemingly being taken over by our day-to-day tech, trying to negate the harmful effects of copious amounts of blue light from phones and laptops would obviously be hugely beneficial. Applying screen filters to your laptop or computer would work well, as would reducing the amount of time spent on phone, iPads and watching the TV.

Green Tea

Cups of tea can prove useful for keeping your eyes healthy thanks to it containing a compound called EGCG (epigallocatechin gallate). Various studies have looked at EGCG effects with regards to high levels of antioxidants being present in the eye tissue, leading scientists to believe that green tea could provide protective properties against common eye degeneration and diseases.

Research also suggests that green tea / EGCG can inhibit angiogenesis, similar to that of lycopene. Other nutrients and compounds that help inhibit angiogenesis are red grapes, mulberries and peanuts thanks to them having an abundance of resveratrol the natural polyphenol.

# Cataracts Risk



Cataracts Risk  
**NORMAL RISK**

## Results

Studies indicate that you share no genetic link for developing cataracts.

## Genes of Interest

EPHA2

## Recommendations

You share no genetic variants in this analysis when it comes to developing cataracts. However, certain lifestyle and environmental factors can also contribute towards the development of cataracts.

## Cataracts Risk

Cataracts are synonymous for being an age-related health issue. It occurs when the lens within the eye develops cloudy patches, which over time can increase in size and eventually lead to complete blindness.

Most people are unaware but there are 3 types of cataracts:

Cortical cataracts develops in the inner portion of the lens between the nucleus and the capsule called the Cortex and can often be an issue with glare.

Nuclear cataracts - develops in the nucleus, which is the central portion of the lens.

Subcapsular cataracts - develops at the back surface of the lens, which will usually affect your reading and ability to see at night.

There have been various foods / nutrients which have been shown to have protective qualities against cataracts.

# Open-Angle Glaucoma



Open-Angle Glaucoma  
**INCREASED RISK**

## Results

Studies indicate that you show a genetic link of Open - Angle Glaucoma.

## Genes of Interest

MYOC, LOXL1

## Recommendations

You share a genetic risk when it comes to developing open angle glaucoma so please read through the recommendation below. They will provide some useful insight to reduce your risk of developing glaucoma.

Blood pressure - has been looked at in relation to how it may affect glaucoma. One area, named "Ocular Perfusion", refers to oxygen and micronutrient flow to within the eye and how this is affected through blood pressure. It is believed that, when high blood pressure is not stable and controlled, it will dramatically reduce the eye's ability to remove waste build up.

So, how can you keep your blood pressure and circulation healthy to improve blood, oxygen and nutrient uptake within the eyes?

Hydration - Most people are chronically dehydrated. Try drinking 500ml of water as soon as you wake up and aim for between 2 - 3 litres throughout the day.

Nitrate rich foods - Studies indicate the correlation between certain vegetables and the increase of a substance called Nitric Oxide; a vasodilator that helps to expand the blood vessels and reduce blood pressure. Such vegetables include beet root, leafy greens and garlic as well as dark chocolate.

Exercise - Aerobic exercise has various benefits when it comes to reducing high blood pressure, one of these is because it helps to reduce a peptide hormone called angiotensinogen II, which causes vasoconstriction and will increase blood pressure. It also improves endothelial function, which helps to regulate your inflammatory response and blood flow.

Green tea - Cups of green tea could prove useful for keeping your eyes healthy thanks to a compound it contains called EGCG. Various studies have looked at EGCG effects with regards to high levels of antioxidants being present in the eye tissue, leading scientists to believe that green tea could provide protective properties against common eye

## Open-Angle Glaucoma

There are two types of eye conditions that can damage the optic nerve: open angle and angle closure glaucoma. In this section we will be looking at your genetic predisposition for developing by far the most common: open angle glaucoma (OAG) - or the "Silent thief of sight" as it is often called. Most people with OAG usually feel healthy and have little to no changes to their vision as their symptoms usually develop slowly over time. Unfortunately, the damage being permanent. OAG usually manifests and starts reducing your peripheral or side vision, and develops into tunnel vision over time, which will also increase intraocular pressure (IOP) - the fluid pressure within the eye.

There will be various reasons for developing OAG, from genetics, age, lifestyle (stress and sleep) to even environmental factors such as pollution and ultraviolet build-up. Left untreated, it can eventually lead to blindness.

Glaucoma has a genetic association and tends to run in families. Various studies have now identified the specific genes associated with glaucoma, and this allows us to provide you with some unique insights and recommendations to hopefully mitigate its effect.

degeneration and diseases. Research also suggests that green tea / EGCG can inhibit angiogenesis (the formation of new blood cells which can eventually cause major issues with your sight).

Caffeine - As much as caffeine can give you a much-needed boost throughout the day, it also increases your adrenaline and blood pressure. This effect can be extremely detrimental for glaucoma patients and or people that have a risk of glaucoma. And, as you have a risk of developing glaucoma, you may want to reduce your caffeine intake each day. The effect will also be magnified if you are drinking insufficient amounts of water each day, which also increases blood pressure.

# Eye Health and B Vitamin Deficiency



## Results

Studies indicate that you have a normal risk of B vitamin deficiency.

## Genes of Interest

NBPF3, MTHFR, SLC19A1

## Recommendations

Your genetic variants indicate a normal risk of B vitamin deficiency, meaning that you should be able to achieve healthy levels from a balanced diet. Please note that if you are following a vegetarian, or - more specifically - a vegan diet then you should look to incorporate more vitamin B-rich food such as soybeans and spinach.

## Eye Health and B Vitamin Deficiency

B vitamins are made up of 8 key vitamins that form the B- vitamin family. They will both individually and collectively offer a whole variety of unique health properties that can help protect your eyes. These will include reducing oxidative stress and homocysteine levels, which have both shown to cause tissue degeneration and break down. B vitamins are also fundamentally important for a process called methylation, which is a process that helps regulate your gene expression otherwise known as epigenetics.

Methylation and epigenetics are extremely important as they are the intersection between genetics, nutrition, and environment and how diet, micronutrients, exercise and sleep can all change the expression of our genes. For the most part we have two main areas that will affect our health, nature otherwise known as our genes and nurture through our lifestyle and environment, which is known as epigenetics.

So, the importance of B vitamins alongside other key nutrients such as folate and choline cannot be underestimated with regards to keeping your gene health functioning in the correct way.



# Sun Damage Risk



Sun Damage Risk  
**HIGH RISK**

## Results

Studies indicate that you share variants similar to those linked to being highly sun sensitive.

## Genes of Interest

TYR, SLC45A2, SLC24A5, KITLG.

## Recommendations

This would be considered an uncommon outcome and is linked to an increased skin sensitivity; therefore, it is wise to follow some of the ensuing guidance.

### Hypoallergenic products

Hypoallergenic products for your clothes and bedding as well as cosmetics could prove helpful depending on the type of skin sensitivity that you have.

### Allergies

Allergies, both externally (such as from your environment including dust, pollen and chemicals, etc) and internally (such as certain food groups like nuts, dairy, soy, caffeine, alcohol and sugar) will all act as possible triggers.

### Antioxidants

Every minute of every day your body is either under attack from bacteria and viruses or producing reactive oxygen species (ROS), also referred to as free radicals. Research clearly demonstrates that free radicals cause oxidative stress, which will affect your collagen production and skin health.

One way to counteract free radical build up is to incorporate foods high in antioxidants. A food's antioxidant level is derived by its ORAC score, which stands for Oxygen Radical Absorbance Capacity, and is the method used for measuring antioxidant capacities in nutrients.

Incorporating foods higher on the ORAC scale would be the route to follow to reduce skin sensitivity and improve your skin health.

### Top 5 ORAC foods

Cloves, Cinnamon, Oregano, Turmeric, Cocoa

## Sun Damage Risk

Skin damage caused from the sun is on the rise and - despite the vast majority of us fully understanding how dangerous too much sunlight can be - it's happening at an alarming rate. As much as the sun is vital for life, getting too much or too little can dramatically affect our health. The safest and most effective way to avoid skin damage from the sun is, obviously, to stay indoors, or to avoid the hottest parts of the day completely. However, getting sunlight is essential for vitamin D creation so complete avoidance is not ideal (or realistic) for a balanced lifestyle.



Incorporating more colourful fruits and vegetables, which will contain a variety of vitamins, such as A, C and E will also be beneficial. All of these vitamins have been shown to either help protect or repair the skin.

## Lycopene

Lycopene is a carotenoid (Vitamin A) found in tomatoes and other red/orange fruits and vegetables. It's a fantastic antioxidant that has been shown to absorb UVB and UVA rays and can offer some sun protection qualities.

## Selenium

Primary antioxidant gene GPX1 incorporates the mineral selenium and is dependent on there being sufficient levels to work effectively. Selenium is an extremely important antioxidant which prevents cellular and subcellular lipids and fats from being peroxidised, meaning it prevents body fats from going rancid. These are seen externally as "Age and Liver spots".

The antioxidant protection qualities of selenium have been well publicised and is increasingly recognised as a versatile anti-carcinogen. Selenium is also required for the activity of a group of enzymes called glutathione peroxidases, which play a critical role in the body's detoxification pathways. It's also involved in recycling of vitamin C from its used form back to active.

Selenium deficiency has a few symptoms to look out for, such as: muscle tenderness and weakness, chronic fatigue, and as previously mentioned "Age Spots". It is also extremely important in supporting healthy thyroid function, as the selenium-containing enzyme is responsible for transporting the less active thyroid hormone T4 into the more active T3.

Brazil Nuts are a great source of selenium, however, it does depend on where they are grown. One ounce of Brazil nuts can contain as much as 10 times the dietary requirements. This statement is obviously true of every vegetable or fruit, as the mineral content of any plant is governed by the quality of the soil that they are grown in. Vitamins, on the other hand, are easily made by plants via photosynthesis.

## Health Top Tips:

- Try and obtain your selenium from a varied source of food groups
- Avoid all cooking oils, opt instead for butter and warm on a low heat
- Cut fluoride, which means NO tap water; opt for filtered water and natural fluoride free toothpaste. Fluoride will deplete the thyroid of iodine, so combined with a selenium deficiency may affect your health

## Top 5 Selenium Foods (Animal)

Tuna, Shrimp, Sardines, Salmon, Cod

## Top 5 Selenium Foods (Plants)

Tofu, Brown Rice, Sunflower seeds, Shiitake Mushroom, Asparagus

## Coenzyme Q10 (CoQ10)

Coenzyme Q10 comes in two forms – ubiquinone and ubiquinol. It's a compound that's naturally produced in the mitochondria within the cells and helps to keep them energised. Simplistically, our skin is made up from two protein building blocks: elastin, which gives our skin its supple and elastic nature - and collagen, which provides its strength.

As previously mentioned, CoQ10 is found and produced naturally within our cell mitochondria and is fundamentally

important to your skin health as it protects both elastin as well as collagen from free radical build up and damage.

## Vitamin B5

Vitamin B5 can help keep the skin hydrated thanks to panthenol, a compound which is known to keep the skin smooth and soft. It's also known to strengthen the skin barrier. Vitamin B5 is also a precursor for CoQ10, which has been shown to reduce oxidative damage and free radical build up caused by UV.

## Top 5 Foods Rich in vitamin B5

Shiitake mushrooms, Salmon, Chicken, Avocado, Sweet Potato

# Rate of Skin Ageing



Rate of Skin Ageing  
**NORMAL AGEING**

## Rate of Skin Ageing

As we age our skin loses hydration and wrinkles begin to occur. Skin ageing is also affected dramatically by “weathering”, this is the affect the environment is having upon our skin, whether that’s exposure to sunlight, winds, rain and cold. Other aspects like acne, pox, trauma may cause scars over time, which again can be added to the idea of aged skin. This aspect looks at the genetic variants that may affect your skins resilience and how it may age over time.

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal outcome for skin ageing

## Genes of Interest

TYR, SLC45A2

## Recommendations

There are a variety of areas that we will need to address in relation to improving your skin health and thus reduce the effects of ageing, even though you do not have increased genetic risk.

Improving your body's collagen production is one such key area that will help with skin elasticity and reduce the appearance of fine lines and wrinkles. Providing the body with all the necessary nutrients and cofactors that will help improve and manufacture collagen more effectively would obviously be hugely beneficial.

Below we have provided some of the key nutrients and the food groups that you will need to incorporate more into your diet, to maximise your collagen production and minimise tissue degeneration and skin ageing.

## Vitamin C

Vitamin C is an essential vitamin for to allow for correct growth and repair of your body's tissues. This vitamin also aids in the production of collagen, and therefore helps build and maintain your skin, tendons, ligaments, blood vessels and cartilage.

## Top 5 Foods Rich in Vitamin C

Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

## Manganese

Manganese is a required cofactor for an enzyme called Prolidase, which is in turn necessary to make collagen as a structural component of skin and connective tissues and joint cartilage.

## Copper

Copper aids the formation of red blood cells, melanin and collagen in the body. It also plays a pivotal role in oxygen process and transportation, as well as copper and iron cooperate for oxygen activation and reduction. Copper is required in many physiological functions including DNA, RNA and strength of elastic fibres in blood vessels, vertebral

discs and hair and skin pigmentation.

#### Top 5 Foods Rich in Copper

Sesame Seeds, Cashews , Soybeans, Shiitake Mushroom, Beet Greens

#### Vitamin B-3

Vitamin B-3 has been found to raise the formation of collagen and decrease dark spots on the skin. They are essential to the oxidation-reduction reactions in the release of energy from carbohydrates, fats and proteins. Below is a list of niacin-rich foods.

#### Top 5 Foods Rich In B-3. \* Majority of meats are excellent sources

Tuna, Chicken, Peanuts, Brown Rice, Sweet Potato

#### Iron

Iron is an extremely important nutrient as it makes up a central part of haemoglobin, which carries oxygen in the blood. A study in the 2009 edition of the Journal of the Korean Society of Food Science and Nutrition, says iron can aid in collagen formation. Iron is a key building block and cofactor needed for the production of collagen. Therefore, consuming iron-rich foods may help boost your collagen levels.

#### Top 5 Foods Rich in Iron

Soybeans, Lentils, Spinach, Sesame Seeds, Garbanzo Beans

#### Inflammatory foods

Inflammatory foods have a detrimental effect on collagen and skin health as they deplete the body's micronutrient stores, and thus the cofactors needed for healthy production and maintenance. Pro-inflammatory foods will also lead to tissue degeneration through reduced circulation.

#### Worst 5 Inflammatory foods

- Sugar is by far the worst for inflammation and is void of any nutritional value.
- Refined/processed grains have no fibre, a high GI and are void of nutrients.
- Cooking oils are full of pro-inflammatory Omega 6.
- Additives and sweeteners, MSG, food colouring and aspartame being a few.
- Trans Fats that are found in fast foods and margarine.

#### Vitamin A

Vitamin A has effective anti-ageing properties, through reducing free radical build up and damage. It's also extremely important for maintaining healthy skin, as retinoids can significantly reduce wrinkles by producing higher levels of collagen.

#### Top 5 Vitamin A Retinoid Foods

Shrimp, Eggs, Cheese, Yogurt, Salmon

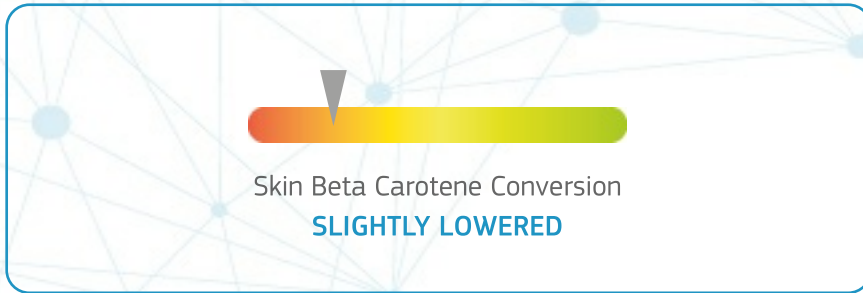
#### Top 5 Vitamin A Carotenoids Foods

Sweet Potato, Carrots, Spinach, Kale, Mustard Greens

Astaxanthin is a carotenoid found in orange and red fruits and vegetables as well as leafy greens, wild salmon and shrimp. It helps to increase the expression and activation of a longevity gene named Foxo3 by 90% in mice, so by no means conclusive evidence, but definitely a point of interest. Another area of interest is that of saunas, which have been shown to have a variety of health and longevity benefits. Various studies have looked at saunas to improve high blood pressure, cardiovascular disease, arthritis, skin health, and overall mortality levels.

If we look at skin health in more detail, the heat stress provided by a sauna will have regenerating effects, through improvements to circulation making blood vessels more flexible, which will help oxygenate the skin and cells.

# Skin Beta Carotene Conversion



## Results

Studies indicate you have a slightly hampered conversion rate of beta-carotene to retinyl esters.

## Genes of Interest

BCO1

## Recommendations

This means you probably need more carotene and vitamin A to keep your levels sufficient and avoid deficiency. When you eat peppers, carrots, etc., you do not utilise the carotene correctly and thus in some cases you will have 20-30% less conversion. This means you may need to get your vitamin A from meats or from supplementation. Low levels of vitamin A can lead to skin issues such as dryness and poor wound healing. It may also affect how well your skin deals with the sunlight and harsh weather. Vitamin A supplementation in the form of retinyl acetate or retinyl palmitate (retinol) should only be used with advice from your doctor due to its fat-soluble nature, meaning it can build up within the body.

## Skin Beta Carotene Conversion

Vitamin A is more than just a single nutrient. It's a broad group of related nutrients, each providing us with differing health benefits. Below is a brief explanation to vitamin A, and some of the health benefits that it offers.

**Retinoids** There are some specific immune, inflammatory, genetic and reproductive-related benefits of vitamin A that can only be obtained from the retinoid (animal source) forms of the vitamin.

**Carotenoids** These act much in the same way as retinoids in providing us with unique health benefits. They function as antioxidant and anti-inflammatory nutrients, with some having a special role to play in the protection of our health. The two forms are not just chemically different - they also provide us with different types of health benefits. Each offer specific immune, inflammatory and genetic benefits of vitamin A, with some that can only be obtained from the retinoid (animal source) forms of the vitamin.

**Retinoids** are especially important with respect to pregnancy and childbirth, childhood growth, night vision, red blood cell production and resistance to infectious disease. However, retinoids in high dosages can cause birth defects and, therefore, it is unwise to supplement retinoid-based supplements when pregnant unless otherwise specified by your physician. In most instances we will be required to consume both retinoids and carotenoids, with carotenoids converting to retinol in the body. However, conversion of the most important carotenoid, beta-carotene, differs

between individuals based on their genetic variances.

#### Top Five Vitamin A Retinoids Foods

Shrimp 4oz 102mcg

Eggs 1 medium 75mcg

Cheese 1oz 73mcg

Yoghurt 250g 65mcg

Salmon 4oz 56mcg

#### Top Five Vitamin A Carotenoids Foods

Sweet Potato 1 cup 3800mcg

Carrots 1 cup 2000mcg

Spinach 1 cup 1880mcg

Kale 1 cup 1760mcg

Mustard Greens 1 cup 1730mcg



# Gluten Related Skin Condition Risk



## Results

Studies indicate that you share results that are similar to those with a high genetic risk of gluten causing skin conditions.

## Genes of Interest

HLA-DQA1, CCR3, IL18RAP, MYO9B, IL2

## Recommendations

From a genetics perspective you have a high risk of gluten-causing skin conditions, so please be mindful that eating a diet high in gluten will most likely cause you to have issues with your skin and complexion. The best course of action would be to reduce or remove gluten from your diet completely, which can be difficult to do as gluten is unfortunately used in a vast majority of common foods. These include baked goods such as cakes, cookies, breads, pasta and anything containing wheat, rye and barley. Please make sure to read food labels carefully as manufactures use differing forms of wheat in seasonings, salad dressing and processed meats. It may be worthwhile and more realistic to try and reduce gluten in your diet to start with as complete elimination is often very difficult.

## Gluten Related Skin Condition Risk

Gluten is a protein contained in wheat, barley and rye and is found in a variety of everyday food items. It allows doughs to be more elastic and pliable and thus is why gluten-containing grains have been used in breads and other baked goods for many years. It can sometimes be difficult to know if you have intolerance to gluten as there may be little - or no - symptoms. Typical symptoms of intolerance include stomach pain with possible diarrhoea when gluten begins to damage the intestinal lining. The small intestines are covered with millions of little octopus-like arms called villi, which pull nutrients in from our foods and absorb them into the blood stream. Our bodies create enzymes that break gluten (a protein) down, but if it can't fully do so due to gluten intolerance, damage to the villi can occur to such an extent that they cannot function correctly. This can lead to a tremendous amount of inflammation and pain as well as eventual malnutrition, which can also cause skin issues. Those who have gluten sensitivities may also show symptoms of skin issues from skin flushing, rashes and irritation.

# Collagen Breakdown



Collagen Breakdown  
**POOR BREAKDOWN**

## Results

Studies indicate that you have a hampered collagen breakdown.

## Genes of Interest

BCMO1, TYR, MATP, SLC45A2, SLC24A5, KITLG, FOXO3

## Recommendations

This would be a semi uncommon result. It shows that you may have hampered collagen breakdown and you should do the following to help improve the functioning of the systems that affect collagen breakdown and creation.

### Top 5 Foods Rich in Vitamin C

Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries

### Manganese

Is a required co-factor for an enzyme called Prolidase, which is necessary to make collagen as a structural component of skin and connective tissues and joint cartilage. In addition to its collagen production role, manganese also functions with glucose metabolism, energy production, and creation of one of the body's strongest internal antioxidant enzymes superoxide dismutase.

Deficiency in manganese can be seen with asthma, reduced ability to metabolise carbohydrates and fats as well as joint problems such as tendon and ligament degeneration, repetitive motion syndrome and carpal tunnel syndrome. Top 5 Foods Rich in Manganese

Mussels, Sweet Potato, Oats, Brown Rice, Pineapple

### Copper

Copper aids the formation of red blood cells, melanin and collagen in the body. It also plays a pivotal role in the transportation of oxygen as copper and iron cooperate for oxygen activation and reduction.

Copper is required in many physiological functions including DNA, RNA and the strength of elastic fibers in blood

## Collagen Breakdown

Collagen is the most common and abundant form of protein in the body, helping to build and maintain the skin, tendons, ligaments, blood vessels and cartilage.

Unfortunately, collagen production and health can be affected by a variety of areas, such as ageing, diet and lifestyle as well as strong genetic factors. Collagen is an important protein playing an important role in skin health. It both protects and supports the healing of skin, thereby increasing skin firmness and integrity, helping to smooth out fine lines and wrinkles. Fibroblasts create collagen and elastic fibers while fibroclasts are skin cells that break down these fibers.

### Cells That Produce Collagen

Osteoblasts

Chondroblasts

Fibroblasts

### Cells That Destroy Collagen

Osteoclasts

Chondroclasts

Fibroclasts

Each of these cell pairs work together in the constant process of collagen breakdown and creation. However, collagen production slows as we age, and destruction will speed up.

vessels. It also helps with the strength of vertebral discs and hair.

#### Top 5 Foods Rich in Copper

Sesame Seeds, Cashews, Soybeans, Shiitake Mushroom, Beet Greens

#### Vitamin B-3 (niacin)

Vitamin B-3 has been found to raise the formation of collagen and decrease dark spots on the skin. B-3 is essential to the oxidation-reduction reactions in the release of energy from carbohydrates, fats and proteins. Below is a list of niacin-rich foods.

#### Top 5 Foods Rich in B-3. \* Majority of meats are excellent sources

Tuna, Chicken, Peanuts, Brown Rice, Sweet Potato

#### Iron

A study in the 2009 edition of the Journal of the Korean Society of Food Science and Nutrition, says iron can aid in collagen formation. Iron is a key building block and co-factor needed for the production of collagen. Therefore, consuming iron-rich foods may help boost your collagen levels.

#### Top 5 Foods Rich in Iron

Soybeans, Lentils, Spinach, Sesame Seeds, Garbanzo Beans

#### Hyaluronic acid

Hyaluronic acid (hyaluronan) is a substance that is naturally produced within most of the cells in the body, and is the key molecule involved in skin moisture because it has a unique capacity for retaining water.

In the skin, hyaluronan may help to retain water in the dermis of the skin. Unfortunately, as we age, the levels of hyaluronic acid decrease meaning it could be a one of the contributing factors to wrinkles and fine lines.

#### Foods rich in Hyaluronic acid

• Root Vegetables • Bone broth • Organ meats • Soy products • Citrus fruits • Or supplemented

#### Antioxidants

Every minute of every day your body is either under attack from bacteria, viruses or producing reactive oxygen species (ROS), also referred to as free radicals.

Research is clearly demonstrating that free radicals cause oxidative stress, which will affect your collagen production and skin health. They will also lead to ageing as your DNA becomes damaged, triggering all disease processes.

One way to counteract free radical build up is to incorporate foods high in antioxidants. A food's antioxidant level is derived by its ORAC score, which stands for Oxygen Radical Absorbance Capacity, and is the method used for measuring antioxidant capacities in nutrients.

So, incorporating foods higher on the ORAC scale would obviously be the route to follow to reduce collagen breakdown and improve your skin health.

## Top 5 ORAC foods

Cloves, Cinnamon, Oregano, Turmeric, Cocoa

We should also incorporate more colourful fruits and vegetables, which contain a variety of vitamins, such as A, C and E. All of which have been shown to either help protect or repair the skin.

## Lycopene

Lycopene is a carotenoid (Vitamin A) found in tomatoes and other red/orange fruits and vegetables. It is a fantastic antioxidant that has been shown to absorb UVB and UVA rays while offering some sun protection qualities.

## Coenzyme Q10 (CoQ10)

Coenzyme Q10 comes in two forms – ubiquinone and ubiquinol. It's a compound naturally produced in the mitochondria within the cells and helps to keep them energised. Simplistically, our skin is made up from two protein building blocks: elastin, which gives our skin its supple and elastic nature - and collagen, which provides its strength.

CoQ10 as previously mentioned is found and produced naturally within our cell mitochondria and is fundamentally important to your skin health as it protects both elastin as well as collagen from free radical build up and damage.

## Aloe vera

Aloe vera has gained notoriety for its numerous health benefits, particularly burns including sunburn. But recent studies have also indicated its effectiveness at reducing wrinkles when taken as a food supplement through increasing the production of collagen and hyaluronic acid.

## Inflammatory foods

Inflammatory foods will have a detrimental effect on collagen health and production. Most pro-inflammatory foods deplete the body's micronutrient stores and thus the co-factors needed for healthy collagen production and skin health. Pro-inflammatory foods can also lead to tissue degeneration through reduced circulation.

## Top 5 Inflammatory foods.

- Sugar is by far the worst for inflammation and is void of any nutritional value.
- Refined/processed grains have no fibre, a high GI and are void of nutrients.
- Cooking oils are high in pro-inflammatory Omega 6.
- Additives and sweeteners
- Trans fats that are found in fast foods and margarine.

## Exfoliate your skin

Washing your face or having shower before you go to bed will help remove dirt and unclog your pores stopping any build-up of irritants. Exfoliating once or twice per week will also help to remove dead skin cells and help to stimulate collagen production.

# Skin Glycation With Age



Skin Glycation With Age  
**NORMAL GLYCATION**

## Results

Studies indicate that you share results that are similar to those with normal skin glycation.

## Genes of Interest

APOE, ADRB2, PLIN, IL-6

## Recommendations

This is the most common outcome. It indicates your assimilation of sugary and processed foods is most likely average in relation to glycation. Nevertheless, there are a whole variety of dietary changes that you can make to help to reduce your AGEs consumption and build up.

- Avoid simple sugars such as white sugar, breads, rice and pasta
- Remove foods highest in AGEs such as processed and junk foods, red meat, fried eggs, butter, full fat dairy, and margarine
- Super heating your food such as frying, grilling and barbecuing will increase AGEs.
- Incorporate more fresh fruit and vegetables each day
- Hydration is also key, so we would recommend 2-3 litres per day depending your exertion rate from work and exercise, etc

## Skin Glycation With Age

Glycation is a process where insulin doesn't metabolise sugars correctly, allowing the sugar molecules to bind to fat and protein cells such as collagen and elastin. This results in the production of new harmful molecules glycotoxins called Advanced Glycation End Products (AGEs), which cause oxidative stress and chronic inflammation.

If the body produces high levels or too much glycation then this will have a detrimental effect with regards to collagen and elastin production, thus negatively impacting your skin health. This process occurs mainly due to the foods we eat and the temperature we cook them at.

Those individuals with higher blood sugar levels, such as diabetics and people that eat a lot of processed foods will be more prone to glycation producing high levels of AGEs.

There is no way to completely stop glycation or remove AGEs from your diet, however, there are things you can do to reduce the amount of AGEs that you consume each day.

# Skin Ancestry



Skin Ancestry  
**LIGHTER SKIN ANCESTRY**

## Skin Ancestry

This is an aspect for interest purposes only and holds no bearing on lifestyle alteration.

### Results

Studies indicate that you share results that are similar to those with European or light skin.

### Genes of Interest

SLC45A2, SLC24A5, KITLG

### Recommendations

This is an aspect for interest purposes only and holds no bearing on lifestyle alteration.



# Risk of Wrinkles with Age



Risk of Wrinkles with Age  
**INCREASED RISK**

## Results

Studies indicate that you have an increased risk of wrinkles.

## Genes of Interest

BCMO1, TYR, MATP, SLC45A2, SLC24A5, KITLG, FOXO3A, MTHFR, ARL15, ATP2B1

## Recommendations

This outcome would be considered uncommon and would be linked to an increased risk of wrinkles forming. There are a whole variety of lifestyle changes that you can make to either help slow the chances of developing wrinkles or minimise the lines that you currently have.

### Top lifestyle changes

- Hydration – drink at least 2 litres of water per day
- Sleep – check the sleep mode to see how much sleep you need
- Reduce stress – meditation, reading and exercise can all reduce your stress levels
- Quit smoking
- Reduce over exposure to the sun – overexposure will damage the skin and can lead to further - and perhaps more serious - health conditions
- Dietary changes – maintaining a balanced diet with healthy levels of proteins, fats, fibre and complex carbs and lower sugars will be beneficial.

### Hydration

Staying hydrated obviously goes without saying really, as the body consists of around 60% water and it plays an integral role in both reducing fine lines by keeping the skin plum and full, maintaining elasticity, as well as helping to transport all the crucial nutrients your skin and body needs via the blood.

### Sleep

Sleep can be a bit of a double-edge sword, as sleeping in some instances can cause wrinkles by the repeated pressure placed on the side of the face. But sleep is also required for our bodies to repair the damage that occurs throughout the day. Reducing friction and pressure on the face with a silk pillowcase is one way to help prevent “sleep lines” or wrinkles. (please check your Sleep results, within health insights)

### Reduce stress

Stress can manifest itself in a manner of ways, all of which can be extremely detrimental to your health and skin. We have three main types of stress (physical, emotional and chemical) which can cause high levels of stress hormones

## Risk of Wrinkles with Age

Wrinkles, or “rhytids” to give them their medical name are creases in the skin, which usually appear or become more pronounced as we age. The reason for this is that the skin cells divide more slowly, with the dermis (the middle layer of the skin) beginning to thin. The dermis is composed of proteins such as elastin and collagen fibres, which provide support and elasticity to the skin.

Various factors contribute towards wrinkles, from genetic, sun and smoke exposure, diet, pollution as well as our sleep patterns.



such as cortisol.

Stress hormones can negatively affect your skin by increasing chronic inflammation, leading to a breaking down of collagen and elastin within your skin, thus increasing your chances of developing wrinkles.

Cortisol (a stress hormone) is our friend for most of the time and only becomes an issue if it's produced at the wrong time and in the wrong amount. Sleep deprivation has an immediate effect with an increase in cortisol levels and a decrease in growth hormone production. Therefore, if you're staying up late and burning the midnight oil checking your emails, then your cortisol levels will be elevated, and you will literally be breaking down your muscle tissue for energy at an increased rate. This process is called gluconeogenesis and basically refers to when we break down valuable muscle tissue into sugar (glucose). (please check your Stress results, within health insights)

#### Quit smoking

Smoking is one of the main causes of wrinkles, which can usually be seen by wrinkles around the mouth. Cigarettes contain thousands of harmful chemicals, which will negatively affect your skin with the development of wrinkles. One of these chemicals is nicotine. It damages the collagen and elastin in the skin as well as shrinks the size of the blood vessels, which will reduce the circulation and blood flow starving the skin of oxygen and vital nutrients.

#### Reduce over exposure to the sun

Over exposure to the sun and ultraviolet rays (UV) is the most common cause of skin damage and wrinkles. Reducing over exposure to the sun's UV rays will help to reduce collagen and elastin breakdown as well as the build-up reactive oxygen species (ROS), otherwise known as free radicals.

#### Histidine

Histidine is an essential amino acid (essential meaning it cannot be made by the human body), which has lots of important roles such as helping with the repair of skin and other tissues, blood cell production and protecting sensitive skin from sun damage and radiation.

One study found that histidine increases the production of skin urocanic acid (UCA), which helps reduce UVB absorption. So, again, it might prove useful to increase foods which are high in histidine to offer some possible skin and wrinkle protection during the summer.

#### Top 5 Foods Rich in Histidine

Meat / Fish, Dairy, Eggs, Cauliflower, Mushrooms

#### Lycopene

Lycopene is a carotenoid (Vitamin A) found in tomatoes and other red/orange fruits and vegetables. It's a fantastic antioxidant that has been shown to absorb UVB and UVA rays while offering some sun protection qualities.

#### Dietary changes

Your day to day diet will have huge connotations on your skin health and development of wrinkles. Remember glycation, a process where sugars don't metabolise correctly results in the production of new harmful molecules glycotoxins called Advanced Glycation End Products (AGEs), which damage the collagen and elastin.

There a whole variety of dietary changes that you can make to help you reduce your AGEs consumption and build up. These are:

- Avoid simple sugars such as white sugar, breads, rice and pasta
- Remove foods highest in AGEs, such as processed and junk foods, red meat, fried eggs, butter, full fat dairy and margarine
- Super-heating your food, such as frying, grilling and barbecuing will increase AGEs
- Incorporate more fresh fruit and vegetables each day
- Alcohol is largely full of toxins and will also dehydrate you
- Hydration is also key, so we recommend 2-3 litres per day depending your exertion rate from work and exercise, etc

We can also look to include a few key supplements, which when incorporated into a “Low AGEs” diet can also prove to be extremely useful:

- Curcumin has been shown in studies to inhibit the effects of AGEs
- Resveratrol, which is the polyphenol found in red grapes and berries suppresses oxidative stress and has antiglycation properties
- Green tea extract has also been shown to significantly inhibit the glycation process

#### Coenzyme Q10 (CoQ10)

Coenzyme Q10 comes in two forms – ubiquinone and ubiquinol. It’s a compound that’s naturally produced in the mitochondria within the cells and helps to keep them energised. Simplistically, our skin is made up from two protein building blocks: elastin, which gives our skin its supple and elastic nature - and collagen, which provides its strength.

CoQ10 as previously mentioned is found and produced naturally within our cell mitochondria and is fundamentally important to your skin health as it protects both elastin as well as collagen from free radical build up and damage.

#### Aloe vera

Aloe vera has gained notoriety for its numerous health benefits, particularly burns including sunburn. But recent studies have also indicated its effectiveness at reducing wrinkles when taken as a food supplement through increasing the production of collagen and hyaluronic acid.

#### Exfoliate your skin

Washing your face or having shower before you go to bed will help remove any dirt and unclog your pores stopping any build-up of irritants.

Exfoliating once or twice per week will also help to remove dead skin cells from in between the lines and help to stimulate collagen production.

# Dermal Sensitivity Risk



Dermal Sensitivity Risk  
**HIGH RISK**

## Results

Studies indicate that you share variants similar to those linked to high dermal sensitivity.

## Genes of Interest

TYR, SLC45A2, SLC24A5, KITLG

## Recommendations

This would be considered an uncommon outcome and is linked to an increased skin sensitivity; therefore, it is wise to follow some of the ensuing guidance.

### Hypoallergenic products

Hypoallergenic products for your clothes and bedding as well as cosmetics could prove helpful depending on the type of skin sensitivity that you have.

### Allergies

Allergies, both externally (such as from your environment including dust, pollen and chemicals, etc) and internally (such as certain food groups like nuts, dairy, soy, caffeine, alcohol and sugar) will all act as possible triggers.

### Antioxidants

Every minute of every day your body is either under attack from bacteria and viruses or producing reactive oxygen species (ROS), also referred to as free radicals. Research clearly demonstrates that free radicals cause oxidative stress, which will affect your collagen production and skin health.

One way to counteract free radical build up is to incorporate foods high in antioxidants. A food's antioxidant level is derived by its ORAC score, which stands for Oxygen Radical Absorbance Capacity, and is the method used for measuring antioxidant capacities in nutrients.

Incorporating foods higher on the ORAC scale would be the route to follow to reduce skin sensitivity and improve your skin health.

## Dermal Sensitivity Risk

Sensitive or hyper-reactive skin can be caused for various reasons, either from skin disorders such as eczema or rosacea, which dehydrated or dry the skin, or even from using household or cosmetic products, which can irritate the skin causing inflammation.

It can also be caused by high levels of stress or from poor dietary choices, which will increase inflammation as well as the chances of that individual having a vitamin or mineral deficiency.

Factors to consider

- Alcohol, which is full of toxins and dehydrates the skin
- Poor diet, such as those high in processed and sugary foods will not contribute towards healthy skin
- Smoking has thousands of chemicals that will affect your circulation and skin health
- Environment - both hot and cold climates as well as the temperature of the water when showering or bathing may cause possible issues
- Chemicals, such as pollution, household cleaners or cosmetics products
- Hormone changes, such as during a woman's menstrual cycle or menopause

## Top 5 ORAC foods

Cloves, Cinnamon, Oregano, Turmeric, Cocoa

Incorporating more colourful fruits and vegetables, which will contain a variety of vitamins, such as A, C and E will also be beneficial. All of these vitamins have been shown to either help protect or repair the skin.

## Lycopene

Lycopene is a carotenoid (Vitamin A) found in tomatoes and other red/orange fruits and vegetables. It's a fantastic antioxidant that has been shown to absorb UVB and UVA rays and can offer some sun protection qualities.

## Selenium

Primary antioxidant gene GPX1 incorporates the mineral selenium and is dependent on there being sufficient levels to work effectively. Selenium is an extremely important antioxidant which prevents cellular and subcellular lipids and fats from being peroxidised, meaning it prevents body fats from going rancid. These are seen externally as "Age and Liver spots".

The antioxidant protection qualities of selenium have been well publicised and is increasingly recognised as a versatile anti-carcinogen. Selenium is also required for the activity of a group of enzymes called glutathione peroxidases, which play a critical role in the body's detoxification pathways. It's also involved in recycling of vitamin C from its used form back to active.

Selenium deficiency has a few symptoms to look out for, such as: muscle tenderness and weakness, chronic fatigue, and as previously mentioned "Age Spots". It is also extremely important in supporting healthy thyroid function, as the selenium-containing enzyme is responsible for transporting the less active thyroid hormone T4 into the more active T3.

Brazil Nuts are a great source of selenium, however, it does depend on where they are grown. One ounce of Brazil nuts can contain as much as 10 times the dietary requirements. This statement is obviously true of every vegetable or fruit, as the mineral content of any plant is governed by the quality of the soil that they are grown in. Vitamins, on the other hand, are easily made by plants via photosynthesis.

## Health Top Tips:

- Try and obtain your selenium from a varied source of food groups
- Avoid all cooking oils, opt instead for butter and warm on a low heat
- Cut fluoride, which means NO tap water; opt for filtered water and natural fluoride free toothpaste. Fluoride will deplete the thyroid of iodine, so combined with a selenium deficiency may affect your health

## Top 5 Selenium Foods (Animal)

Tuna, Shrimp, Sardines, Salmon, Cod

## Top 5 Selenium Foods (Plants)

Tofu, Brown Rice, Sunflower seeds, Shiitake Mushroom, Asparagus

## Coenzyme Q10 (CoQ10)

Coenzyme Q10 comes in two forms – ubiquinone and ubiquinol. It's a compound that's naturally produced in the

mitochondria within the cells and helps to keep them energised. Simplistically, our skin is made up from two protein building blocks: elastin, which gives our skin its supple and elastic nature - and collagen, which provides its strength.

As previously mentioned, CoQ10 is found and produced naturally within our cell mitochondria and is fundamentally important to your skin health as it protects both elastin as well as collagen from free radical build up and damage.

## Vitamin B5

Vitamin B5 can help keep the skin hydrated thanks to panthenol, a compound which is known to keep the skin smooth and soft. It's also known to strengthen the skin barrier. Vitamin B5 is also a precursor for CoQ10, which has been shown to reduce oxidative damage and free radical build up caused by UV.

## Top 5 Foods Rich in vitamin B5

Shiitake mushrooms, Salmon, Chicken, Avocado, Sweet Potato

# Natural Testosterone Level



Natural Testosterone Level  
**NORMAL LEVELS**

## Results

Studies indicate that you share similar genetic variants with users that have shown a normal outcome for testosterone levels.

## Genes of Interest

FAM9B, PDE7B, SHBG, HSD17B3

## Recommendations

This is a common outcome and is linked to a normal testosterone level from a genetic perspective. However, remember that multiple aspects affect hormone levels such as stress, lack of sleep, poor nutrition, ageing and poor nutrition. The following tips may help keep your levels stable:

### Sleep

Reduced and poor-quality sleep have been shown to play a major role in testosterone production. One study indicated that daytime testosterone levels decreased by 10 to 15 % in men who reduced their sleep to just five hours per night for one week.

It's a condition that will be experienced by at least 15% of the working population. The quality of sleep you get is obviously vital for healthy testosterone levels and therefore unwinding at the end of the day and incorporating some of the following would be beneficial:

### Melatonin

Foods rich in melatonin with your evening meal, such as: tomatoes, asparagus, broccoli, olives, barley, rice, walnuts or milk in combination with foods high in tryptophan.

### Tryptophan

Is an essential amino acid which is found in a variety of foods and acts as a mood regulator and increases melatonin and serotonin levels, helping you to feel more relaxed, calm and possibly sleepy.

Top 5 Tryptophan foods Pumpkin seeds, Soy Beans, Cheese, Beef, Chicken

## Natural Testosterone Level

Testosterone is most commonly known as the male sex hormone. It is produced primarily in the testicles in men as well as in smaller amounts in the ovaries in women, and is mostly associated with sex drive, strength and male characteristics such as facial hair, deepening of voice and lean muscle.

Testosterone slowly builds throughout puberty and tapers off as we age. This can affect a whole variety of physiological as well as psychological factors, with low testosterone causing various health issues, such as:

- Reduced bone strength
- Decrease muscle tone and size
- Energy levels / fatigue
- Depression
- Decreased mood / sense of wellbeing
- Weight gain
- Decreased sex drive / libido

As you can see from the list above, testosterone is extremely important for overall health and wellbeing and can improve our quality of life significantly. There are a few contributing factors causing fluctuating testosterone levels. These can be range from age, weight, diet, time of day as well as a strong genetic component. Fortunately, there are various areas studied, - both nutritional and lifestyle-related - which have been shown to increase testosterone levels.



If you would like to understand your genetic sleep predispositions then please take the time to read through the "Sleep" section of your DNA profile, which will provide you with more hints, tips and recommendations to improve your sleep patterns.

## Stress

While short term stress has been shown to increase testosterone levels, chronic and prolonged stress can affect multiple health areas with testosterone being reduced if you are constantly in that "Fight or Flight" mode. For example, leading a hectic lifestyle and burning the candles at both ends will be extremely detrimental to healthy testosterone levels.

For more insights into how you can better deal and mitigate the effects of stress please look through the "Stress" section to understand your genetic predisposition's in greater detail.

## Vitamin D

Research is clearly demonstrating the importance of Vitamin D on our health; and unfortunately, vitamin D deficiency affects almost 50% of the world's population.

Some of the elements contributing towards this include lifestyle factors, such as reduced outdoor activities, obesity, environmental factors, such as living in northern hemisphere, air pollution, poor dietary choices and certain genetic factors.

Studies show that almost 1/24th of the human genome - or around 900 genes - may be regulated by Vitamin D, so obtaining sufficient levels is crucial to your health, fitness and longevity. But the sunshine vitamin has also been shown in various studies to increase and regulate testosterone levels, so maintaining healthy levels throughout the year with particular attention being paid during the autumn and winter months would be of the utmost importance.

Especially those with a genetic predisposition for lower testosterone levels. Vitamin D can be obtained from a variety of foods such as eggs, fish, dairy and mushrooms but it might be difficult to achieve healthy and consistent levels through food alone, so it would be extremely diligent to take a good quality vitamin D3 supplement.

## Fenugreek

Fenugreek is a legume which has been used for thousands of years to treat a whole host of ailments, from wound-healing to digestive issues and heart burn. Its health properties may come from the fact that it is a good source of healthy polyunsaturated fats, antioxidants as well as containing saponins, which are phytochemicals found in plants that affect the immune system. But they have also been shown to increase free testosterone levels quite dramatically. One 12-week study showed that a daily dose of 500 mg of fenugreek increased testosterone by 46% in 90% of the participants.

## Ginger

Ginger has a whole host of wonderful health properties, from improving digestion to helping alleviate nausea. There have been numerous animal studies conducted to see as to whether ginger had a direct effect on testosterone levels. These have shown some positive outcomes with ginger increasing testosterone by enhancing various pathways, including increasing blood flow and cholesterol to the testes and enhancing the luteinizing hormone, which regulates the reproductive system.

## Zinc

Zinc may be a less familiar mineral than iron, calcium or magnesium, but it's still extremely important to consume in



small amounts every day to support metabolism and maintain your health. Zinc has a variety of important functions such as improved immune, hormone and regeneration capabilities. Deficiency can cause an array of symptoms such as a loss of taste or appetite, impaired vision, lack of energy and an inability for wounds to heal.

It is easily sourced in a variety of foods and supplements, such as gels or lozenges, with highest concentrations in animal proteins such as meat and dairy. One study highlighted the fact that restricting zinc from the diet of healthy young men had a direct correlation with low serum testosterone levels.

So, incorporating foods which have healthy levels of zinc would obviously be beneficial such as the foods listed below:

Top 5 Zinc Foods Beef, Lamb, Sesame Seeds, Pumpkin Seeds, Lentils

Ashwagandha

Is a traditional Indian herb which has many potent health properties such as reducing anxiety, stress and cortisol. This is largely achieved from being an “adaptogen herb”, meaning it helps your body to adapt and cope to a variety of physiological stressors. It has been shown to regenerate nerve cells and promote dendrite (from the Greek word meaning tree and which is a branched projection of a nerve cell that conducts electrical stimulation to the cell body) growth throughout the brain.

# Exercise Induced Muscle Pain



Exercise Induced Muscle Pain  
**INCREASED**

## Results

Studies indicate that you share similar genetic variants with users that have shown more exercise induced muscle pain.

## Genes of Interest

ADRA1A, COMT, AMPD1, ACTN3

## Recommendations

This result means that you may suffer with worse DOMS than normal and during exercise you may get more pain than others. Fortunately, there are many things you can do to help alleviate this:

### Tart cherry

Tart cherry is gaining notoriety for its ability to reduce pain and inflammation, as well as improving recovery rates after exercise. It acts along similar pathways to that of NSAID (Non-steroidal anti-inflammatory drugs) such as ibuprofen but is much safer with respect to stomach ulcers and bleeding. The anti-inflammatory effects of cherries are due to anthocyanin phytonutrients, which are produced by plants to stay healthy. They are classified as non-essential nutrients unlike protein, carbohydrates, fats as well vitamins and minerals but offer a whole host of benefits in the form of antioxidants as well as their anti-inflammatory properties. Please be mindful when taking tart cherries at the same time as any other anti-inflammatory medications, as the combination could be extremely harmful to your stomach.

### Turmeric

Turmeric is a world-famous spice which has been used for thousands of years in Chinese and Indian medicine and has a multitude of health benefits associated with it. Turmeric acts along the same pathways as tart cherries in relation to pain and inflammation, with both targeting a family of genes named cyclooxygenase or COX to give them their genetic abbreviation. This group of genes have a variety of functions. COX-1, for example, is a protective enzyme that covers our stomach lining and stops us from digesting ourselves, so is fairly useful.

COX-2 controls our pain and inflammatory response, infections, injuries, burns, trauma and fever. The trouble is anti-inflammatory drugs such as ibuprofen, which are also known as non-selective, not only reduce the enzyme associated with pain and inflammation, but they also affect the enzyme that protects and coats the lining of our stomach, which is not something we want to happen. Please be mindful of taking turmeric at the same time as any other anti-inflammatory medications, as the combination could be extremely harmful to your stomach.

### Stretching

Cool-down stretching may be beneficial post-exercise and should not be dynamic or have any high intensity. Stretching allows the muscles move without the restraints of resistance or force as well as ensures muscles gain

## Exercise Induced Muscle Pain

There are four types of pain related to exercise, this being pain experienced during exercise or immediately after, delayed onset of muscle soreness (DOMS), cramps and injury. This aspect looks at the genes associated with pain whilst exercising and DOMS, understanding these genes can help with altering recovery periods and may explain increased pain after exercise as well as how to deal with it.

Pain perceived during exercise is considered to result from a mixture of aspects which include lactic acid, hormones, inflammation and muscle damage. DOMS often occurs 24-48 hours post-exercise and is believed to be caused by eccentric (muscle lengthening) muscle actions in resistance work or strenuous endurance events like a marathon. DOMS is often accompanied with general muscle weakness and fatigue and those suffering from it have shown blood markers that are associated with muscle damage. DOMS is believed to be a mainly inflammatory state post-exercise.

flexibility while they are still warm, which can help prevent injuries. A good cool-down stretch will help alleviate lactic acid in the muscles and allow the heart rate to come down naturally. Why not check out our warm-up/cool-down section in the workout plan aspect of the app.

#### Cinnamon

This potent and tasty spice might be just the thing you are looking for to help alleviate muscle and joint pain, as cinnamon is full of extremely useful antioxidants such as cinnamaldehyde, which actually gives cinnamon its flavour and odour. Cinnamon has been shown in animal studies to increase liver and cardiac antioxidant enzymes as well as increasing the body's strongest antioxidant glutathione. In a study published in the Journal of the American College of Nutrition, which looked at women with rheumatoid arthritis being supplemented 500 mg of cinnamon per day over eight weeks, it has also been shown to reduce inflammation.

#### Ginger

Ginger has a whole host of wonderful health properties from improving digestion to helping alleviate nausea. It has also been shown to reduce muscle pain in various studies and would be a wise choice to incorporate into your daily diet. Ginger and turmeric are both from the Zingiberaceae family and are probably two of the most-researched natural remedies. So, if you have a few aches and pains then starting the day with some hot water with ginger and lemon might be well worth doing.

#### Protein

Protein would be one of the main areas to focus on with regards to helping to reduce muscle pain and damage. Without sufficient protein in your diet each day, your body's ability to repair your muscles as well as other tissues will be affected.

Protein is derived from the Greek of first importance, meaning it is the first macronutrient you should consume. Proteins are the most abundant and key organic compounds of all living tissue and organisms and the majority are located in skeletal muscle with the remainder in the organs, teeth, blood and other body fluids.

The basic structural unit of protein are amino acids, with digestion of protein resulting in its breakdown and release of individual amino acids. Classically, there are nine essential amino acids that are required in the daily diet as they cannot be made by the body. Amino acids are required for the synthesis of tissue protein and other metabolic functions:

#### Proteins Function

Proteins are used to repair worn out tissue.

Proteins are used to build new tissue.

Protein can be used as an energy source.

Proteins make up a large percentage of essential body fluids.

Proteins aid in the blood transport of key nutrients such as vitamins, minerals and fats etc.

Increasing protein intake if you feel recovery is taking too long may be just the thing to improve your body's repair time and allow for more sessions or/and increased intensity sessions.

#### Omega 3s

Omega 3s are probably one of the most well-known fats out there. There are a variety of different Omega 3s, found in chia seeds, flaxseeds, walnuts, fish and meats. Studies have indicated that a diet rich in essential fatty acids, and higher Omega 3 fatty acids (i.e. Linolenic acid [ALA], eicosapentaenoic acid [EPA], and docosahexaenoic [DHA]) have been generally associated with a decrease in pain and inflammation.

One study compared the use of NSAID medications with taking higher dosages 1200-2400mg of Omega 3 from fish oils. The results were extremely interesting, concluding that Omega 3 had the equivalent effect as ibuprofen for reducing arthritic pain and were a much safer alternative.

#### Top 5 sources of Omega 3.

Flaxseeds 2TBS 3.19g

Walnuts 0.25 cup 2.72g

Sardines 3.20 oz 1.46g

Salmon 4 oz 1.32g

Tofu 4 oz 0.66g

# Stress Related Muscle Pain Risk



Stress Related Muscle Pain Risk  
**NORMAL RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown normal induced muscle pain from stress.

## Genes of Interest

ADRA1A, AMPD1, COMT, HCRT2, BDNF

## Recommendations

This is the most common outcome and will be associated with some potential muscle aches from pressure and chronic stress. Fortunately, there may be some things you can do to help prevent that from occurring:

### Exercise

The BDNF gene - Brain derived neurotrophic factor (BDNF) is a protein produced by a variety of different cells and helps regulate our central nervous system as well as increasing our sensitivity to pain. There are various studies which have shown different ways to increase BDNF levels naturally, such as exercise and exposure to blue light.

Exercising while you already have muscle pain might be difficult to do, but gently walking could be useful when attempting to increase BDNF as you'll be reducing muscle pain by improving blood flow and allowing a fresh supply of nutrients into the muscles, as well as reducing inflammation biomarkers.

### Fresh Air

Getting out in the fresh air when you are walking will also be useful to increase BDNF levels. This way, you'll also be increasing your serotonin levels - otherwise known as the happy hormone - as vitamin D is a key co-factor when turning tryptophan into serotonin.

## Stress Related Muscle Pain Risk

Stress can manifest itself in a whole host of ways and is largely caused by an individual's perception of what is occurring around them (their environment), what they perceive to be occurring from others (external pressure) and internal emotions that might be deemed stressful to them. When aspects of life appear threatening, stress can accumulate, and this is heightened if the individual does not believe they have the resources required to deal with it.

The psychological effects of stress can - in many instances - have a knock-on physical effect, such as shoulder, back and muscle pain. Addressing the cause and not the symptoms of your stress is the best course of action, but unfortunately our everyday lives get in the way sometimes.

# Coenzyme Q10 Deficiency Risk



Coenzyme Q10 Deficiency Risk  
**NO RISK**

## Results

Studies indicate that you share similar genetic variants with users that have shown no link to coQ10 deficiency.

## Genes of Interest

COQ8A, COQ6, COQ4, ADCK3, COQ9, COQ7

## Recommendations

From this analysis of the most common genes associated with CoQ10 deficiency you do not appear to share any potential links.

## Coenzyme Q10 Deficiency Risk

Coenzyme Q10 or CoQ10 - as it is referred - comes in two forms: ubiquinone and ubiquinol. It's a compound that is naturally produced in the mitochondria within the cells and helps to keep them energised. Some genetic variants are linked to lower levels of CoQ10. The severity, combination of signs and symptoms, and age of onset of primary coenzyme Q10 deficiency are different for nearly every individual, however, it can lead to muscle damage, pain and weakness.